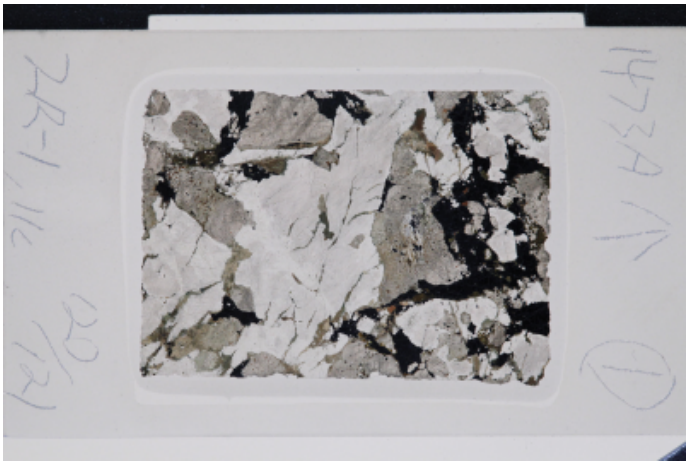
THIN SECTION LABEL ID: **360-U1473A-2R-1-W 120/121-TSB-TS_1** Piece no.: #11 TS no.: 1

Group	Summary
Igneous petrology:	A medium-grained oxide gabbro with a granular texture. Plagioclase is partly recrystallized and clinopyroxene is rimmed by amphibole (green and brown) and opaque oxides. Olivine probably existed in this sample, but has been completely altered. Opaque minerals are dominated by magnetite, with very few sulfides.
Metamorphic petrology:	Local recrystallization of plagioclase into fine grained neoblastic aggregates displaying irregular boundaries. Clinopyroxene is only locally recrystallized into nearly polygonal aggregates and is in places rimmed by nearly polygonal aggregates of brown Amp. Primary and neoblastic Pl are crosscut by micro-veins filled with brown Amp. The latter is frequently rimmed by green Amp. The background alteration is moderate.
Structure:	Isotropic magmatic texture with locally recrystallized plagioclase and clinopyroxene. Common fractures on plagioclase, locally filled with amphibole.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A medium-grained oxide gabbro with a granular texture. Plagioclase is partly recrystallized at the boundary of large grains or subgrains, which display deformation twins. Clinopyroxene is rimmed by amphibole (green and brown) and opaque oxides. It also contain abundant blebs of brown amphibole and oxides. Amphibole veins or patches can also be seen within plagioclase. Olivine probably existed in this sample, but has been completely altered. Opaque minerals are interstitial and dominated by magnetite, with very few sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	20			3	anhedral	elongate	
Plagioclase	54		10	5	subhedral	tabular	
Clinopyroxene	25		8	3	anhedral	poikilitic	
Orthopyroxene	0.2				anhedral	interstitial	rims around Ol
Amphibole	0				anhedral	interstitial	brown amphibole is also present as blebs in Cpx
Opaques	1						
Magnetite	1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): RT

Detailed description The rock shows the local recrystallization of plagioclase into fine grained neoblastic aggregates displaying irregular boundaries, associated in places with brown amphibole. Clinopyroxene is only locally recrystallized into nearly polygonal aggregates. The static background alteration is moderate. Cpx is locally rimmed by nearly polygonal aggregates of brown Amp, in turn rimmed by green Amp. Primary and neoblastic Pl are frequently crosscut by micro-veins filled with Amp. The latter has brown color and is rimmed by green Amp.

Comment type	Comment
Alteration general comments:	The static background alteration is moderate.
Mylonite comments:	Recrystallization of plagioclase into fine grained neoblastic aggregates displaying irregular boundaries, locally in association with brown amphibole. Clinopyroxene is only locally recrystallized into nearly polygonal aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		40		15
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless		10		10
Amphibole, green		30		40
Clay minerals		15		
Clinopyroxene, sec.	n/a	5	n/a	n/a
Oxide		5		n/a
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 65 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Isotropic magmatic texture with locally recrystallized plagioclase and clinopyroxene. Common fractures on plagioclase, locally filled with amphibole.

Feature type	Observation	Intensity rank
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse grain shape: subhedral to anhedral grain boundary: curved to straight (recrystallized) twinning: mechanical undulose extinction: common and irregular subgrains: not observed fractures: common texture: porphyroclastic/partially recrystallized
Clinopyroxene:	Grain size: coarse grain shape: subhedral grain boundary: straight undulose extinction: irregular fractures: common texture: porphyroclastic/partially recrystallized/altered
Oxide:	band/pond geometry: irregular, interstitial pods texture: located at grain boundaries

Interval domain no: 2 Domain rel. abundance (%): 35 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: fine to medium grain shape: subhedral to anhedral grain boundary: curved twinning: rare mechanical (medium-sized grains) undulose extinction: common fractures: rare texture: recrystallized
Clinopyroxene:	Grain size: medium to fine grain shape: anhedral grain boundary: curved to straight (recrystallized)l undulose extinction: irregular fractures: common texture: locally recrystallized
Oxide:	band/pond geometry: elongated pods texture: interstitial at recrystallized grain boundaries

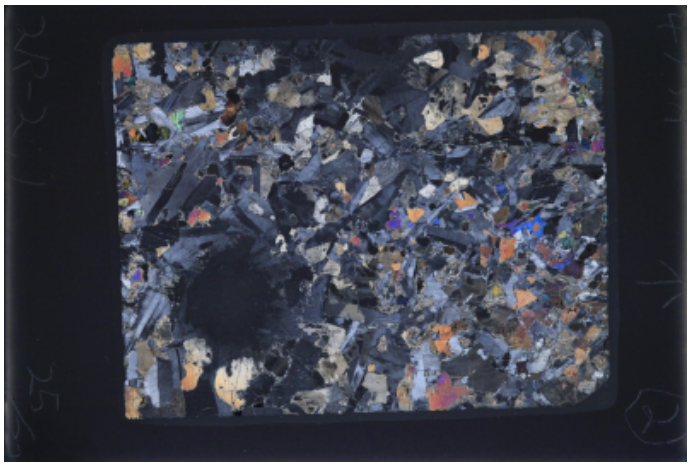
THIN SECTION LABEL ID: **360-U1473A-2R-2-W 25/30-TSB-TS_2** Piece no.: #01 TS no.: 2

Group	Summary
Igneous petrology:	An altered and undeformed coarse-grained olivine gabbro with a subophitic texture. Both olivine and clinopyroxene are moderately altered.
Metamorphic petrology:	Static alteration intensity is moderate. Green or colorless amphibole and chlorite are dominant of alteration minerals.
Structure:	Weak magmatic fabric defined by shape preferred orientation of elongated plagioclase crystals.

Plane-polarized

32905771

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: LF

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: An altered and undeformed coarse-grained olivine gabbro with a subophitic texture. Both olivine and clinopyroxene are moderately altered. Olivine displays deformation bands and occasionally occurs as inclusion within plagioclase. It is also rimmed by orthopyroxene and brown amphibole. Clinopyroxene displays a poikilitic texture and partly enclose euhedral to subhedral tabular plagioclase. Plagioclase commonly displays magmatic twins.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			8	anhedral	subequant	completely altered and original shape is not preserved
Plagioclase	55		20	6	anhedral	subequant	undulose extinction
Clinopyroxene	30		20	5	anhedral	subequant	heavily altered and replaced by amphibole
Opaques	10						
Ilmenite	9.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): TN

Detailed description Olivine is partially replaced by actinolitic amphibole and surrounded by chlorite with coronitic structure, and replaced by serpentine with mesh texture. Clinopyroxene is replaced significantly along cleavage surfaces and along microfractures by probably pale green amphibole, but the identification of this mineral is uncertain due to its very small grain size. Clinopyroxene is also replaced by patchy secondary clinopyroxene and brown amphibole. Plagioclase is relatively fresh and its microfractures filled with green amphibole and chlorite.

Comment type	Comment
Alteration general comments:	Olivine is partially replaced by actinolitic amphibole and surrounded by chlorite with coronitic structure, and replaced by serpentine with mesh texture. Clinopyroxene is replaced significantly along cleavage surfaces and along microfractures by probably pale green amphibole, but the identification of this mineral is uncertain due to its very small grain size. Clinopyroxene is also replaced by patchy secondary clinopyroxene and brown amphibole. Plagioclase is relatively fresh and its microfractures filled with green amphibole and chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	50		5
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless	70	90		
Amphibole, green				50
Chlorite				50
Clinopyroxene, sec.	n/a	5	n/a	n/a
Oxide	5			n/a
Talc	5	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Late stage fractures filed with alteration material are observed.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	grain size: medium grain shape: subhedral to anhedral grain boundary: straight undulose extinction: regular subgrains: not observed fractures: abundant texture: partially altered, included in cpx and plag.
Plagioclase:	grain size: coarse grain shape: subhedral boundary: straight twinning: igneous and mechanical undulose extinction: regular subgrains: not observed fractures: common texture: elongated grains define weak foliation, included in cpx
Clinopyroxene:	grain size: coarse to medium shape: anhedral to poikilitic grain boundary: straight to curved fractures: common texture: partially altered, inlcudes plagioclase and olivine

THIN SECTION LABEL ID: **360-U1473A-3R-1-W 79/85-TSB-TS_3** Piece no.: #05 TS no.: 3

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing oxide gabbro crosscut by two mylonite veins. Both olivine and clinopyroxene have been strongly altered. Opaque minerals occur along the boundary between gabbro and mylonites.
Metamorphic petrology:	The background static alteration is overall moderate. The thin section locally shows evidence for dynamic crystallization of brown Amp, in association with fine-grained Pl and oxide phases.
Structure:	A high temperature shear zone overprinted by brittle deformation

Plane-polarized

32975081

Cross-polarized

32975121

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine-bearing oxide gabbro. The primary magmatic texture is not preserved. Olivine is completely altered and clinopyroxene is heavily replaced by amphibole. Plagioclase has experienced brittle deformation and commonly displays undulose extinction. Opaque oxides are predominated by ilmenite, with minor sulfides. The opaque minerals are concentrated along teh which display a sieve texture and occur along the crosscutting two mylonites.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			4	anhedral	subequant	completely altered
Plagioclase	60		14	7	anhedral to subhedral	tabular	with magmatic twins
Clinopyroxene	28		12	8	anhedral	poikilitic	heavily replaced by amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): RT

Detailed description The thin section includes two bands characterized by association of oxides, brown Amp and fine-grained Pl. In addition, brown Amp locally dynamically develops at the expense of Cpx. The brown Amp is frequently rimmed or replaced by green Amp. The rock shows a moderate background static alteration, mostly recorded by Ol and Cpx. Pl alteration is represented by clay minerals that occur in places along microveins and along Pl grain boundaries.

Comment type	Comment
Alteration general comments:	The rock shows a moderate background static alteration, mostly recorded by Ol and Cpx.
Mylonite comments:	The thin section includes two bands characterized by association of oxides, brown Amp and fine-grained Pl. In addition, brown Amp locally dynamically develops at the expense of Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	35		10
Amphibole, brown	n/a	70	n/a	n/a
Amphibole, green		30		
Clay minerals	25			100
Oxide	5			n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: fault rock Observer: JD

Detailed description A high temperature shear zone overprinted by brittle deformation. The core of the fault/shear zone has very fine grained recrystallized plagioclase and elongate oxide pods. Brittle deformation overprinted the shear zone fracturing and faulting the plagioclase. Plagioclase grains are comminuted.

Feature type	Observation	Intensity rank
Intensity of dynamic recrystallization:	absent	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	common	n/a
Clasts in fault rock (%)	95	n/a
Fault rock clast size:	20	n/a
Fault rock intensity:	dense anastomosing fracturing and incipient breccia	3
Fault sense of shear:	dextral	n/a

Type	Comment
Olivine:	altered.
Plagioclase:	Grain size: 1-20 mm. Grain shape: anhedral, elongate. Grain boundary: irregular. Twinning: typically absent or tapered. Undulose extinction: very well developed. Subgrains: some development, not strong Texture: Fractured porphyroclasts of plagioclase filled with clasts of plagioclase and amphibole. Very strong undulose extinction.
Clinopyroxene:	Grain size: ~30 mm. Grain shape: subhedral. Grain boundary: curved to straight. Texture: Phenocrysts of pyroxene form backstops against bands of oxide and recrystallized plagioclase.

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: fault rock Observer: JD

Detailed description A high temperature shear zone overprinted by brittle deformation. The core of the fault/shear zone has very fine grained recrystallized plagioclase and elongate oxide pods. Brittle deformation overprinted the shear zone fracturing and faulting the plagioclase. Plagioclase grains are comminuted.

Feature type	Observation	Intensity rank
Intensity of dynamic recrystallization:	absent	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a
Clasts in fault rock (%)	30	n/a
Fault rock clast size:	1	n/a
Fault rock intensity:	well developed fault, breccia	4
Fault sense of shear:	dextral	n/a

Type	Comment
Olivine:	altered.
Plagioclase:	Grain size: 0.01-5 mm Grain shape: elongate and anhedral. Grain boundary: highly irregular. Twinning: tapered, if present. Undulose extinction: well developed, even in very fine grained clasts. Subgrains: well developed. Texture: Core of larger clasts mantled by very fine grained zone of comminution. The larger clasts are fractured and offset, have complete undulose extinction, The smaller clasts have undulose extinction and irregular grain boundaries.
Clinopyroxene:	Grain size: 1-4.5 mm Grain shape: elongate, subhedral. Grain boundary: serrate to straight. Texture: The pyroxene is elongate parallel to the foliation and kinked. Some clasts are mantled by smaller clasts, most of which are altered.
Oxide:	Bands of oxide on either side of the highly brecciated zone. Might be from originally high temperature shear zone.

THIN SECTION LABEL ID: **360-U1473A-3R-2-W 89/98-TSB-TS_4** Piece no.: #07 TS no.: 4

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Anhedral to subhedral tubular plagioclase is partly or fully enclosed in poikilitic clinopyroxene. Very few opaque minerals are present.
Metamorphic petrology:	Total static alteration intensity is substantial on average, but more intense near amphibole veins. Olivine is heavily altered to reddish clay.
Structure:	Coarse-grained olivine gabbro with alteration vein cross-cutting plagioclase grains.

Plane-polarized

32905871

Cross-polarized

32905811

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is completely altered and original shape is not preserved. The tabular plagioclase displays magmatic twins and is partly or fully enclosed in the poikilitic clinopyroxene. It occasionally shows undulose extinction. Clinopyroxene is heavily replaced by amphibole. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15	0.8	0.8	4	anhedral	subequant	rimmed by orthopyroxene and amphibole
Plagioclase	60	0.6	8	5	anhedral	tabular	undulose extinction
Clinopyroxene	25	0.4	10	4	anhedral	subequant	showing a consertal intergrowth texture
Amphibole	0.2		0.2	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): TN

Detailed description Olivine is heavily altered to reddish clay. Clinopyroxene is mainly replaced by pale-colored amphibole. Plagioclase microfractures are filled with green amphibole.

Comment type	Comment
Alteration general comments:	Olivine is heavily altered to redish clay. Cpx is mainly replaced by pale-colored amphibole. Pl microfractures are filled with green amphibole.
Vein 1 minerals:	Green amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		10
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless	10	75		20
Amphibole, green		5		80
Clay minerals	70	5		
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	5			n/a
Talc	10	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	clay pseudomorph after olivine; description below focuses on the underlying primary olivine microstructure; Grain size: 3-5 mm Grain shape: subhedral; Grain boundary: curved;
Plagioclase:	Grain size: 5-15 mm (long axis) Grain shape: subhedral Grain boundary: straight Twinning: magmatic and mechanical Undulose extinction: absent
Clinopyroxene:	Grain size: 7-10 mm Grain shape: subhedral Grain boundary: straight to curved Others: enclosure of plagioclase grains; in some case plagioclase grains are fractured

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Observer: OP

Detailed description Alteration vein cross-cuts plagioclase grains

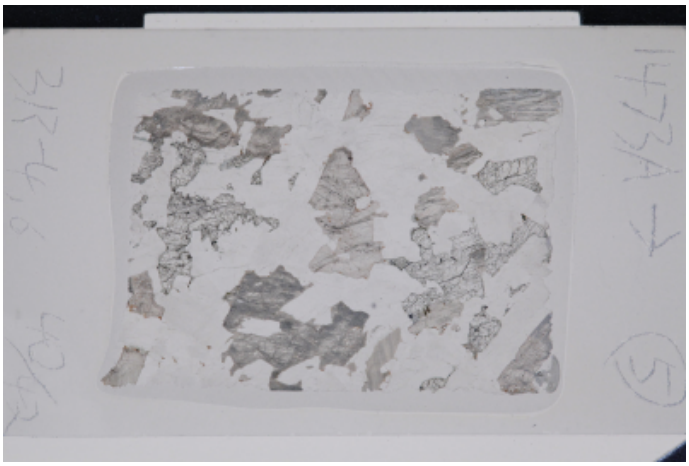
Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Oxide:	Fine-grained, secondary oxide grains are found (1) within localized domains at the edge of olivine alteration domains and (2) as grains following fracture networks within clay-altered olivine domains.
Vein:	vein morphology: planar; vein connectivity: single; vein with several small veins connecting to large vein; vein texture: massive vein structure: uniform vein; vein-wall rock relationship: clear cut

THIN SECTION LABEL ID: **360-U1473A-3R-4-W 40/42-TSB-TS_5** Piece no.: #06 TS no.: 5

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Small amount of orthopyroxene and brown amphibole occur as selvages around olivine. Very few opaque minerals are present.
Metamorphic petrology:	The alteration intensity of this thin section is moderate. Mesh texture of olivine consists of serpentine and oxides.
Structure:	Isotropic olivine gabbro.

Plane-polarized



32906621

Cross-polarized

32906641

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: ophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is in a subequant shape and displays deformation bands. Small amount of orthopyroxene and brown amphibole occur as selvages around olivine. Plagioclase is anhedral and partly or fully enclosed within poikilitic clinopyroxene, which contains brown amphibole blebs. Plagioclase displays magmatic zoning and occasionally shows undulose extinction. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15	0.8	0.8	4	anhedral	subequant	rimmed by orthopyroxene and amphibole
Plagioclase	60	0.6	8	5	anhedral	tabular	containing inclusions of clinopyroxene and olivine
Clinopyroxene	25	0.4	10	4	anhedral	subequant	occasionally rimmed by brown amphibole
Amphibole	0.2		0.2	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Mesh texture of olivine consists of serpentine and magnetite. Olivine developed rims with talc, amphibole and oxides. Clinopyroxene altered into green amphibole with minor brown amphibole. Plagioclase mainly altered into secondary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	30		25
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, green	5	87		8
Chlorite				2
Oxide	35	3		n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	15	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	grain size: coarse grain shape: anhedral grain boundary: curved to straight undulose extinction: common subgrains: straight fractures: common and filled by alteration (serpentine) texture: partially altered - interstitial - included in plagioclase
Plagioclase:	grain size: coarse grain shape: subhedral grain boundary: curved to straight twinning: igneous/mechanical undulose extinction: irregular subgrains: not observed fractures: common texture: fresh, includes olivine, included in cpx
Clinopyroxene:	grain size: coarse grain shape: subhedral to anhedral, poikilitical grain boundary: curved to straight fractures: common texture: includes subhedral plag, interstitial, altered

THIN SECTION LABEL ID: **360-U1473A-3R-4-W 64/67-TSB-TS_6** Piece no.: #09 TS no.: 6

Group	Summary
Igneous petrology:	A medium-grained gabbro with a subopitic to poikilitic texture. Plagioclase is in a tabular shape and shows brittle deformation. Clinopyroxene is completely altered and replaced by green amphibole. Very few opaque minerals are present.
Metamorphic petrology:	The section is crosscut by a vein mostly consisting of green acicular amphibole. The Cpx frequently displays thin rims made of brown amphibole, which is in turn rimmed by green amphibole. Near the amphibole vein, Cpx is almost completely altered into green amphibole. Pl is altered along micro-veins. The static background alteration is substantial.
Structure:	Coarse grained olivine gabbro cross-cut by amphibole alteration vein.

Plane-polarized

32906581

Cross-polarized

32906601

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a subopitic to poikilitic texture. Plagioclase is in a tabular shape and shows brittle deformation. It commonly displays undulose extinction. Small subhedral plagioclase grains are partly or full within a poikilitic texutre. Clinopyroxene is completely altered and replaced by green amphibole. Consertal intergrowth texture can be seen in clinopyroxene. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55	0.2	11	2	anhedral	tabular	undulose extinction
Clinopyroxene	45	0.8	10	3	anhedral	poikilitic	heavily altered

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): RT

Detailed description The section is crosscut by a vein consisting of green acicular amphibole. The amphibole is presumably associated with trace amounts of plagioclase, which is now completely altered. Near the amphibole vein, Cpx from the host rock is almost completely altered into green amphibole. Far from the vein, Cpx frequently displays thin rims made of brown amphibole, which is in turn rimmed by green amphibole. The overall alteration of the rock is substantial and confined to Cpx.

Comment type	Comment
Alteration general comments:	The overall alteration of the rock is substantial.
Vein 1 minerals:	The section is crosscut by a vein consisting of green acicular amphibole. The amphibole is presumably associated with trace amounts of plagioclase, which is now completely altered.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		60		10
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, green		95		100
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

Detailed description The coarse grained olivine gabbro is cross-cut by amphibole alteration vein.

Feature type	Observation	Intensity rank
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	absent	n/a
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a
Fault rock intensity:		2

Type	Comment
Olivine:	altered
Plagioclase:	Grain size: 4-5 mm; Grain shape: elongated subhedral; Grain boundary: curved; Twinning: mechanical and magmatic; Undulose extinction: irregular/patchy; fractures: extensively fractured some faulting along fractures
Clinopyroxene:	Grain size: 2-3 mm; Grain shape: anhedral to subhedral; Grain boundary: curved; Texture: subophitic enclosing plagioclase

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Observer: OP

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Vein:	vein morphology: irregular; vein connectivity: branched; vein texture: polycrystalline; vein structure: composite vein; vein-wall rock relationship: clear cut vein; mineral orientation: random

THIN SECTION LABEL ID: **360-U1473A-4R-1-W 68/73-TSB-TS_7** Piece no.: #08 TS no.: 7

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro with a subophitic texture. Olivine is partly altered. Plagioclase is displays undulose extinction and sometimes preserves magmatic twins. Clinopyroxene is pervasively altered and displays a consertal intergrowth texture. Very few opaque minerals are present.
Metamorphic petrology:	The sample consist of a tremolite vein and an altered host rock. The most altered primary mineral is clinopyroxene which is completely replaced by pale amphibole near the vein.
Structure:	Isotropic magmatic fabric crss-cut by intense fracturing.

Plane-polarized

32975021

Cross-polarized

32975041

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine-bearing gabbro with a subophitic texture. Olivine is partly altered and rimmed by green amphibole. Plagioclase is in a subhedral shape and shows brittle deformation, which is widely crosscut by green amphibole vein. It displays undulose extinction and sometimes preserves magmatic twins. Subhedral plagioclase is partly or fully enclosed within poikilitic clinopyroxene. Clinopyroxene is pervasively altered and consertal intergrowth texture still can be seen. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			2	anhedral	subequant	partly altered
Plagioclase	58		7	4	subhedral	tabular	undulose extinction
Clinopyroxene	40		11	6	anhedral	poikilitic	moderately replaced by amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): JL

Detailed description The sample includes a pale green amphibole (tremolite) vein and an altered olivine gabbro. A halo of completely altered clinopyroxene is conspicuous near the vein. Clinopyroxene is mostly altered into pale green and brown amphibole. Olivine and plagioclase are also substantially altered, but to a lesser degree than clinopyroxene. Common replacing minerals are talc after olivine and secondary plagioclase after primary plagioclase.

Comment type	Comment
Vein 1 minerals:	Vein is composed mostly of tremolite and minor chlorite. The vein does not have a sharp boundary as it cuts through plagioclase grains. Tremolite crystals are identified through their pale color and distinct acicular habit.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	70		30
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless	25	30		
Chlorite				20
Clay minerals	5	10		
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium; Grain shape: anhedral; Grain boundary: irregular, altered; Undulose extinction: patchy; Subgrain: straight; Texture: vein network
Plagioclase:	Grain size: coarse; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular and common; Texture: folted, tweet structure
Clinopyroxene:	Grain size: coarse; Grain shape: poikilitic; Grain boundary: straight to curved; Texture: altered, includes plg
Oxide:	associated to serpentine veins over olivine
Vein:	Fractures filled with alteration material

THIN SECTION LABEL ID: **360-U1473A-4R-3-W 40/44-TSB-TS_8** Piece no.: #08 TS no.: 8

Group	Summary
Igneous petrology:	This thin section have two domains. The major domain is a recrystallized fine-grained oxide-bearing gabbro, which is weakly foliated. The minor domain is a granular medium-grained gabbro.
Metamorphic petrology:	Alteration intensity is slight. Most of the alteration occurs in olivine, which is substantially replaced by brownish clays. Pyroxene, plagioclase and oxides are only slightly altered to amphibole, chlorite and oxidize iron minerals, respectively.
Structure:	Fine grained recrystallized matrix of plagioclase, clinopyroxene and oxides. Oxides form bands parallel to the foliation.

Plane-polarized

32906541

Cross-polarized

32906561

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 90 Domain name: lithology domain 1 major

Lithology: **oxide-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained [345]

Detailed description: A recrystallized fine-grained oxide-bearing gabbro. Both plagioclase and clinopyroxene are distributed along the foliation. Plagioclase commonly displays an undulose extinction. Clinopyroxene is strongly altered and replaced by green amphibole. Small amount of brown amphibole, commonly associated with ilmenite, are also present. Opaque oxides are dominated by ilmenite, with few sulfides. Intergrowth between ilmenite and sulfides can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2	0.02	0.02	0.2	anhedral	interstitial	
Plagioclase	50	0.04	0.6	0.2	anhedral	subequant	with undulose extinction
Clinopyroxene	44	0.01	1	0.4	anhedral	subequant	moderately altered
Amphibole	0.5		0.4	0.2	anhedral	interstitial	commonly associated with ilmenite
Opaques	3						
Magnetite	2						
Ilmenite	1.9						
Sulfide	0.1						

Interval domain no: **2** Domain rel. abundance (%): 10 Domain name: lithology domain 2 minor

Lithology: gabbro Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a granular texture. Clinopyroxene is partly recrystallized and strongly altered. Plagioclase commonly displays undulose extinction.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	30		1.3	1.2			with undulose extinction
Clinopyroxene	70		8	0.6		subequant	strongly altered

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Sample is a foliated olivine gabbro consisting mostly of fine-grained crystals. Olivine is conspicuously replaced by reddish clay. Clinopyroxene and plagioclase are less altered. Oxides are very fresh.

Comment type	Comment
Mylonite comments:	Most of the sample consists of foliated fine-grained minerals that are probably product of deformation.
Vein 1 minerals:	Green amphibole vein is present.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	15		5
Amphibole, colorless		30		
Amphibole, green		50		
Chlorite				100
Clay minerals	100	20		
Other			100	100
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: coarse to medium recrystallized Grain shape: anhedral Grain boundaries: curved Undulose extinction: rare and irregular Texture: altered porphyroclast and partially altered recrystallized
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved to straight Twinning: mechanical and rare Undulose extinction: irregular Subgrains: rare Texture: completely recrystallized
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: straight to curved Fractures: common and filed with alteration Texture: oriented, define foliation and usually associated with oxides
Oxide:	elongated pods associated with cpx, parallel to foliation

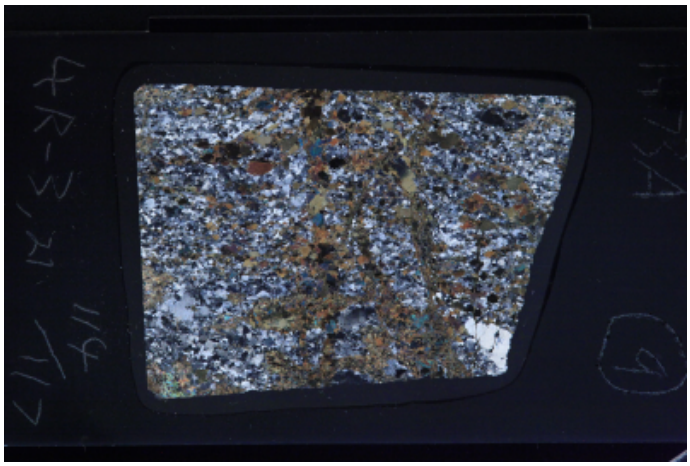
THIN SECTION LABEL ID: **360-U1473A-4R-3-W 114/117-TSB-TS_9** Piece no.: #21 TS no.: 9

Group	Summary
Igneous petrology:	A fine-grained gabbro cut by amphibole veins. The gabbro is strongly foliated.
Metamorphic petrology:	Static alteration intensity is extensive and likely related to amphibole veins.
Structure:	Fine grained, recrystallized gabbro cross-cut by amphibole alteration vein nearly perpendicular to foliation.

Plane-polarized

32906481

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained [345]

Detailed description: A fine-grained gabbro intruded by amphibole veins. The gabbro is strongly foliated. The foliation is defined by preferred orientation of both clinopyroxene and plagioclase. Plagioclase is almost completely recrystallized and commonly displays undulose extinction. Magmatic twins are still preserved in some plagioclases. Clinopyroxene is completely replaced by green amphibole. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60	0.1	2	0.4	subhedral	equant	showing magmatic twins and undulose extinction
Clinopyroxene	40	0.1	2	0.8	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 70 Observer(s): TN

Detailed description Clinopyroxene porphyroclasts and neoblasts are completely replaced by brown or green amphibole. Plagioclase is substantially replaced by secondary plagioclase.

Comment type	Comment
Mylonite comments:	Pl and Amp porphyroclasts and neoblasts.
Vein 1 minerals:	brownish green Amp

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		100		50
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		10		
Amphibole, green		85		30
Chlorite				30
Plagioclase, sec.	n/a	n/a	n/a	40
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Detailed description Fine grained, recrystallized gabbro cross-cut by amphibole vein.

Feature type	Observation	Intensity rank
Recrystallization grain size:	coarse grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Plagioclase:	Grain size: medium; Grain shape: anhedral; Grain boundary: straight to curve with triple junction; Twinning: rare mechanical Undulose extinction: irregular; Subgrains: irregular; Texture features: recrystallized in layers
Clinopyroxene:	Grain size: coarse; Grain shape: subhedral to anhedral; Grain boundary: curved; Fractures: common; Texture: Deformed and altered aggregates, long axis oriented along a preferred orientation defining foliation

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Observer: OP

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Vein:	vein morphology: planar; vein connectivity: subparallel network; vein texture: fibrous to massive; vein-wall rock relationship: clear cut

THIN SECTION LABEL ID: **360-U1473A-4R-4-W 26/30-TSB-TS_10** Piece no.: #02 TS no.: 10

Group	Summary
Igneous petrology:	This thin section has two domains, a pegmatic olivine gabbro and a fine-grained foliated gabbro. The pegmatic olivine gabbro displays a subophitic texture and the fine-grained gabbro is weakly foliated.
Metamorphic petrology:	Alteration minerals indicative of amphibolite to subgreenschist facies conditions are more abundant in the fine-grained rock and in the part of coarse-grained rock that is in contact with fine-grained rock.
Structure:	Coarse grained to pegmatitic olivine gabbro intruded by fine grained gabbro then subsequently plastically deformed. Fine grained gabbro that intruded into coarse grained to pegmatitic olivine gabbro, then subsequently plastically deformed.

Plane-polarized

32905931

Cross-polarized

32905951

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: pegmatitic [345]

Detailed description: This domain is a pegmatic olivine gabbro with a subophitic texture. Olivine is moderately altered. Plagioclase is in a tabular shape and shows undulose extinction. Recrystallized plagioclase neoblasts are surrounding the large plagioclase grains. Clinopyroxene with a poikilitic texture partly or fully enclose plagioclase. It also contain abundant blebs of brown amphiboles, sometimes together with opaque oxides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			8	anhedral	subequant	moderately altered
Plagioclase	45		32	32	anhedral	tabular	partly recrystallized
Clinopyroxene	43		32	32	anhedral	poikilitic	cotains abundant brown amphibole blebs
Amphibole	2		0.6	0.1	anhedral	interstitial	

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology domain 2

Lithology: **gabbro** Observer: CL

Texture: foliated Ave. grain size: fine grained [345]

Detailed description: This domains is a foliated find-grained gabbro. The foliation is defined by the preferred orientation of both plagioclase and clinopyroxene. Plagioclase commonly displays undulose extinction. Clinopyroxene is also elongated and almost completely replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	45		1	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	55		0.8	0.6	anhedral	elongate	almost completely replaced by green amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Olivine is unevenly replaceed by amphibole and talc at grain rims; and by brown clay at rims and along fractures. Clinopyroxene is replaced by brown amphibole at rims of neoplasts, and rims and blebs of prophyroclasts; by brownish green amphibole at rims or pseudomorphs after neoblasts; and by colorless Amp aggregate pseudomorphs after neoblasts. Plagioclase is mainly replaced by secondary plagioclase; by subordinate amounts of chlorite and green amphiboles along fractures; and by chlorite and colorless amphibole with a trace amount of titanite near amphiboles replacing clinopyroxene.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	50		50
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	30	30		
Amphibole, green		60		15
Chlorite				4
Clay minerals	30			
Oxide	3			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Sulfide	2			n/a
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Coarse grained to pegmatitic olivine gabbro intruded by fine grained gabbro then subsequently plastically deformed.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	inequigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: The grain size ranges from 0.45 to 5 mm. The recrystallized grains are ~0.05 mm. Grain shape: Equigranular and subhedral. Grain boundary: curved to serrate. Undulose extinction: very strong with straight boundaries. Subgrains: well developed defined by undulose extinction.
Plagioclase:	Grain size: The porphyroclasts are up to 3 cm long. The recrystallized grains are ~0.15 to 0.3 mm. Grain shape: Very elongate crystals parallel to the foliation. Subhedral. Grain boundary: serrate. Twinning: Primary igneous twinning is present in the porphyroclasts, some crystals with mechanical twinning. Some neoblasts have twins. Undulose extinction: present in porphyroclasts; weakly developed in the recrystallized grains. Subgrains: well developed defined by undulose extinction. Texture: core and mantle structure.
Clinopyroxene:	Grain size: several cm's long. Grain shape: euhedral to subhedral. Grain boundary: irregular. Undulose extinction: minor due to kinking of the crystal. Subgrains: none. Texture: pegmatitic crystals.

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Fine grained gabbro that intruded into coarse grained to pegmatitic olivine gabbro, then subsequently plastically deformed.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	inequigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: The porphyroclasts are up to 1.2 mm long defined by albite twinning. The recrystallized grains are ~0.15 to 0.3 mm. Grain shape: subhedral and granular. Grain boundary: straight. Twinning: primary igneous porphyroclasts have albite twinning. However, the porphyroclasts are similar in size to the recrystallized grains that lack twinning. Undulose extinction: better developed in crystals with twins. Subgrains: not well developed. Texture: polygonal aggregates of recrystallized neoblasts. elongate porphyroclasts.
Clinopyroxene:	Grain size: ~1.0 mm. Grain shape: subhedral and elongate parallel to the foliation. Grain boundary: straight. Texture: pyroxene shape preferred orientation may represent an original magmatic fabric overprinted by crystal plastic deformation.

THIN SECTION LABEL ID: **360-U1473A-4R-4-W 127/130-TSB-TS_11** Piece no.: #16 TS no.: 11

Group	Summary
Igneous petrology:	A olivine-bearing gabbro crosscut by a mylonite vein. The magmatic texture is not preserved.
Metamorphic petrology:	The section includes a mylonitic band where primary Cpx is recrystallized into neoblastic Cpx and brown Amp. The mylonitic band also includes aggregates mostly consisting of brown Amp in association with minor amounts of oxides. The host rock is characterized by extensive alteration. An extensive alteration is also commonly observed within the oxide-rich portion of the mylonitic band.
Structure:	Fine grained shear zone defined by alternated layers of recrystallized monomineralic plagioclase and mixture of olivine, plagioclase, pyroxene and oxide.

Plane-polarized

32906421

Cross-polarized

32906441

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine-bearing gabbro crosscut by a mylonite vein. Plagioclase displays undulose extinction and is occasionally crosscut by amphibole veins. Clinopyroxene has been completely replaced by green amphibole. Deformation twins can be seen in plagioclase in the mylonite vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1			0.8			completely altred
Plagioclase	50		2.4	1	anhedral	elongate	undulose extinction
Clinopyroxene	49		2.8	2	anhedral	subequant	completely replaced by green amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): RT

Comment type	Comment
Alteration general comments:	The rock overall records a substantial static alteration.
Mylonite comments:	The section includes a mylonitic band where primary Cpx is recrystallized into neoblastic Cpx and brown Amp. The mylonitic band also includes aggregates mostly consisting of brown Amp in association with minor amounts of oxides. The host rock is characterized by extensive alteration. An extensive alteration is also commonly observed within the oxide-rich portion of the mylonitic band.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	90	80	90	10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	40		40	60
Amphibole, green	10	70	10	
Clay minerals	50	10	40	
Subtotals replaced	100	100	90	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: crystal-plastic Observer: GV

Detailed description Fine grained amphibole are observed in the matrix and filling fractures in plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Olivine:	Grain size: medium Grain shape: anhedral Grain boundary: curved Undulose extinction: common and regular Subgrains: not observed Fractures: common and partially altered
Plagioclase:	Grain size: fine to medium Grain shape: anhedral Grain boundary : straight Twinning: mechanical in porphyroclast Undulose extinction: common Subgrains: common and regular Texture: porphyroclastic, recrystallized crystals
Clinopyroxene:	Grain size: medium Grain shape: anhedral Grain boundary: straight Fractures: common Texture: recrystallized and porphyroclast
Oxide:	Thin bands parallel to foliation, they define the shear zone boundary

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name:

Microstructure: Observer: GV

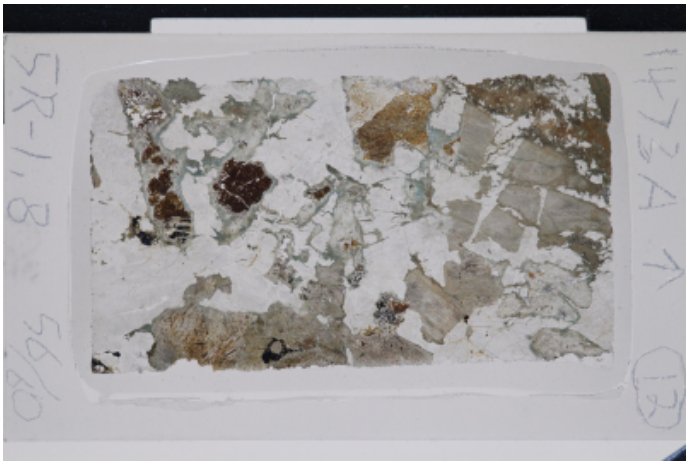
Feature type	Observation	Intensity rank
Recrystallization grain size:	coarse grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: medium Grain shape: subhedral Grain boundary: curved Twinnoing: mechanical common Undulose extinction: irregular Subgrains: curved Texture: porphyroclastic recrystallized
Clinopyroxene:	Grain size: coarse Grain shape: subhedral Grain boundary: curved Fractures: common Texture: partially altered

THIN SECTION LABEL ID: **360-U1473A-5R-1-W 56/60-TSB-TS_12** Piece no.: #08 TS no.: 12

Group	Summary
Igneous petrology:	A olivine gabbro with a subophitic texture. Olivine was completely altered. Plagioclase is in a tabular shape and sometimes partly enclosed within poikilitic texture. Clinopyroxene is heavily replaced by green amphibole. Opaque minerals are predominated by ilmenite.
Metamorphic petrology:	The alteration intensity of this thin section is extensive. There are two types of olivine alteration. One is talc pseudomorph; The other is brown clay pseudomorph; Both of them have green amphibole rims. Pale and green color amphiboles occur in the cleavages of plagioclase. Clinopyroxene mostly altered into tiny grain pale amphibole pseudomorph. Plagioclase mainly altered into secondary plagioclase.
Structure:	Weakly deformed with partially recrystallized plagioclase between grain boundaries of magmatic phases. Plagioclase shows irregular undulose extinction and clinopyroxene is not deformed.

Plane-polarized



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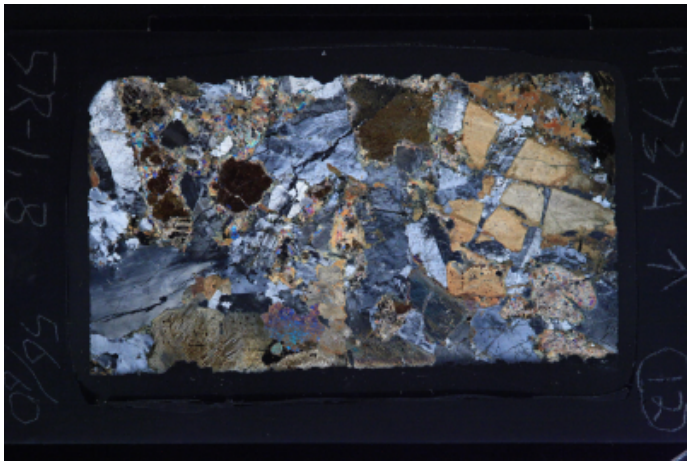
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: An olivine gabbro with a subophitic texture. Olivine was completely altered. Plagioclase is in a tabular shape and commonly shows undulose extinction. It is partly enclosed within clinopyroxene. Brittle deformation can be seen in plagioclase and is filled by amphibole vein. Clinopyroxene is in a subequant shape and heavily replaced by green amphibole. Occasionally, it also contain blebs of brown amphibole. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			3			completely altered
Plagioclase	40		10	7	subhedral	tabular	shows brittle deformation and crosscut by amphibole veins
Clinopyroxene	55		7	5	anhedral	poikilitic	heavily replaced by green amphibole; with blebs of brown amphibole and opaque oxides
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 65 Observer(s): QM

Detailed description There are two types of olivine alteration. One is talc pseudomorph; The other is brown clay pseudomorph; Both of them have green amphibole rims. Pale and green color amphiboles occur in the cleavages of plagioclase. Clinopyroxene mostly altered into tiny grain pale amphibole pseudomorph. Plagioclase mainly altered into secondary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	70		30
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		85		12
Amphibole, green	15	10		6
Chlorite				2
Clay minerals	55			
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	25	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 95 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: curved and altered Texture: Completely altered, internal structure not visible
Plagioclase:	Grain size: coarse Grain shape: subhedral to anhedral Grain boundaries: straight to curved Twinning: mechanical Undulose extinction: common and irregular Texture: partially altered and fractured
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight Texture: Poikilitic coarse cpx fractured and fractures filled with plg recrystallized

Interval domain no: 2 Domain rel. abundance (%): 5 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Recrystallization do not define the foliation. Late abundant fractures cross-cut igneous altered minerals.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved to straight Twinning: not observed Texture: locally recrystallized along plg porphyroclast boundary

THIN SECTION LABEL ID: **360-U1473A-6R-3-W 52/54-TSB-TS_13** Piece no.: #13 TS no.: 13

Group	Summary
Igneous petrology:	A foliated oxide-bearing olivine gabbro. The primary magmatic texture is not preserved.
Metamorphic petrology:	The sample is a mylonitic oxide-gabbro crosscut by a vein filled with brown amphibole. There are also micro-veins filled with: (i) opaque minerals and colourelss amphibole, and (ii) clay minerals. The background alteration is overall substantial.
Structure:	Porphyroclastic fabric defined by coarse porphyroclasts of pyroxene and amphibole in a matrix of fine grained recrystallized plagioclase and oxide pods.

Plane-polarized

32906311

Cross-polarized

32906361

IGNEOUS PETROLOGY

Lithology: **oxide-bearing olivine gabbro** Observer: LF

Texture: granular Ave. grain size: fine grained [345]

Detailed description: A foliated oxide-bearing olivine gabbro. Olivine is completely altered and clinopyroxene is strongly replaced by amphibole. Plagioclase is completely recrystallized and commonly displays undulose extinction. The foliation is defined by the preferred orientation of plagioclase and clinopyroxene. Opaque minerals are composed of ilmenite and magnetite, with an intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	11			0.25	anhedral	interstitial	
Plagioclase	38		0.6	0.3	subhedral	equant	completely recrystallized and undulose extinction
Clinopyroxene	27		2	0.6	subhedral	equant	completely replaced by amphibole
Amphibole	8		0.8	0.3	anhedral	interstitial	
Opaques	16						
Magnetite	6						
Ilmenite	10						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): RT

Detailed description The sample is a mylonitic oxide-gabbro crosscut by a vein filled with brown amphibole. The latter is commonly rimmed by thin coronas made up of green amphibole. There are also micro-veins filled with: (i) opaque minerals and colourelss amphibole, and (ii) clay minerals. The background alteration is overall substantial.

Comment type	Comment
Mylonite comments:	The sample is a mylonitic oxide-gabbro crosscut by a vein filled with brown amphibole.
Vein 1 minerals:	The thin section is crosscut by a vein filled with brown amphibole. The latter is commonly rimmed by thin coronas made up of green amphibole. There are also some crosscutting micro-veins filled with opaque minerals and colorless amphibole.
Vein 2 minerals:	There is also a relatively thick vein mostly filled with orange clay.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		70		30
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		5		
Clay minerals		85		100
Oxide		5		n/a
Other			100	100
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: metamorphic Observer: GV

Detailed description Strongly altered sample with network of fractures filled with alteration products.

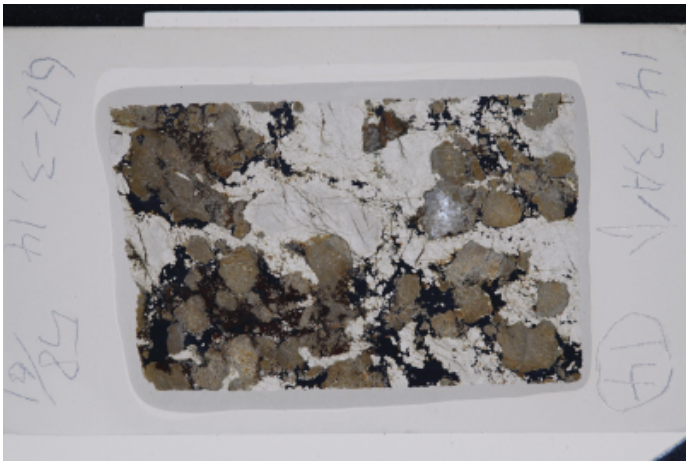
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium Grain shape: anhedral Grain boundaries: curved Texture: strongly altered
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundaries: curved Twinning: not observed Undulose extinction: irregular Subgrains: not observed Fractures: common Texture: fractures filled with alteration products
Clinopyroxene:	Grain size: coarse porphyroclasts to medium recrystallized Grain shape: anhedral Grain boundaries: curved Fractures: common Texture: strongly altered, fractures filled with alteration, cpx associated to oxides
Oxide:	interstitial and irregular pods between cpx recrystallized

THIN SECTION LABEL ID: **360-U1473A-6R-3-W 58/61-TSB-TS_14** Piece no.: #14 TS no.: 14

Group	Summary
Igneous petrology:	An oxide olivine gabbro. The primary magmatic texture is not preserved. Both olivine and clinopyroxene are highly altered. Opaque oxides consist of ilmenite and magnetite.
Metamorphic petrology:	The alteration intensity of this thin section is extensive. Clay was pervasive in this thin section.
Structure:	Complete recrystallization of plagioclase and occurrence of network of fractures filled with alteration products.

Plane-polarized



32906271

Cross-polarized

32906291

IGNEOUS PETROLOGY

Lithology: **oxide olivine gabbro** Observer: CL

Texture: porphyrostic Ave. grain size: medium grained [345]

Detailed description: An oxide olivine gabbro with a porphyroclastic texture. Olivine is completely altered and clinopyroxene is heavily replaced by green amphibole. Plagioclase is almost completely recrystallized and the big porphyroclasts display deformation twins. Opaque oxides consist of ilmenite and magnetite, with intergrowth texture. They are commonly interstitial among clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7						olivine is completely altered and original shape is not preserved.
Plagioclase	40		10	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	42		8	3	anhedral	subequant	heavily replaced by green amphibole
Amphibole	1		1.6	0.1	anhedral	interstitial	occurs at the rim of clinopyroxene
Opaques	10						
Magnetite	4						
Ilmenite	6						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 70

Observer(s):

Detailed description The alteration intensity of this thin section is extensive. Olivine was mainly replaced by red clay with olivine pseudomorph, also minor amount were replaced by talc and oxides. These different types represent two alteration stages of olivine. Clinopyroxene mainly altered into clay. Plagioclase were mostly replaced by secondary plagioclase. Clay was pervasive in this thin section.

Comment type	Comment
Mylonite comments:	Slight deformation was observed as evidenced by curved plagioclase cleavage.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	90		40
Amphibole, colorless		20		30
Amphibole, green	1			5
Chlorite				10
Clay minerals	85	80		10
Plagioclase, sec.	n/a	n/a	n/a	45
Talc	7	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic

Observer: GV

Detailed description This sample has a vertical shear zone defined by elongate and recrystallized plagioclase and pyroxene. The plagioclase forms a core and mantle structure. There are abundant oxides that surrounds recrystallized plagioclase and pyroxene neoblasts. The largest concentrations of oxides occurs near pyroxene and is limited within bands of recrystallized plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: porphyroclasts range from 1.5 to 6 mm long. The neoblasts range from 0.1 to 0.3 mm. Grain shape: subhedral. Grain boundary: porphyroblasts: serrate; neoblasts: straight to curved. Twinning: mechanical twins in porphyroclasts. limited but present in neoblasts. Undulose Extinction: extinction is strong in porphyroclasts, limited in neoblasts. Subgrains: present in porphyroclasts. Texture: core and mantle structure.
Clinopyroxene:	Grain size: neoblasts: 0.15 mm. porphyroclasts: 6 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: surrounded by oxides, some recrystallization.
Oxide:	The oxide pods surround neoblasts and neoblast aggregates of plagioclase and pyroxene. The oxide pods are typically associated with pyroxene and is very limited within recrystallized bands of plagioclase. The oxide bands do not have a strong preferred orientation compared to the crystal plastic fabric.

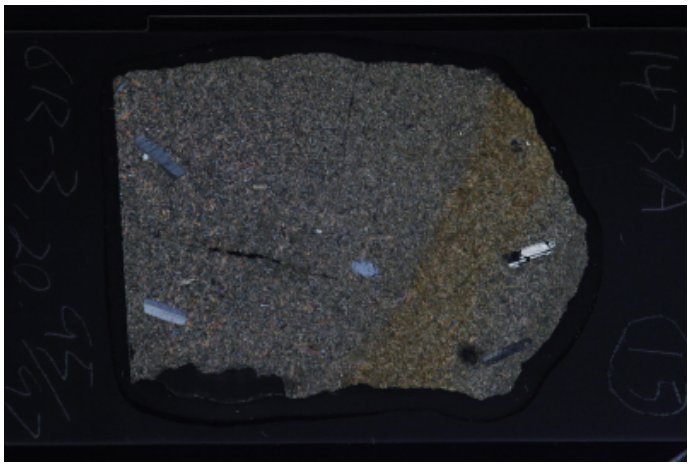
THIN SECTION LABEL ID: **360-U1473A-6R-3-W 95/97-TSB-TS_15** Piece no.: #20 TS no.: 15

Group	Summary
Igneous petrology:	A diabase with an intergranular texture. Space among the plagioclase laths were occupied by glass or clinopyroxene, which have been altered.
Metamorphic petrology:	The sample displays a substantial alteration, which is shown by the development of pale amphibole, clay, titanite and chlorite.
Structure:	Unfoliated. Phenocrystals of plagioclase have weak undulose extinction.

Plane-polarized

32906231

Cross-polarized



32906251

IGNEOUS PETROLOGY

Lithology: **Diabase** Observer: CL

Texture: intergranular Ave. grain size: fine grained [345]

Detailed description: A diabase with an intergranular texture. Space among the plagioclase laths are commly occupied by clinopyroxene. Some subhedral plaigoclase and olivine phenocrysts are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.2	anhedral	interstitial	
Plagioclase	60	0.01	3.2	0.4	subhedral	tabular	
Clinopyroxene	35		0.1	0.05	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): RT

Detailed description The sample displays a substantial alteration that is mostly recorded by the clinopyroxene. Common alteration minerals are pale amphibole, chlorite and clay. In particular, Cpx is locally totally transformed into clay. The Cpx alteration also includes in places the formation of titanite, presumably at the contact with original primary ilmenite.

Comment type	Comment
Alteration general comments:	The sample displays a substantial alteration that is mostly recorded by the clinopyroxene. Alteration minerals are pale amphibole, clay, titanite and chlorite. In an area of the thin section, the Cpx is totally transformed into clay.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		40		20
Amphibole, colorless		45		50
Chlorite		5		
Clay minerals		40		50
Other		10		
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Detailed description Unfoliated. Phenocrystals of plagioclase have weak undulose extinction.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	Plagioclase matrix and phenocrysts. The plagioclaes phenocrysts have weak undulose extinction.

THIN SECTION LABEL ID: **360-U1473A-7R-1-W 131/134-TSB-TS_16** Piece no.: #21 TS no.: 16

Group	Summary
Igneous petrology:	A medium-grained gabbro with a subophitic texture. Olivine is strongly altered. Plagioclase commonly shows magmatic twins and sometimes undulose extinction. Clinopyroxene is moderately altered and replaced by amphibole.
Metamorphic petrology:	Olivine is extensively altered into talc and clay while clinopyroxene is moderately altered into pale-green amphibole. Plagioclase is only slightly altered. Overall, alteration is moderate.
Structure:	Weakly deformed with medium grained recrystallized plagioclase. Plagioclase porphyroclasts are deformed and clinopyroxene is locally recrystallized at clinopyroxene porphyroclasts grain boundaries.

Plane-polarized

32906171

Cross-polarized

32906211

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a subophitic texture. Few olivine is present and strongly altered. Plagioclase is in a tabular to subequant shape, and partly or fully enclosed within the poikilitic clinopyroxene. It commonly shows magmatic twins and sometimes undulose extinction. It is also crosscut by green amphibole vein. Clinopyroxene is moderately altered and replaced by amphibole. Consertal intergrowth texture can be seen in clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.5	0.8	0.8	2.8	anhedral	subequant	highly altered.
Plagioclase	70	0.2	4	2	anhedral	tabular	undulose extinction
Clinopyroxene	29	1.2	4.4	2.8	anhedral	subequant	consertal intergrowth
Amphibole	0.5		0.2	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description The sample is moderately altered. Alteration is heterogeneous, with many olivine grains exhibiting partial to total replacement. The more altered olivine is replaced by clay in the center and is rimmed by talc and amphibole. No significant clay alteration was observed in the fresher olivine grains. CPX is the next most altered mineral, and is partially replaced mostly by green amphibole along rims. Plagioclase is only slightly altered with chlorite and green amphibole occurring in rims and microfractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	30		5
Amphibole, brown	n/a	25	n/a	n/a
Amphibole, green	20	60		30
Chlorite				70
Clay minerals	40	10		
Clinopyroxene, sec.	n/a	5	n/a	n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 85 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: coarse to medium Grain shape: anhedral Grain boundary: altered Undulose extinction and subgrains: not observed because it is too altered
Plagioclase:	Grain size: coarse Grain shape: subhedral Grain boundary: straight Twinning: igneous and mechanical Undulose extinction: Irregular Subgrains: not observed
Clinopyroxene:	Grain size: coarse Grain shape: anhedral to poikilitic Grain boundary: straight to curved Fractures: common and filed with alteration Textures: variably altered and locally recrystallized

Interval domain no: 2 Domain rel. abundance (%): 15 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved to straight Twinning: common and mechanical Undulose extinction: irregular Texture: locally recrystallized at porphyroclast boundary, sometimes in a fracture fragmenting cpx
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: straight Fractures: absent Texture: locally recrystallized overprint of previous cpx porphyroclast

THIN SECTION LABEL ID: **360-U1473A-8R-3-W 21/27-TSB-TS_17** Piece no.: #04 TS no.: 17

Group	Summary
Igneous petrology:	Strongly deformed and altered olivine-bearing gabbro. Primary magmatic texture is not preserved.
Metamorphic petrology:	The gabbro shows a mylonitic foliation characterized by recrystallization of primary Pl and Cpx. The mylonitic foliation is crosscut at a high angle by a vein filled with brown-green Amp and accessory amounts of Pl. The vein is associated with a 1.5 cm thick halo in the host rock, in which the clinopyroxene is pseudomorphically replaced by brown-green Amp. The thin section includes cataclastic fault zones characterized by extensive development of green and pale-green Amp associated with secondary Pl, chlorite and clay. The gabbro overall shows a substantial background static alteration.
Structure:	Porphyroclastic gabbro with elongate and recrystallized plagioclase and clinopyroxene. The recrystallization is more intense in plagioclase, but no mantle and core structures are observed. Subgrain development is limited, however undulose extinction is strong. There is a strong brittle overprint which caused several fractures, comminution of grains, the undulose extinction in plagioclase and pyroxene, and cataclasite. The fault zone has a variable thickness up to 2.4 mm thick. There is an amphibole vein that crosscuts the crystal plastic fabric and is also faulted with broken clasts of amphibole.

Plane-polarized

32905891

Cross-polarized

32905911

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: LF

Texture: foliated Ave. grain size: medium grained [345]

Detailed description: A foliated olivine-bearing gabbro. The foliation is defined by the preferred orientation of the elongated plagioclase and clinopyroxene. Plagioclase commonly displays undulose extinction and deformation twins can be seen in some big grains. Olivine is completely altered. It is crosscut by an 1.5-2 mm amphibole vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			0.3	anhedral	elongate	
Plagioclase	55		7	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	40.6		6	3	anhedral	elongate	
Amphibole	0.5		0.1	0.1	anhedral	interstitial	brown amphibole is also present as blebs in Cpx
Opaques	0.9						
Ilmenite	0.9						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): RT

Detailed description

The gabbro shows a mylonitic foliation characterized by recrystallization of primary Pl and Cpx. The Cpx neoblasts are locally associated with minor amounts of red-brown Amp and/or opaque phases. The mylonitic foliation is crosscut at a high angle by a vein filled with brown-green Amp and accessory amounts of Pl. The vein is associated with a 1.5 cm thick halo in the host rock, in which the clinopyroxene is pseudomorphically replaced by brown-green Amp. The thin section includes cataclastic fault zones characterized by extensive development of green and pale-green Amp associated with secondary Pl, chlorite and clay. The gabbro shows a substantial background static alteration. In the halo associated with the Amp vein, Cpx is almost completely replaced by brown-green Amp. Far from the Amp vein, the Cpx is moderately to substantially replaced by green and pale-green amphiboles. These amphiboles occur as: (i) coronas around Cpx at the contact with Pl, and (ii) along micro-fractures. The Cpx is also locally replaced by minor amounts of clay, which develop along Cpx cleavages and micro-fractures. Opx is only locally preserved and is replaced by talc, oxide phases and, at the contact with Pl, by pale green Amp. It is also typically replaced by a substantial amount of clay. Pl is locally altered into; (i) green and pale green Amp along micro-fractures, locally in association with secondary Pl, and (ii) clay along the grain boundaries among the neoblastic Pl grains.

Comment type	Comment
Alteration general comments:	The gabbro shows a substantial background static alteration.
Mylonite comments:	The gabbro shows a mylonitic foliation characterized by recrystallization of primary Pl and Cpx. The Cpx neoblasts are locally associated with minor amounts of red-brown Amp and/or opaque phases.
Cataclasite comments:	The cataclastic fault zones are characterized by extensive development of green and pale-green Amp associated with secondary Pl, chlorite and clay.
Vein 1 minerals:	The mylonitic foliation is crosscut at a high angle by a vein filled with brown-green Amp and accessory amounts of Pl. The vein is associated with a 1.5 cm thick halo in the host rock, in which the clinopyroxene is pseudomorphically replaced by brown-green Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		35	90	15
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		20	25	35
Amphibole, green		30		35
Clay minerals		10	35	30
Oxide			5	n/a
Talc		n/a	35	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description

Porphyroclastic gabbro with elongate and recrystallized plagioclase and clinopyroxene. The recrystallization is more intense in plagioclase, but no mantle and core structures are observed. Subgrain development is limited, however undulose extinction is strong. There is a strong brittle overprint which caused several fractures, comminution of grains, the undulose extinction in plagioclase and pyroxene, and cataclasite. The fault zone has a variable thickness up to 2.4 mm thick. There is an amphibole vein that crosscuts the crystal plastic fabric and is also faulted with broken clasts of amphibole.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a
Fault rock intensity:	dense anastomosing fracturing and incipient breccia	3

Type	Comment
Olivine:	absent
Plagioclase:	Grain size: recrystallized grains range from 0.1-0.3 mm. porphyroclasts range from 1-6.0 mm. Grain shape: the porphyroclasts are elongate parallel to the foliation and are subhedral. neoblasts are elongate to equigranular. Grain boundary: serrate. Twinning: twinning is absent, even in porphyroclasts. Undulose extinction: all crystal types have undulose extinction. Subgrains: subgrain development is weak to absent, even though the undulose extinction is strong. Texture: the plagioclase crystals are heavily fractured and the finest grained part of the section is within a fault.
Clinopyroxene:	Grain size: 0.6 to 3.0 mm. Grain shape: the pyroxene is parallel to the foliation and subhedral. Grain boundary: serrate. Fractures: some fracturing, but lower than plagioclase. Texture: the pyroxene is often kinked with undulose extinction; very elongate and altered in places. recrystallization is limited.
Vein:	4.5 mm thick amphibole vein crosscuts the CPF at relatively high angles. The vein include fragments of igneous pyroxene. Minor oxides present.

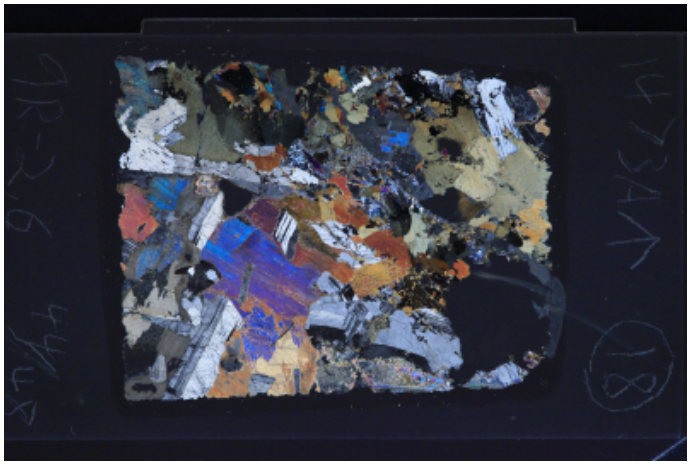
THIN SECTION LABEL ID: **360-U1473A-9R-2-W 44/48-TSB-TS_18** Piece no.: #06 TS no.: 18

Group	Summary
Igneous petrology:	A medium-grained gabbro crosscut by an amphibole vein. The gabbro displays a subophitic texture. Clinopyroxene is strongly altered.
Metamorphic petrology:	The sample consist a vein, a halo and an altered host gabbro. Observed assemblages record amphibolite, greenschist and clay alteration processes.
Structure:	Isotropic magmatic fabric cross-cut by a polycrystalline metamorphic vein showing an halo of green amphibole.

Plane-polarized

32919521

Cross-polarized



32919541

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro crosscut by an amphibole vein. The gabbro displays a subophitic texture, in which tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is strongly altered. In particular, it is completely replaced by green amphibole close to the vein. Consertal intergrowth texture can be seen in some clinopyroxene grains.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60	0.6	8	3.6	subhedral	tabular	undulose extinction
Clinopyroxene	40	0.8	11	3.6	anhedral	subequant	completely replaced by green amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): JL

Detailed description The sample consist of a vein, a halo and an altered host rock. Plagioclase and clinopyroxene from the host rock are slightly to moderately altered, respectively. In the halo and the vein, Cpx is completely altered into green amphibole while some plagioclase remained relatively fresh. The vein is composed of clinozoisite and tremolite-actinolite. Replacement of the green amphibole that composed the halo by tremolite-actinolite were observed. A later stage replacement of plagioclase by clay was also observed. These greenschist and clay alteration events superimposed a much earlier high-temperature vein that caused the formation of the abovementioned green amphibole replacement of Cpx in the halo. Overall, this vein and halo features different metamorphic events that grades from high temperature (amphibolite facies or felsic vein) to greenschist and lastly a clay alteration event.

Comment type	Comment
Vein 1 minerals:	There was likely a felsic and/or amphibole vein that produced a halo of green amphibole replacing the clinopyroxene of the host rock. It is hard to discern the mineralogy of this high-temperature vein due to overprinting of later greenschist and clay alteration. Likely evidence for a felsic veins are the elongated plagioclase laths that seems to cross cut Cpx crystals (inc. amphibole replaced Cpx) at the halo zone. Greenschist alteration occurs later and caused zoisite and actinolite formation. Some of the original green amphibole composing the abovementioned halo are partially replaced to actinolite. Lastly, late-stage clay replacement of the plagioclase occurs causing a dirty-brown texture on some plagioclase grains at/near the vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		70		20
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		30		
Amphibole, green		65		10
Clay minerals				80
Plagioclase, sec.	n/a	n/a	n/a	10
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: subhedral to euhedral Grain boundary: straight Twinning: igneous and mechanical Undulose extinction: uniform and weak Texture: fractured crystals, euhedral included in cpx
Clinopyroxene:	Grain size: coarse Grain shape: poikilitic Grain boundary: straight Texture: altered, include plg

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: microfabric

Microstructure: metamorphic N.B.: cpx including plg is deformed and fractured, sigmoidal shape, might related to vein shear (opposite side not visible) Observer: CF

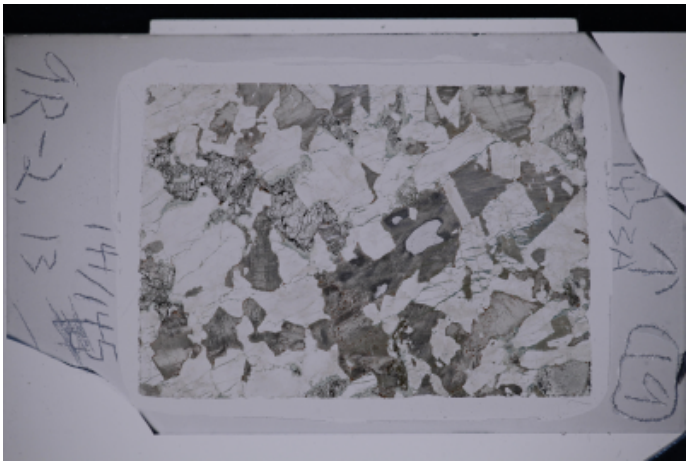
Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Vein:	Metamorphic vein, irregular, cross-cutting, polycrystalline, haloed, green amphibole halo

THIN SECTION LABEL ID: **360-U1473A-9R-2-W 141/145-TSB-TS_19** Piece no.: #13 TS no.: 19

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and amphibole. Clinopyroxene displays a consertal intergrowth texture. Opaque minerals are predominated by sulfides, with minor ilmenite.
Metamorphic petrology:	The sample is moderately altered. Olivine is substantially replaced by talc and pale green amphibole. Clinopyroxene is partially replaced by secondary clinopyroxene and pale green amphibole. Plagioclase is only slightly altered.
Structure:	Isotropic olivine gabbro with plagioclase deformed showing partially preserved igneous twinning overprinted by mechanical twinning.Clinopyroxene is fractured and not deformed.

Plane-polarized



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Cross-polarized

32932121

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: LF

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and amphibole. Plagioclase commonly shows a tabular shape and is occasionally crosscut by amphibole vein. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is commonly rimmed by green amphibole, and occasionally by brown amphibole and oxides. Consertal intergrowth texture is common in clinopyroxene. Opaque minerals are predominated by sulfides, with minor ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			5	anhedral	elongate	partly altered
Plagioclase	49		8	6	subhedral	tabular	rarely undulose extinction
Clinopyroxene	39.4		12	6	subhedral	poikilitic	consertal intergrowth
Orthopyroxene	0.2		0.15	0.04	anhedral		present as rims around Ol
Amphibole	0.9		0.2	0.1	anhedral	interstitial	present as blebs in Cpx
Opaques	0.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): JL

Detailed description Overall, the sample is moderately altered. Most common alteration replacement mineralogy and texture observed is talc-amphibole rim after olivine. Talc is often associated with oxides (likely magnetite).

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	40		5
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	55	40		70
Chlorite				30
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	5			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse Grain shape: hopper Grain boundary: straight to curved, altered Undulose extinction: common Subgrains: straight Texture: fractured and partially altered
Plagioclase:	Grain size: coarse Grain shape: subhedral to anhedral Grain boundary: straight Twinning: magmatic and mechanical Undulose extinction: irregular Texture: fractured, twinning show displacement due to filled fracture
Clinopyroxene:	Grain size: coarse Grain shape: anhedral to poikilitic Grain boundary: straight Texture: fractured and partially altered, include plg
Vein:	late stage metamorphic veins (or filled fractures)

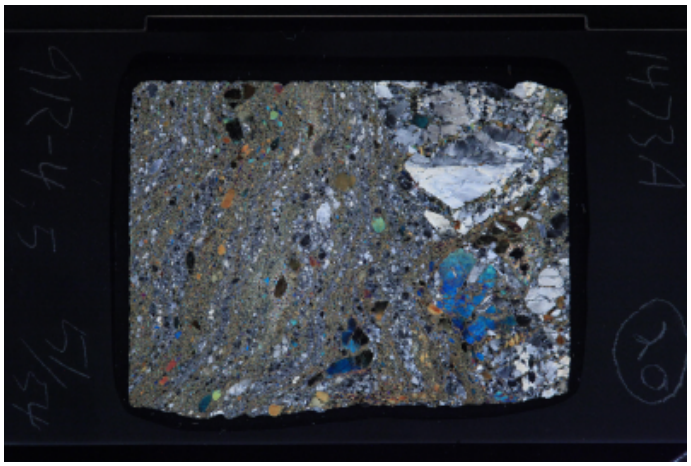
THIN SECTION LABEL ID: **360-U1473A-9R-4-W 51/54-TSB-TS_20** Piece no.: #05 TS no.: 20

Group	Summary
Igneous petrology:	The protolith was a gabbro, which was highly altered and deformed.
Metamorphic petrology:	Static alteration intensity is extensive. Green amphibole is the most dominant phase.
Structure:	Deformed gabbro with foliation defined by fine grained recrystallized amphibole and plagioclase.

Plane-polarized

32906131

Cross-polarized



32906151

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: The protolith was a gabbro, which was highly altered and deformed.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	50		6	0.4	anhedral	elongate	almost completely recrystallized
Clinopyroxene	50		5	0.8	anhedral	elongate	almost completely replaced by green amphibole
Amphibole	0.2		0.6	0.2	anhedral	interstitial	occurring as blebs on clinopyroxene

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): TN

Detailed description Mylonitic porphyroclasts and neoblasts are affected by brittle fracturing and brecciation. Brown amphibole is static alteration product; green amphibole is related with plastic and brittle deformation. Plagioclase porphyroclasts are cut by veins of secondary plagioclase and green amphibole.

Comment type	Comment
Alteration general comments:	Mylonitic porphyroclasts and neoblasts are affected by brittle fracturing and brecciation. Brown amphibole is static alteration product; green amphibole is related with plastic and brittle deformation. Plagioclase porphyroclasts are cut by veins of secondary plagioclase and green amphibole.
Mylonite comments:	Amp and Pl porphyroclasts and neoblasts
Cataclasite comments:	Fracturing and brecciation of porphyroclasts and neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		95		10
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		10		
Amphibole, green		85		40
Plagioclase, sec.	n/a	n/a	n/a	60
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Plagioclase:	Grain size: coarse grained to fine recrystallized Grain shape: subhedral to anhedral Grain boundary: curved Twinning: mechanical in porphyroclasts Undulose extinction: common and irregular Subgrains: common Texture: porphyroclastic recrystallized
Clinopyroxene:	Grain size: medium Grain shape: sbhedral to anhedral Fractures: common Texture: partially altered; partially recrystallized with plagioclase

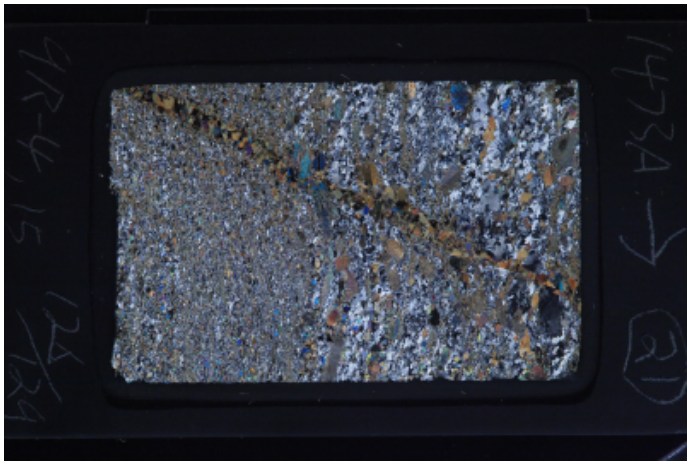
THIN SECTION LABEL ID: **360-U1473A-9R-4-W 126/129-TSB-TS_21** Piece no.: #15 TS no.: 21

Group	Summary
Igneous petrology:	This thin section contains two domains of gabbronorite with different grain sizes, i.e., medium- and fine-grained. Plagioclase is strongly recrystallized and foliated. Both clinopyroxene and orthopyroxene are sheared along the foliation. The two domains are crosscut by an amphibole vein.
Metamorphic petrology:	Static alteration intensity is substantial. Neoblasts by dynamic recrystallization consist of clinopyroxene, orthopyroxene and plagioclase, and they are staticaly replaced mainly by green amphibole and secondary plagioclase.
Structure:	Vertical contact between very fine and fine grained mylonitic layer cut and offset by 0.3-0.5 mm wide amphibole vein. Foliation folds/deflects at the vein. Mylonite foliation in both the fine and the very fine layer oblique to contact in the core sample. Incipient sheer bands.

Plane-polarized

32906091

Cross-polarized



32906111

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: medium-grained

Lithology: **gabbronorite** Observer: LF

Texture: mylonitic Ave. grain size: medium grained [345]

Texture comment: deformation foliation

Detailed description: This thin section contains two domains of gabbronorite with different grain sizes, i.e., medium- and fine-grained. Plagioclase is strongly recrystallized and foliated. Both clinopyroxene and orthopyroxene are sheared along the foliation. The two domains are crosscut by an amphibole vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.5						
Plagioclase	62.7		3.5	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	30		3	1.2	anhedral	elongate	
Orthopyroxene	5		4	0.6	anhedral	elongate	
Amphibole	0.9		0.12	0.35	anhedral	interstitial	also present as blebs in Cpx
Opaques	0.9						

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: fine-grained

Lithology: **gabbronorite** Observer: LF

Texture: mylonitic Ave. grain size: fine grained [345]

Texture comment: deformation foliation

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.5						
Plagioclase	59		0.5	0.2	anhedral	elongate	
Clinopyroxene	35		0.8	0.3	anhedral	elongate	
Orthopyroxene	5		0.5	0.25	anhedral	elongate	
Amphibole	0.5		0.15	0.08	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): TN

Detailed description Green amphibole replaces clinopyroxene and orthopyroxene porphyroclasts and neoblasts, and forms a vein cutting mylonite foliation.

Comment type	Comment
Alteration general comments:	Green Amp replace Cpx and Opx porphyroclasts and neoblasts, and forms vein cutting mylonite foliation.
Mylonite comments:	Cpx, Opx and Pl porphyroclasts and neoblasts are remaining.
Cataclasite comments:	Displacement of 1 mm wide along Amp vein
Vein 1 minerals:	green amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50	50	30
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		10	50	
Amphibole, green		85	50	
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 57.5 Domain name: microfabric

Microstructure: crystal-plastic Observer: MJC

Detailed description Vertical contact between very fine and fine grained mylonitic layer cut and offset by 0.3-0.5 mm wide amphibole vein. Foliation folds/deflects at the vein. Mylonite foliation in both the fine and the very fine layer oblique to contact in the core sample. Incipient sheer bands.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size 0.2mm, elongate, anhedral, recrystallised. rare subgrains
Plagioclase:	Grain size 100 microns, elongate, with serriate boundaries. Undulose extinction, with subgrains and rare deformation twins. Plagioclase has been recrystallised. Grain size varies. Forms very fine grained ribbons.
Clinopyroxene:	Grain size 100 to 300 microns and smaller. Stretch and recrystallised to forn long tails. Cores remain. Anhedral with irregular grain boundaries

Interval domain no: 2 Domain rel. abundance (%): 37.5 Domain name: microfabric

Microstructure: crystal-plastic Observer: MJC

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Olivine recrystallised, into elongate patches. 80% altered. Grainsize 160 microns. Grains elongate, anhedral.
Plagioclase:	Grain size 300 microns, elongate, with serriate boundaries. Undulose extinction, with subgrains and rare deformation twins. Rare fractured, very large plag grains (3mm). Plagioclase has been recrystallised. Grain size varies, with some very fine grained seams.
Clinopyroxene:	Grain size 0.5mm, but can be much larger. One one cm grain stretched out & broken near contact. Bending and undulose extinction shown by some grains. Cpx recrtystallsed around margins, whereas cores are brittlely fractured. Tails are often altered. Anhedral.

Interval domain no: 3 Domain rel. abundance (%): 5 Domain name: metamorpic vein

Microstructure: metamorphic Observer: MJC

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	absent	n/a
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Vein:	Single, 0.3-0.5mm wide planar amphibole vein. 1 mm sinistral, normal offset of foliation, as well as some additional deflection of host rock foliation. (seen in many core samples). 2-3 mm wide alteration halo surrounds vein, with cpx replaced by amphibole. Amp grain size 0.5mm. Vein is uniform, with clear cut margins.

THIN SECTION LABEL ID: **360-U1473A-9R-5-W 2/8-TSB-TS_22** Piece no.: #01 TS no.: 22

Group	Summary
Igneous petrology:	A weakly foliated gabbro is crosscut by an amphibole vein. Plagioclase is elongated and displays undulose extinction. Clinopyroxene is moderately replaced by green amphibole.
Metamorphic petrology:	The mylonitic foliation shows the recrystallization of primary Pl and Cpx, and is crosscut at a high angle by a major amphibole vein. The evaluation the static background alteration is prevented by the bad quality of the thin section.
Structure:	Strong crystal plastic fabric defined by recrystallized plagioclase and pyroxene. Foliation is cross cut by amphibole and chlorite veins.

Plane-polarized

32906051

Cross-polarized

32906071

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A gabbro is crosscut by an amphibole vein. The gabbro is weakly foliated, as indicated by the preferred orientation of clinopyroxene and plagioclase. Plagioclase is elongated and displays undulose extinction. Clinopyroxene is moderately replaced by green amphibole. Small amount of brown amphiboles are also present at the rim of clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	68		1	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	32		2.4	1.6	anhedral	elongate	competely altered
Amphibole	0.2		0.2	0.2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): Observer(s): RT

Detailed description The evaluation the static background alteration is prevented by the bad quality of the thin section. The rock shows a crystal plastic fabric defined by recrystallized Pl and Cpx. The neoblastic Cpx aggregates include grains of red-brown amphibole. The mylonitic foliation is crosscut by a major amphibole vein. The amphibole grains are mostly elongated along the direction of the vein.

Comment type	Comment
Alteration general comments:	The evaluation the static background alteration is prevented by the bad quality of the thin section.
Mylonite comments:	Crystal plastic fabric defined by recrystallized Pl and Cpx. The neoblastic Cpx aggregates include grains of red-brown amphibole.
Vein 1 minerals:	The mylonitic foliation is crosscut by a major amphibole vein. The amphibole grains are mostly elongated along the direction of the vein.

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Strong crystal plastic fabric defined by recrystallized plagioclase and pyroxene cut by amphibole and chlorite veins.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: 0.15 to 1mm. Grain shape: subhedral to granular. Grain boundary: serrate. Twinning: mechanical twinning in porphyroclasts, weakly developed in neoblasts. Undulose Extinction: present in porphyroclasts and neoblasts. Subgrains: present. Texture: aggregates of neoblasts surrounding porphyroclasts. recrystallization is not very intense.
Clinopyroxene:	Grain size: ~1mm. Grain shape: subhedral and elongate. Grain boundary: serrate. Texture: kinked.
Vein:	Amphibole and chlorite veins crosscut the crystal plastic fabric.

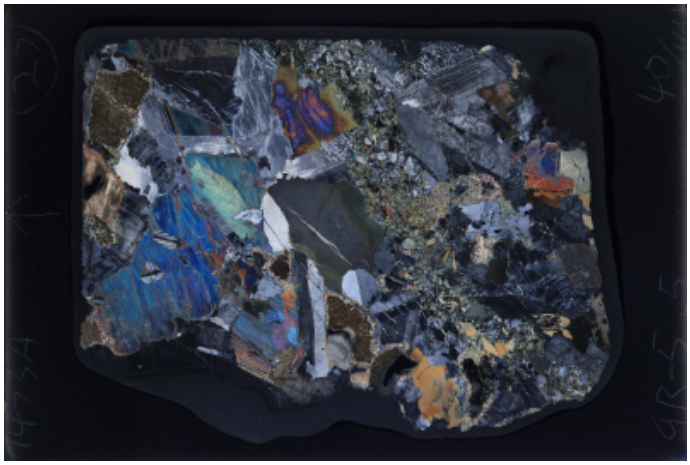
THIN SECTION LABEL ID: **360-U1473A-9R-5-W 40/44-TSB-TS_23** Piece no.: #05 TS no.: 23

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro crosscut by an amphibole vein. The olivine gabbro displays a subophitic texture. Olivine is heavily altered. Plagioclase commonly displays undulose extinction. Clinopyroxene is partly or completely replaced by amphibole.
Metamorphic petrology:	The rock is slightly altered expressed by olivine replacement by mostly green amphibole, serpentine, and clay, plagioclase replacement by secondary plagioclase, and clinopyroxene replacement by green amphibole. The rock is cut by a vein following a cataclastic zone consisting of green amphibole coexisting with secondary plagioclase and titanite.
Structure:	Coarse grained olivine gabbro cross-cut by amphibole alteration vein. Feldspar is faulted parallel to the vein.

Plane-polarized

32905971

Cross-polarized



32905991

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro crosscut by an amphibole vein. The olivine gabbro displays a subophitic texture, in which plagioclase is partly or fully enclosed within clinopyroxene. Olivine is heavily altered. Plagioclase is subhedral and in a tabular shape. It commonly displays undulose extinction and occasionally deformation twins. Clinopyroxene commonly displays consertal intergrowth texture and is partly or completely replaced by amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			4	anhedral	subequant	heavily altered
Plagioclase	65		14	10	anhedral	tabular	undulose extinction
Clinopyroxene	30		15	10	anhedral	subequant	moderately replaced by green amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JK

Detailed description The rock is slightly altered expressed by olivine replacement by mostly green amphibole, serpentine clay, plagioclase replacement by secondary plagioclase, and clinopyroxene replacement by green amphibole. The rock is cut by a vein following a cataclastic zone consisting of green amphibole coexisting with secondary plagioklase and titanite.

Comment type	Comment
Alteration general comments:	The rock is slightly altered expressed by olivine replacement by mostly green amphibole, serpentine claz, plagioclase replacement by secondary plagioclase, and clinopyroxene replacement by green amphibole.
Cataclasite comments:	cataclastic overprint after crystalplastic deformation
Vein 1 minerals:	vein of green am coexist. with secondary plag, leukoxen
Vein 2 minerals:	monomineralic grenn amph veins

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	20		5
Amphibole, brown	n/a	2	n/a	n/a
Amphibole, colorless	30			
Amphibole, green		90		20
Chlorite	30			
Clay minerals	10			
Clinopyroxene, sec.	n/a	8	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

Detailed description This coarse grained olivine gabbro is cross-cut by amphibole alteration vein. Faulted feldspar are parallel to the vein.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium- to coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved
Plagioclase:	Grain size: medium- to coarse-grained; Grain shape: subhedral; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral; Grain boundary: curved

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Observer: OP

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	plagioclase faulting sub-parallel to vein
Vein:	vein morphology: irregular vein connectivity: single vein texture: polycrystalline vein-wall rock relationship: clear cut

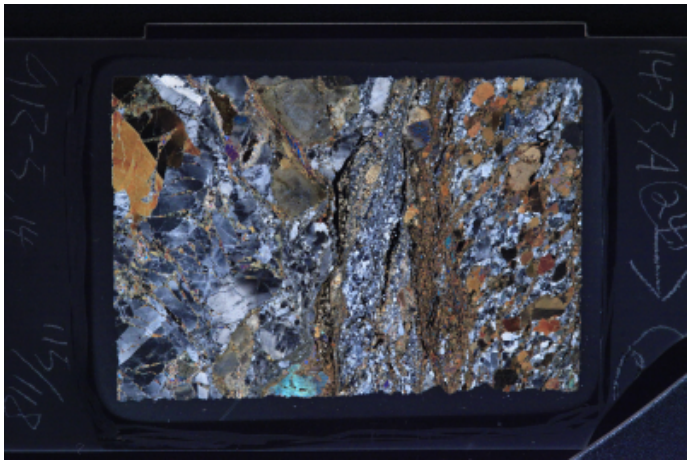
THIN SECTION LABEL ID: **360-U1473A-9R-5-W 115/118-TSB-TS_24** Piece no.: #14 TS no.: 24

Group	Summary
Igneous petrology:	There are two domains, a coarse-grained gabbro with a subophitic texture and a mylonitic oxide-bearing gabbro.
Metamorphic petrology:	Nearly half of the thin section consists of a foliated rock characterized by brown Amp and neoblastic Pl, in association with minor amounts of oxide phases. In the other portion of the thin section, micro-fractures are dominant and mostly filled with green Amp; micro-structures suggesting dynamic crystallization of green Amp are present in places.
Structure:	Fault breccia cored by a cataclasite.

Plane-polarized

32906011

Cross-polarized



32906031

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 20 Domain name: lithology domain 1

Lithology: **oxide-bearing gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: This domains is a foliated oxide-bearing gabbro. The primary magmatic texture is not preserved. Plagioclase is completely recrystallized. Opaque minerals are are concentrated in the boundary and are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	50	0.1	1.6	0.6	anhedral	subequant	recrystallized
Clinopyroxene	47		2.4	1.2	anhedral	elongate	strongly altered
Amphibole	0.2		0.4	0.4	anhedral	interstitial	
Opaques	3						
Ilmenite	3						

Interval domain no: **2** Domain rel. abundance (%): 80 Domain name: lithology domain 2

Lithology: **gabbro** Observer:

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: This domains is a coarse-grained gabbro with a subophitic texture. Plagioclase is strongly deformed and displays undulose extinction. It has experienced brittle deformation and is commonly crosscut by amphibole veins. Occasionally, plagioclase partly enclosed within clinopyroxene can be seen. Clinopyroxene is completely replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	65		5.6	5			deformed and crosscut by amphibole vein
Clinopyroxene	35		10	5		subequant	completely replaced by amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): RT

Detailed description Nearly half of the thin section consists of a foliated rock characterized by brown Amp and neoblastic Pl, in association with minor amounts of oxide phases. In the other portion of the thin section, micro-fractures are dominant and mostly filled with green Amp; micro-structures suggesting dynamic crystallization of green Amp are present in places. The rock alteration is overall substantial and mostly confined to Cpx, Pl is locally replaced along micro-veins filled with green Amp and minor secondary Pl.

Comment type	Comment
Alteration general comments:	The rock alteration is overall substantial and mostly confined to Cpx,
Mylonite comments:	Nearly half of the thin section consists of a foliated rocks characterized by brown Amp and neoblastic Pl, in association with minor amounts of oxide phases. In the other portion of the thin section, micro-fractures are dominant and mostly filled with green Amp; micro-structures suggesting dynamic crystallization of green Amp are present in places.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		80	100	10
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless			35	
Amphibole, green		50	15	90
Clay minerals			50	
Plagioclase, sec.	n/a	n/a	n/a	10
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: fault rock Observer: JD

Detailed description This section is a damage zone of a fault cored by a cataclasite. The cataclastic zone may have begun as a higher temperature shear zone. In the areas adjacent to the cataclasite there is a breccia with broken plagioclase clasts filled with amphibole. The pyroxene forms elongate clasts mantled by amphibole. There are oxide pods parallel to the cataclasite, in some cases surrounding clasts of plagioclase.

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a
Clasts in fault rock (%)	10	n/a
Fault rock clast size:	1.5	n/a
Fault rock intensity:	cataclasite	5
Fault sense of shear:	sinistral	n/a

Type	Comment
Plagioclase:	Grain size: 0.01-0.3 mm. Grain shape: elongate and anhedral. Grain boundary: very irregular, serrate. Twinning: tapered twinning in larger clasts. Undulose extinction: in every grain size, even the smallest clasts. Subgrains: well developed, even in smaller clasts. Texture: Cataclastite with comminuted grains that can be very fine. No clasts of plagioclase left. Grain boundaries are very irregular and undulose extinction is compete suggesting no static recrystallization/annealing.
Clinopyroxene:	Grain size: 0.6-2.0 mm. Grain shape: elgonate, subhedral. Grain boundary: curved, but altered. Texture: largest clasts in the cataclastite. some pyroxene cores with rims and tails of amphibole.
Oxide:	Oxide bands are parallel to the cataclasite. In some places where the oxide abundance is relatively high, the oxides enclose plagioclase clasts.

Interval domain no: 2 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: fault rock Observer: JD

Detailed description This section is a damage zone of a fault cored by a cataclasite. The cataclastic zone may have begun as a higher temperature shear zone. In the areas adjacent to the cataclasite there is a breccia with broken plagioclase clasts filled with amphibole. The pyroxene forms elongate clasts mantled by amphibole. There are oxide pods parallel to the cataclasite, in some cases surrounding clasts of plagioclase.

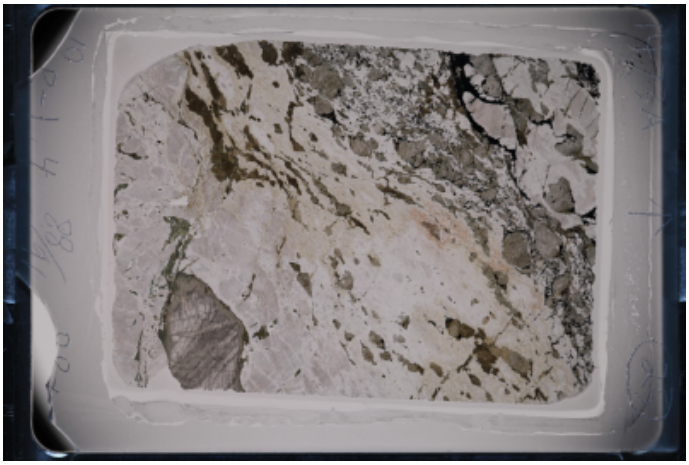
Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a
Clasts in fault rock (%)	90	n/a
Fault rock clast size:	3	n/a
Fault rock intensity:	well developed fault, breccia	4
Fault sense of shear:	unknown	n/a

Type	Comment
Plagioclase:	Grain size: 1-5 mm. Grain shape: anhedral Grain boundary: irregular, serrate. Twinning: tapered twinning. Undulose extinction: complete Subgrains: moderately developed Texture: large clasts of plagioclase that are fractured and filled with amphibole. some zones of smaller clasts surround the larger clasts.
Clinopyroxene:	Grain size: 1-5 mm. Grain shape: elgonate, subhedral. Grain boundary: curved, but altered. Texture: clasts of pyroxene with undulose extinction mantled by amphibole.
Oxide:	One oxide band parallel to the foliation near a pyroxene clast. Another oxide band occurs near a small cataclastic zone.

THIN SECTION LABEL ID: **360-U1473A-10R-1-W 88/91-TSB-TS_25** Piece no.: #04 TS no.: 25

Group	Summary
Igneous petrology:	This thin section contains two domains, a coarse-grained gabbro and a foliated oxide-bearing gabbro. Clinopyroxene in both domains is highly altered and replaced by green amphibole.
Metamorphic petrology:	The alteration intensity of this thin section is extensive(~60%). Clinopyroxene altered into brown and pale color amphibole. Plagioclase altered into secondary plagioclase and clay.
Structure:	Strongly deformed gabbro with evidence of brittle-ductile transition. The mylonitic foliation is defined by completely recrystallized plagioclase and partially clinopyroxene. Levels of very fine grained plagioclase and irregular shape of crystals define the cataclastic fabric. Oxides are present in bands parallel to the foliation.

Plane-polarized



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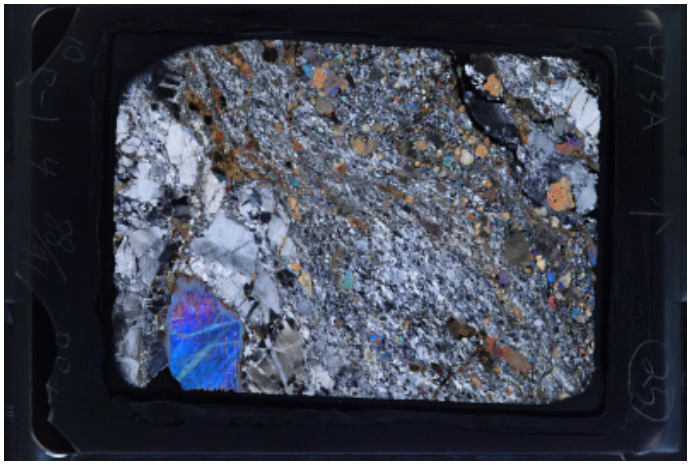
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 30 Domain name: lithology domain 1

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: This domain is a coarse-grained gabbro, with a granular texture. Tabular plagioclase is strongly deformed and displays undulose extinction. Close to the boundary, plagioclase neoblasts are recrystallized along the big subgrains. Clinopyroxene is moderately replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	75		12	8	anhedral	tabular	partly recrystallized and undulose extinction
Clinopyroxene	25		18	18	anhedral	subequant	moderately replaced by green amphibole

Interval domain no: **2** Domain rel. abundance (%): 70 Domain name: lithology domain 2

Lithology: **oxide-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is a foliated medium-grained oxide-bearing gabbro. Plagioclase is elongated and display undulose extinction. Clinopyroxene is heavily replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		2.4	1	anhedral	elongate	undulose extinction
Clinopyroxene	42		4	2	anhedral	subequant	heavily altered and replaced by green amphibole
Opaques	3						
Ilmenite	2.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): QM

Detailed description The alteration intensity of this thin section is extensive. Cpx neoblast altered into brown amphibole and tiny palecolor amphibole. Pl altered into secondary plagioclase and clay. Reddish and yellowlish clay occur among the plagioclase boundary in the neoblast.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro characterized by recrystallization of Pl, Cpx into aggregates. Parts of Cpx neoblasts are associated with brown amphibole and oxides. The brown amphibole neoblasts could be recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		65		55
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		55		5
Clay minerals		5		40
Plagioclase, sec.	n/a	n/a	n/a	55
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Twinning: rare tapered Undulose extinction: irregular Texture: completely recrystallized in elongated crystals, often fractured
Clinopyroxene:	Grain size: medium to fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: totally altered, often recrystallize at clinopyroxene grain boundary

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: fault rock Observer: CF

Detailed description This section shows the brittle-ductile transition that is defined by the contemporaneous recrystallization and intense fracturing. Fine grained levels of neoblasts are observed.

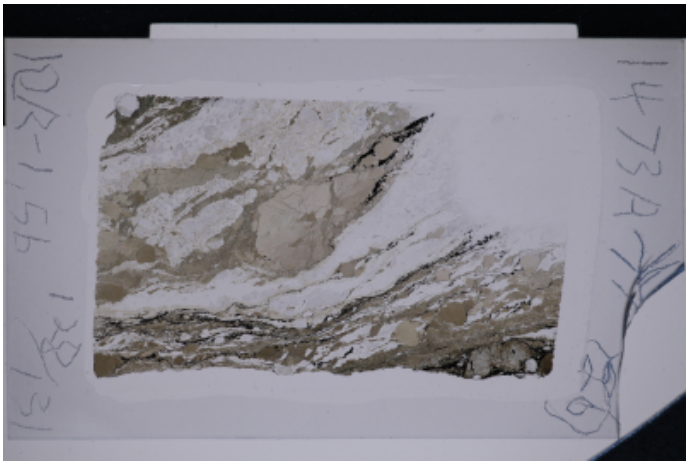
Feature type	Observation	Intensity rank
Fault rock intensity:	cataclasite	5
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Plagioclase:	very fine grained, defines irregular levels between recrytsallized plagioclase
Oxide:	bands parallel to foliation, mainly interstitial between fractured grains

THIN SECTION LABEL ID: **360-U1473A-10R-1-W 128/131-TSB-TS_26** Piece no.: #05 TS no.: 26

Group	Summary
Igneous petrology:	A disseminated oxide gabbro. Primary magmatic texture is not presreved. Plagioclase is elongated and shows undulose extinction. Opaque oxides occur along the foliation or at the pressure shadows.
Metamorphic petrology:	The section includes mylonitic bands consisting of fine-grained Pl, brown Amp and oxides. Two generations of brown Amp occur, with porphyroclasts dynamically replaced by neoblasts. The porphyroclastic Amp presumably replaced the primary Cpx. The coarsest domain of the rock is oxide-free and includes micro-fractures crosscut by micro-veins consisting of brown Amp and secondary Pl.
Structure:	Porphyroclastic mylonite with recrystallized plagioclase and clinopyroxene. Plagioclase and clinopyroxene porphyroclasts are deformed. Oxides form bands parallel to the foliation.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: foliated Ave. grain size: medium grained [345]

Detailed description: A disseminated oxide gabbro, with a texture of porphyroclastic to mylonitic. Plagioclase is strongly elongated and shows undulose extinction. Clinopyroxene is completely replaced by amphibole. Opaque oxides are distributed along the foliation or occur at the pressure shadows. They are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	50		2.8	1.6	anhedral	elongate	undulose extinction
Clinopyroxene	49		4.8	0.4	anhedral	elongate	completely replaced by amphibole
Opaques	1						
Ilmenite	1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): RT

Detailed description The section includes mylonitic bands consisting of fine-grained Pl, brown Amp and oxides. Two generations of brown Amp occur, with porphyroclasts dynamically replaced by neoblasts. The porphyroclastic Amp presumably replaced the primary Cpx. The coarsest domain of the rock is oxide-free and includes micro-fractures crosscut by micro-veins consisting of brown Amp and secondary Pl. The rock alteration estimate is extensive and mostly confined to Cpx. Pl is locally altered along micro-veins filled with brown Amp and/or secondary Pl.

Comment type	Comment
Alteration general comments:	The rock alteration is overall substantial and mostly confined to Cpx,
Mylonite comments:	The section includes mylonitic bands consisting of fine-grained Pl, brown Amp and oxides. Two generations of brown Amp occur, with porphyroclasts dynamically replaced by neoblasts. The porphyroclastic Amp presumably replaced the primary Cpx. The coarsest domain of the rock is oxide-free and includes micro-fractures crosscut by micro-veins consisting of brown Amp and secondary Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		95		20
Amphibole, brown	n/a	100	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF, GV

Detailed description Two amphiboles are present: recrystallized brown amphibole and green amphibole related to deformation event

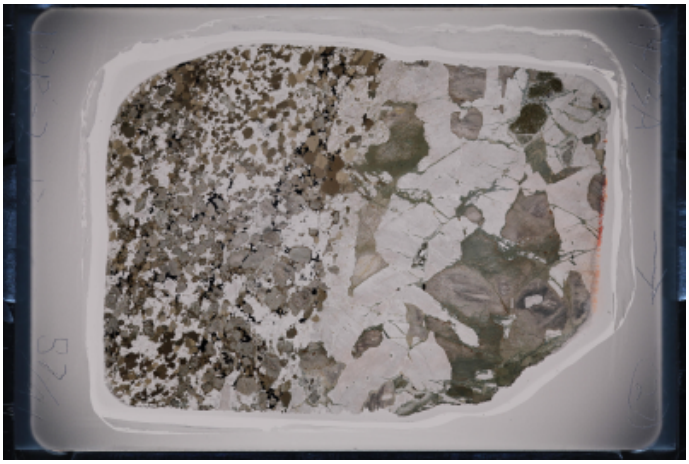
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Plagioclase:	Grain size: fine to very fine recrystallized, and coarse porphyroclast Grain shape: anhedral Grain boundary: curved Twinning: mechanical Undulose extinction: irregular and common Texture: deformed and extremely fractured porphyroclast surrounded by recrystallized grains. Recrystallized crystals define foliation in association with cpx. Levels of plg ultramylonite are observed.
Clinopyroxene:	Grain size: porphyroclast coarse, medium to fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: fractured and deformed porphyroclast. Recrystallized grains associated to plg define foliation
Oxide:	anhedral grains in 0.5-1 mm thick bands parallel to foliation

THIN SECTION LABEL ID: **360-U1473A-10R-2-W 87/91-TSB-TS_27** Piece no.: #13 TS no.: 27

Group	Summary
Igneous petrology:	This thin section contains two domains, a coarse-grained olivine-bearing domain with a subophitic texture and a medium-grained disseminated oxide domain with a granular texture.
Metamorphic petrology:	This thin section contains two alteration domains. One showed olivine totally altered. The other clinopyroxene and plagioclase displayed more alteration than the first domain.
Structure:	Primary contact between coarse grained olivine gabbro and medium to fine grained oxide-bearing gabbro. The medium grained domain shows partially and locally recrystallized plagioclase, and interstitial oxides where clinopyroxene is more abundant. Oxides exhibit lobate contacts with clinopyroxene.

Plane-polarized



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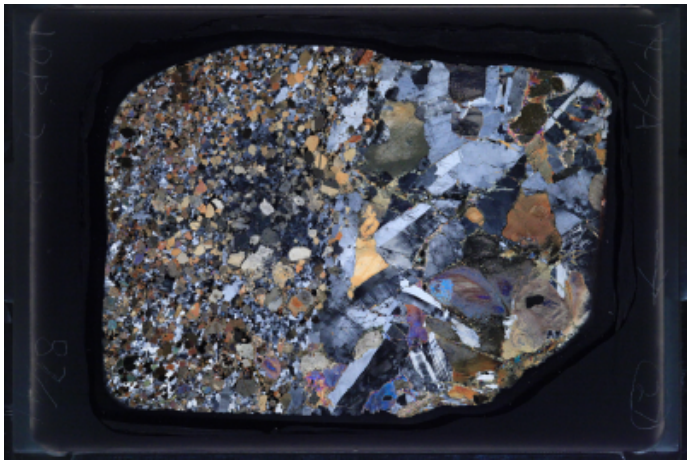
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: This domain is a coarse-grained olivine-bearing gabbro with a subophitic texture. Olivine is completely altered. Tabular plagioclase is partly enclosed within clinopyroxene. Plagioclase is occasionally crosscut by amphibole vein. Clinopyroxene is almost completely replaced by green amphibole and occasionally display consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			4	anhedral	subequant	completely altered
Plagioclase	58		15	6	subhedral	tabular	undulose extinction
Clinopyroxene	40		10	5	anhedral	subequant	heavily altered and replaced by green amphibole

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: lithology domain 2

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a medium-grained disseminated oxide gabbro, with a granular texture. Plagioclase is completely recrystallized and displays magmatic twins. Clinopyroxene is completely replaced by amphibole. Opaque oxides commonly surround clinopyroxene and are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	39		2	0.6	anhedral	subequant	
Clinopyroxene	60		4	2	anhedral	subequant	completely altered and replaced by green amphibole
Opaques	1						
Ilmenite	1						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): Domain name:

Total rock alteration estimate (%): 40 Observer(s): QM

Detailed description Ol developed with typical corona and mesh texture. Mesh texture mainly consist of serpentine and clay. Corona texture consist of pale color amphibole and green amphibole. Cpx were mainly replaced by green, pale color and brown amphibole. Pl almost altered into secondary plagioclase. Several amphibole veins were observed.

Comment type	Comment
Vein 1 minerals:	several green amphibole veins were observed

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	90	45		35
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	25	30		10
Amphibole, green	10	60		
Clay minerals	45			
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): Domain name:

Total rock alteration estimate (%): 55 Observer(s): QM

Detailed description Cpx developed corona textures with pale color amphibole rim. Pseudomorphic amphibole replaced Cpx. Pl were mainly replaced by secondary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		60		50
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		70		7
Amphibole, green		20		
Chlorite				3
Plagioclase, sec.	n/a	n/a	n/a	90
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Late stage fractures occur

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	completely altered
Plagioclase:	Grain size: coarse Grain shape: subhedral Grain boundary: straight Twinning: rare magmatic, common tapered Undulose extinction: common and irregular Texture: partially altered, late fractures dislocate fragments and replacement by alteration material (amph)
Clinopyroxene:	completely altered

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine locally recrystallized Grain shape: anhedral Grain boundary: curved Twinning: tapered Undulose extinction: common and irregular Texture: partially altered and locally weakly recrystallized
Clinopyroxene:	Grain size: medium Grain shape: anhedral Grain boundary: curved Texture: completely altered, granular texture, may show lobate contacts with interstitial oxide
Oxide:	interstitial anhedral pods to interstiscial vermicular along cpx edges; usually between cpx, and along grain size contact where cpx is concentrated

THIN SECTION LABEL ID: **360-U1473A-10R-3-W 72/75-TSB-TS_28** Piece no.: #05 TS no.: 28

Group	Summary
Igneous petrology:	A coarse-grained gabbro with a subophitic texture. Plagioclase displays magmatic twins or undulose extinction. Clinopyroxene is partly replaced by amphibole.
Metamorphic petrology:	Static background alteration is moderate with clinopyroxene partially replaced by mostly pale-brown amphibole.
Structure:	Weakly deformed isotropic gabbro with partially recrystallized plagioclase. Clinopyroxene and plagioclase porphyroclasts show undulose extinction.

Plane-polarized

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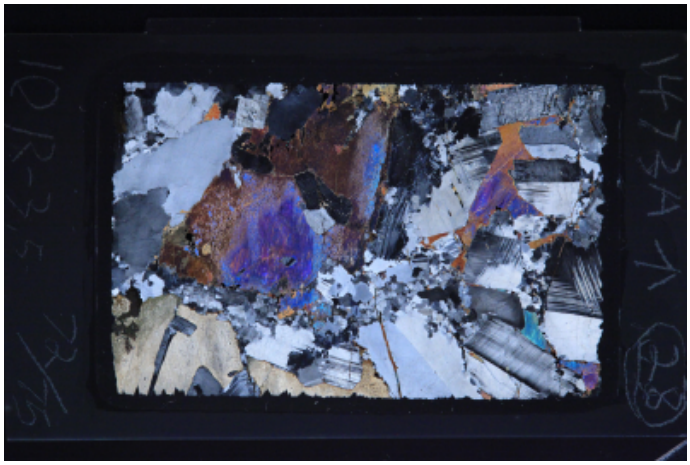
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained gabbro with a subophitic texture. Most plagioclases show magmatic twins and some display undulose extinction. Recrystallized plagioclase neoblasts occur along the boundary of big grains. Tabular plagioclase is partly enclosed within the poikilitic clinopyroxene. Clinopyroxene is interstitial between plagioclase, and is strongly altered. Its rim has been replaced by brown amphibole, occasionally together with ilmenite. Plagioclase occasionally occurs as chadacryst within clinopyroxene. There is a mineral in a square shape and has a high relief, but low birefringence colour. It might be zircon, but not sure.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	69	0.2	8	5	anhedral	tabular	undulose extinction
Clinopyroxene	30	0.4	15	7	anhedral	subequant	heavily replaced by green and brown amphibole
Amphibole	0.5	0.01	0.4	0.2	anhedral	interstitial	occurs at the rim of clinopyroxene
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): JL

Detailed description Alteration degree is moderate as a whole. Clinopyroxene is substantially altered while alteration of plagioclase is only slight. The most conspicuous replacement features are pale brown amphibole rims around primary clinopyroxene.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50		25
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		80		
Amphibole, green		10		10
Plagioclase, sec.	n/a	n/a	n/a	90
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 90 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Late stage veins cross cut the igneous texture and the recrystallized plagioclase.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: euhedral to subhedral Grain boundary: straight Twinning: igneous and mechanical Undulose extinction: irregular and not evenly distributed Subgrains: not observed Texture: no SPO observed, included in cpx, fractured cross cutting the igneous texture filled with alteration
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight to curved and lobate Texture: altered and fractured, includes plg
Oxide:	fine grained, anhedral and interstitial

Interval domain no: 2 Domain rel. abundance (%): 10 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

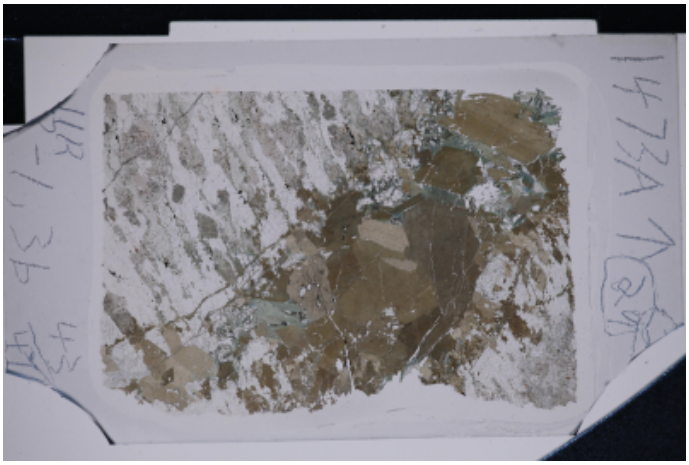
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: fine to medium Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular Texture: recrystallized along grain boundaries between plg and cpx

THIN SECTION LABEL ID: **360-U1473A-11R-1-W 43/47-TSB-TS_29** Piece no.: #03 TS no.: 29

Group	Summary
Igneous petrology:	A medium-grained gabbro crosscut by an amphibole vein. The gabbor is strongly foliated and the primary magmatic texture is not preserved. The amphibole vein is exclusively composed of subhedral amphibole.
Metamorphic petrology:	The thin section includes a thick vein filled with brown Amp and minor Pl. Near the contact with the host gabbro, the brown Amp from the vein is frequently rimmed by green Amp. The halo in the host mylonitic gabbro is characterized by brown Amp replacing Cpx. The brown Amp vein and the host rock are locally crosscut by thin veins filled with pale Amp and Chl.
Structure:	Strongly deformed, mylonitic crystal plastic fabric with plagioclase completely recrystallized in association with partialy recrystallized clinoppyroxene. Foliation is cross-cut by amphibole planar and haloed vein.

Plane-polarized



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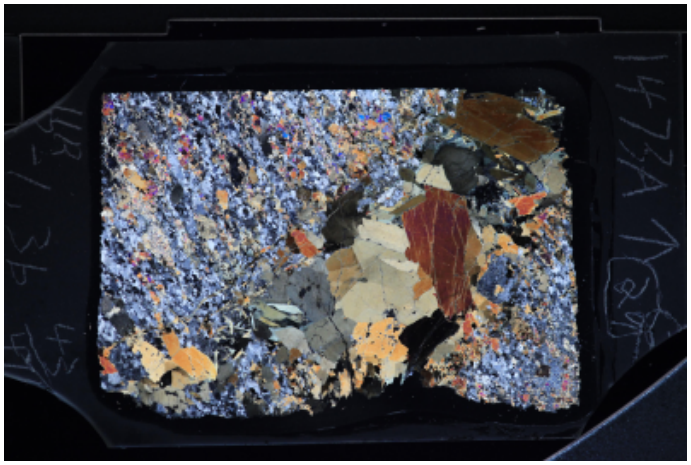
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 55 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: foliated Ave. grain size: medium grained [345]

Detailed description: A foliated medium-grained gabbro, crosscut by amphibole vein. In the gabbro, the foliation is defined by the preferred orientation of both plagioclase and clinopyroxene. Plagioclase displays undulose extinction and clinopyroxene is strongly altered.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		1	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	30		2.4	0.6	anhedral	elongate	moderately altered
Opaques	0.2						
Ilmenite	0.2						

Interval domain no: **2** Domain rel. abundance (%): 45 Domain name: vein

Lithology: **amphibole vein** Observer:

Texture: Ave. grain size:

Detailed description: The amphibole vein mainly consists of subhedral amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Amphibole	100		8	6	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): RT

Detailed description The rock shows a crystal-plastic fabric characterized by Cpx recrystallization into neoblastic Cpx, with the latter typically associated with minor brown Amp and/or opaque phases. The thin section includes a thick vein filled with brown Amp and minor Pl. Near the contact with the host gabbro, the brown Amp from the vein is frequently rimmed by green Amp. The halo in the host gabbro is characterized by brown Amp replacing Cpx. The brown Amp vein and the host rock are locally crosscut by thin veins filled with pale Amp and Chl. The rock alteration is overall substantial. Opx replacement is characterized by Chl and pale Amp preferentially localized at the inner and the external portion of the pseudomorph, respectively. Pl is altered along micro-veins and grain boundaries.

Comment type	Comment
Mylonite comments:	Cpx recrystallized in neoblastic Cpx and minor brown Amp and/or opaque phases
Vein 1 minerals:	The thin section includes a thick vein filled with brown Amp and minor Pl. Near the contact with the host gabbro, the brown Amp from the vein is frequently rimmed by green Amp. The halo in the host mylonitic gabbro is characterized by brown Amp replacing Cpx.
Vein 2 minerals:	The brown Amp vein and the host rock are locally crosscut by thin veins filled with pale Amp and Chl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50	100	10
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless			40	50
Amphibole, green		45		
Chlorite			60	50
Oxide		5		n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular Texture: completely recrystallized in association with cpx, they define foliation
Clinopyroxene:	Grain size: medium/coarse porphyroclast to fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: recrystallized grains in association with plg define foliation, porphyroclast partially replaced by amphibole

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: metamorphic Observer: CF

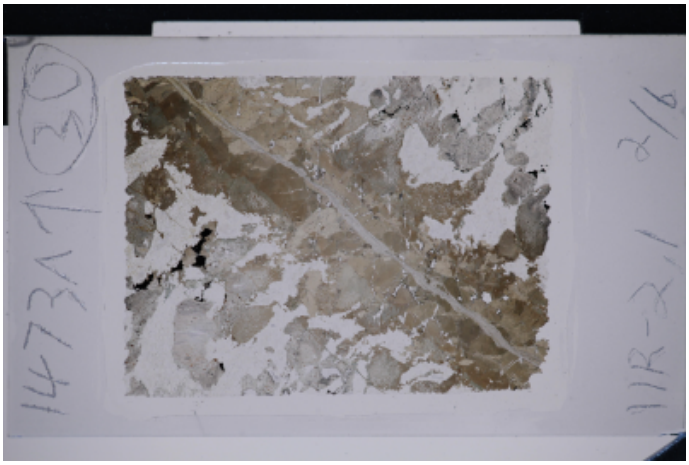
Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fault sense of shear:	reverse-sinistral	n/a

Type	Comment
Vein:	Metamorphic amphibole vein, planar, single, polycrystalline (amph and plg), haloed (green amph), clear-cut with host mylonite

THIN SECTION LABEL ID: **360-U1473A-11R-2-W 2/6-TSB-TS_30** Piece no.: #01 TS no.: 30

Group	Summary
Igneous petrology:	An oxide-bearing gabbro with a porphyroclastic texture, crosscut by an amphibole vein. Plagioclase in the gabbro is completely recrystallized and weakly foliated. Clinopyroxene is moderately altered and replaced by green amphibole. The amphibole vein mainly consists of subhedral amphiboles.
Metamorphic petrology:	This ts represents a ca. 1 cm thick metamorphic vein composed of brown amphibole with an inner thin vein (0.5 mm) consisting of zoisite plus a small amounts of colorless amphibole and chlorite. Cpx directly adjacent to the veins are to 90%-100% altered (mostly replaced by brown amphibole), cpx away from the vein is only to 10 % altered (mostly by amphibole). Because of this strong gradient in background alteration and lack of representativeness in alteration intensity, background data were not obatined.
Structure:	Porphyroclastic with partially and locally recrystallized plagioclase and clinopyroxene. Plagioclase porphyroclasts are deformed and clinopyroxene porphyroclasts are slightly deformed. Oxides form irregular pods. The structure is cross-cut by planar, polycrystalline metamorphic vein.

Plane-polarized



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Cross-polarized

32919501

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology domain 1

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A disseminated oxide gabbro with a porphyroclastic texture. It is crosscut by an amphibole vein. Plagioclase is completely recrystallized and weakly foliated. Clinopyroxene is moderately altered and replaced by green amphibole. Opaque minerals are predominated by ilmenites.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		1.6	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	39		4.4	2.8	anhedral	subequant	moderately altered and replaced by green amphibole
Opaques	1						
Ilmenite	1						

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **amphibole vein** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: The amphibole vein mainly consist of brown amphibole. In the center, a mylonitic vein occurs.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Amphibole	100		6	1.5	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): Observer(s): JK

Detailed description This ts represents a ca. 1 cm thick metamorphic vein composed of brown amphibole with an inner thin vein (0.5 mm) consisting of zoisite plus a small amounts of colorless amphibole and chlorite. Cpx directly adjacent to the veins is to 90%-100% altered (mostly replaced by brown amphibole), cpx away from the vein is only to 10 % altered (mostly by amphibole). Because of this strong gradient in background alteration and lack of representativeness in alteration intensity, background data were not obatined.

Comment type	Comment
Alteration general comments:	This ts represents a ca. 1 cm thick metamorphic vein composed of brown amphibole. Cpx directly adjacent to the veins are to 90%-100% altered (mostly replaced by brown amphibole), those away from the vein are to 10 % altered (mostly by amphibole). Because of this strong gradient in background alteration and lack of representativeness in alteration intensity, background data were not obatined.
Vein 1 minerals:	several mm thick vein consisting of brown green amphibole
Vein 2 minerals:	inner vein within amph vein (0.5 mm thin) consisting of zoisite (+ small amounts of colorless amphibole and chlorite)
Vein 3 minerals:	very thin cracks horizontal to the core mostly open; in rare cases filled with zeolite, clay

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: straight Twinning: mechanical Undulose extinction: regular Texture: recrystallized grain size is finer at cpx porphyroclasts grain boundary, locally recrystallized in association with cpx
Clinopyroxene:	Grain size: coarse porphyroclasts, fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: rounded cpx porphyroclast, locally recrystallized in association with plg
Oxide:	interstitial irregular pods

Interval domain no: 2 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: metamorphic Observer: CF

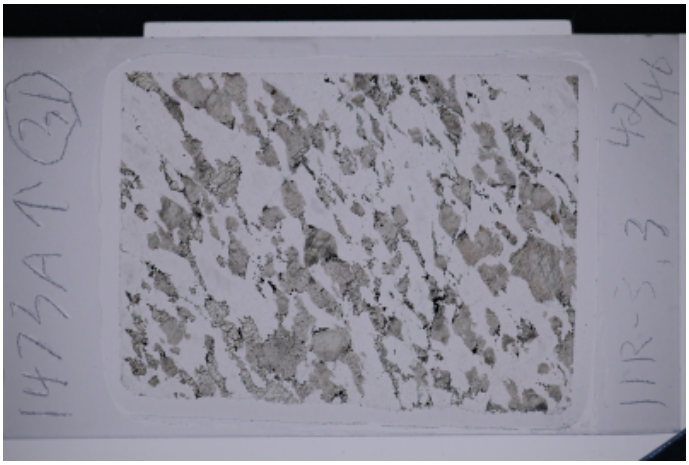
Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Vein:	Metamorphic vein, planar, cross-cutting, polycrystalline, haloed

THIN SECTION LABEL ID: **360-U1473A-11R-3-W 42/46-TSB-TS_31** Piece no.: #05 TS no.: 31

Group	Summary
Igneous petrology:	A medium-grained disseminated oxide olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is elongated and plagioclase is commonly recrystallized. Clinopyroxene is partly recrystallized and occasionally displays a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfide.
Metamorphic petrology:	Fresh mylonite characterized by recrystallization of primary Pl, Ol and Cpx into nearly polygonal aggregates. The neoblastic Cpx is associated with minor amounts of brown Amp and/or opaque phases.
Structure:	Mylonite with completely recrystallized polagioclase, locally recrystallized olivine and plagioclase form elongated aggregates that define the foliation. Oxides form bands parallel to the foliaton.

Plane-polarized



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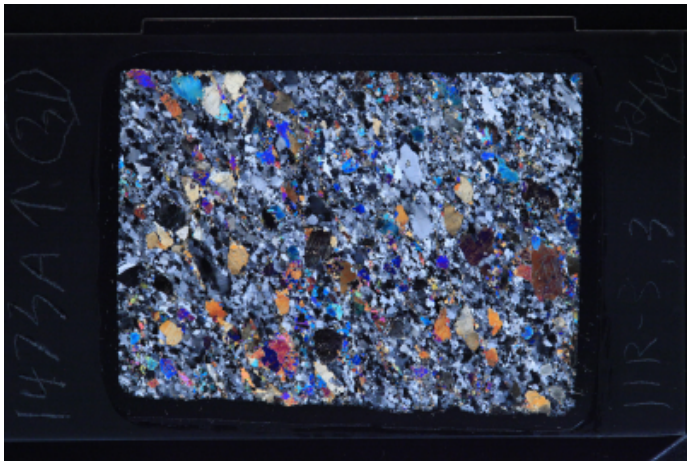
Cross-polarized



32919091

IGNEOUS PETROLOGY

Lithology: **disseminated oxide olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained disseminated oxide olivine gabbro with a porphyroclastic texture. Olivine is elongated and commonly surrounds clinopyroxene. It is weakly altered and replaced by opaque minerals. Plagioclase is commonly recrystallized and elongated. It displays undulose extinction. Clinopyroxene is partly recrystallized and occasionally display a consertal intergrowth texture. It contains blebs of brown amphibole. Opaque minerals are composed of ilmenite and sulfide.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			0.4	anhedral	interstitial	Commonly surrounding clinopyroxene
Plagioclase	59		2.8	0.6	anhedral	elongate	
Clinopyroxene	31		4.8	2	anhedral	subequant	consertal intergrowth
Amphibole	1	0.01	0.7	0.2	anhedral	interstitial	
Opaques	1						
Ilmenite	0.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description Fresh mylonite characterized by recrystallization of primary Pl, Ol and Cpx into nearly polygonal aggregates. The neoblastic Cpx is associated with minor amounts of brown Amp and/or opaque phases.

Comment type	Comment
Mylonite comments:	Fresh mylonite characterized by recrystallization of primary Pl, Ol and Cpx into nearly polygonal aggregates. The neoblastic Cpx is associated with minor amounts of brown Amp and/or opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		5
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, green		30		
Chlorite				100
Clinopyroxene, sec.	n/a	35	n/a	n/a
Oxide	50			n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

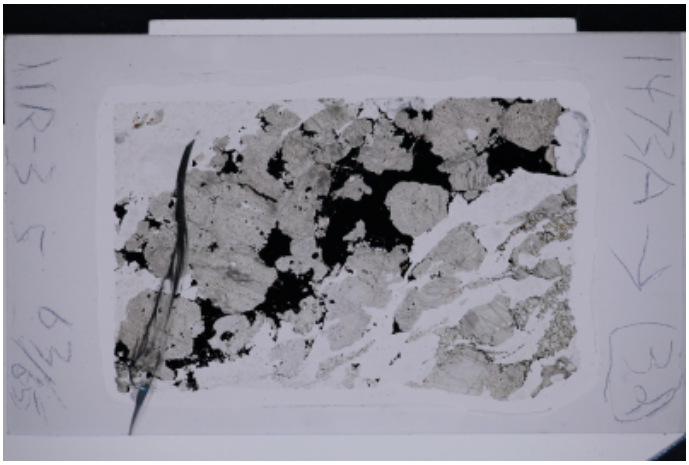
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: regular and common Subgrains: not observed Textures: fractured and partially altered, recrystallized in association with cpx in elongated laths that define the foliation
Plagioclase:	Grain size: medium to coarse Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical Unduluse extinction: irregular and common Texture: completely recrystallized
Clinopyroxene:	Grain size: coarse to fine recrystallized Grain shape: anhedral Grain boundary: curved to straight in recrystallized Texture: porphyroclasts elongated; recrystallized grains are in association with olivine and define foliation
Oxide:	anhedral and interstitial; sometimes thin bands parallel to foliation define cpx porphyroclast tails

THIN SECTION LABEL ID: **360-U1473A-11R-3-W 63/65-TSB-TS_32** Piece no.: #05 TS no.: 32

Group	Summary
Igneous petrology:	A mdeium-grained oxide-bearing olivine gabbro with a porphyroclastic texture. Olivine is elongated and recrystallized. Plagioclase is completely recrystallized and foliated. Clinopyroxene contains brown amphibole blebs and plagioclase inclusions. Opaque minerals mainly consist of ilmenite and magnetite, with minor sulfides.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Weak magmatic fabric overprinted by moderate deformation. Plagioclase is strongly recrystallized, olivine and clinopyroxene are locally recrystallized in elongated aggregates that define the crystal plastic foliation.

Plane-polarized



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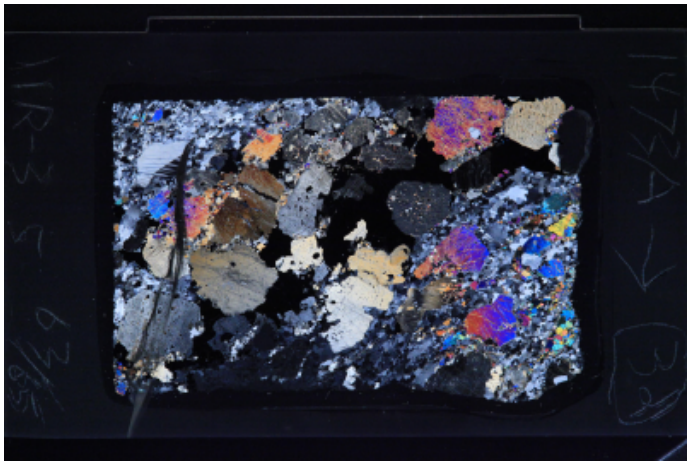
Cross-polarized



32919051

IGNEOUS PETROLOGY

Lithology: **oxide olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained oxide olivine gabbro with a porphyroclastic texture. Olivine is recrystallized and the neoblasts are elongated or surround clinopyroxene. Subhedral olivine neoblasts also occur as granular aggregates. Plagioclase is completely recrystallized and foliated. The plagioclase neoblasts display magmatic twins and show undulose extinction. Deformation twins can be seen in big plagioclase twins. Clinopyroxene contains abundant brown amphibole blebs and plagioclase inclusions. It also displays consertal intergrowth texture. Small orthopyroxene occurs at the rim of clinopyroxene. Opaque minerals are interstitial between clinopyroxene and mainly consist of ilmenite and magnetite, with minor sulfides. Intergrowth between ilmenite and magnetite is common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5	0.1	0.1	1.2	anhedral	elongate	olivine neoblasts surrounding clinopyroxene
Plagioclase	20	0.2	1.8	0.8	anhedral	elongate	strongly recrystallized and foliated
Clinopyroxene	65	0.4	6	4	anhedral	subequant	containing plagioclase chadacrysts
Amphibole	0.1	0.01	0.2	0.1	anhedral	interstitial	occur at clinopyroxene rim or as blebs together with ilmenite in clinopyroxene
Opaques	9.9						
Magnetite	5						
Ilmenite	4.4						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Interval domain no: 2 Domain rel. abundance (%): 45 Domain name:

Total rock alteration estimate (%): 25 Observer(s): QM

Detailed description The alteration intensity of this domain is moderate. Ol were replaced by clay, oxides and serpentine. Cpx mainly altered into green amphibole. Opx altered into pale color amphibole and talc. Pl were mostly replaced by secondary plagioclase.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro characterized by recrystallization of primary Pl, Ol and Cpx into aggregates. Part of olivine neoblasts are associated with oxide.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	10	20	30
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless			70	
Amphibole, green		70		
Chlorite				5
Clay minerals	50			
Oxide	30			n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Talc		n/a	30	n/a
Subtotals replaced	100	100	100	100

Interval domain no: 1 Domain rel. abundance (%): 55 Domain name:

Total rock alteration estimate (%): 20 Observer(s): QM

Detailed description The alteration intensity of this domain is moderate. The Pl less alteraed. Opx occur as exsolutions of Cpx. Opx mainly altered into talc and chlorite with minor oxides. Pl mostly altered into secondary plagioclase with minor pale color amphibole occurring in the cleavages.

Comment type	Comment
Mylonite comments:	Mylonitic oxide gabbro characterized by recrystallization of primary Pl and Cpx into aggregates. In the aggregates, which altered into talc could be Opx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		20	60	15
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		80		10
Chlorite			25	
Oxide			5	n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc		n/a	70	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description This sample shows a central band enriched in clinopyroxene and oxides

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Twinning: mechanical
Clinopyroxene:	Grain size: coarse Grain shape: subhedral to anhedral Grain boundary: straight to curved to lobate Fractures: common Texture: abundant cpx, variably elongated, partially replaced by recrystallized plg along boundaries, include igneous plg
Oxide:	anhedral in irregular pods between igneous cpx

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

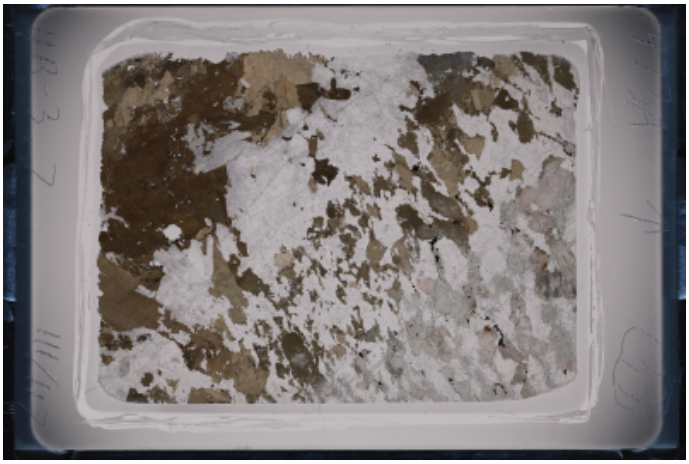
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundaries: straight Undulose extinction: common and regular Subgrains: rare straight Texture: recrystallized in association with cpx in elongated laths that define foliation
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight Twinning: mechanical Undulose extinction: regular to irregular and common Texture: completely recrystallized, elongated crystals that partially define foliation
Clinopyroxene:	Grain size: coarse porphyroclasts to medium recrystallized Grain shape: anhedral, elongated Grain boundaries: straight to curved Texture: porphyroclasts rounded, recrystallized crystals are partially elongated parallel to foliation

THIN SECTION LABEL ID: **360-U1473A-11R-3-W 111/117-TSB-TS_33** Piece no.: #07 TS no.: 33

Group	Summary
Igneous petrology:	A medium-grained gabbro intruded by an diorite vein. The gabbro is weakly foliated and the primary magmatic texture is not preserved. The diorite vein displays a granular texture.
Metamorphic petrology:	The thin section shows a massive vein consisting of brown Amp and Pl, which both display euhedral to subhedral habit. This vein crosscuts at a high angle a mylonitic foliation characterized by recrystallization of primary Pl and Cpx. The vein is associated with a halo in the host gabbro, in which the clinopyroxene is pseudomorphically replaced by brown Amp. The host mylonitic gabbro overall shows a substantial background static alteration. In the massive Amp-Pl vein, Pl is locally altered into epidote and secondary Pl.
Structure:	Mylonitic foliation defined by recrystallized plagioclase and oriented porphyroclasts. Rare oxide crystallized at porphyroclasts grain boundary. Structure cross-cut by polycrystalline, haloed, amphibole and plagioclase vein.

Plane-polarized



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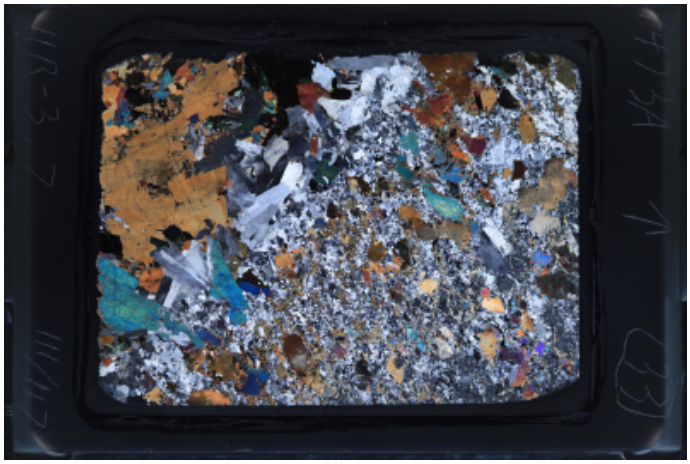
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 20 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is a medium-grained gabbro with a porphyroclastic texture. Plagioclase is highly recrystallized and displays undulose extinction. Clinopyroxene is heavily altered and replaced by green amphibole. Brown amphibole also commonly occurs at the rim of clinopyroxene. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	69		4	0.4	anhedral	subequant	recrystallized
Clinopyroxene	30		7	2	anhedral	elongate	heavily altered
Amphibole	0.5		0.6	0.4		interstitial	
Opaques	0.5						
Ilmenite	0.5						

Interval domain no: **2** Domain rel. abundance (%): 80 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: The diorite vein shows a granular texture and is composed of subhedral plagioclase and brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	45		6	4	subhedral	tabular	altered
Amphibole	55		18	4	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): RT

Detailed description The thin section shows a massive vein consisting of brown Amp and Pl, which both display euhedral to subhedral habit. This vein crosscuts at a high angle a mylonitic foliation characterized by recrystallization of primary Pl and Cpx. The Cpx neoblasts are associated with minor amounts of red-brown Amp. The vein is associated with a halo in the host gabbro, in which the clinopyroxene is pseudomorphically replaced by brown Amp. The Pl from the halo locally shows cores showing high relief and irregular shape. Far from the massive Amp-Pl vein, the primary Cpx is partially altered into pale green Amp and Chl, essentially along micro-veins. Associated Pl is locally altered into aggregates consisting of Chl, pale green Amp and minor epidote, mostly along micro-veins and along the grain boundaries among the neoblastic Pl grains. In the massive Amp-Pl vein, Pl is locally altered into epidote and secondary Pl. The sample overall shows a substantial alteration.

Comment type	Comment
Alteration general comments:	The mylonitic gabbro hosting the massive Amp-Pl vein overall shows a substantial background static alteration.
Mylonite comments:	The thin section shows a massive vein consisting of brown Amp and Pl. This vein crosscuts at a high angle a mylonitic foliation characterized by recrystallization of primary Pl and Cpx. The Cpx neoblasts are associated with minor amounts of red-brown Amp.
Vein 1 minerals:	The thin section shows a massive vein consisting of brown Amp and Pl, which both display euhedral to subhedral habit. The vein is associated with a halo in the host rock, in which the clinopyroxene is pseudomorphically replaced by brown Amp. The Pl from the halo locally shows cores showing high relief and irregular shape.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	55		15
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, colorless	20	10		30
Chlorite	80	10		60
Epidote/zoisite	n/a	n/a	n/a	10
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 65 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Twinning: common tapered Undulose extinction: irregular Texture: completely recrystallized, locally in association with clinopyroxene
Clinopyroxene:	Grain size: coarse porphyroclast to medium recrystallized Grain shape: anhedral Grain boundaries: curved Texture: porphyroclasts parallel to foliation, locally recrystallized in association with plagioclase
Oxide:	interstitial, partially surrounding porphyroclast

Interval domain no: 2 Domain rel. abundance (%): 35 Domain name: microfabric

Microstructure: metamorphic Observer: CF

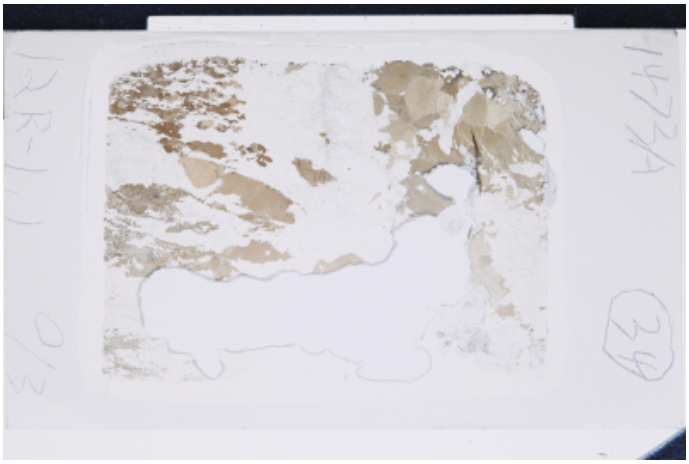
Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Vein:	Metamorphic amphibole vein, high angle with foliation, polycrystalline (plagioclase and amphybole), haloed

THIN SECTION LABEL ID: **360-U1473A-12R-1-W 0/3-TSB-TS_34** Piece no.: #01 TS no.: 34

Group	Summary
Igneous petrology:	A deformed gabbro with a porphyroclastic texture. Plagioclase is recrystallized and elongated along the foliation. Clinopyroxene is also elongated but to a less extent relative plagioclase. Clinopyroxene is completely replaced by green amphibole.
Metamorphic petrology:	Clinopyroxene porphyroclasts and neoblasts are staticaly replaced by amphibole.
Structure:	Porphyroclastic gabbro with recrystallized plagioclase grains parallel to foliation as well as statically replace clinopyroxene porphyroclasts and neoblasts.

Plane-polarized



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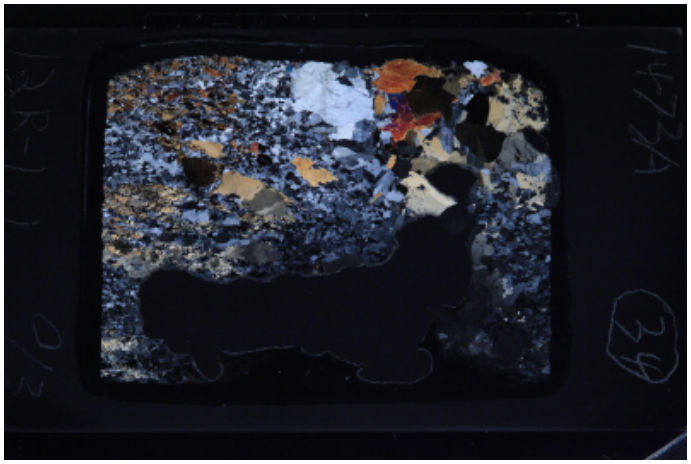
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is a weakly foliated gabbro with a porphyroclastic texture. The foliation is defined by the preferred orientation of both plagioclase and clinopyroxene. Plagioclase is recrystallized and elongated. Clinopyroxene is completely replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		1.8	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	40		2.4	2	anhedral	elongate	

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: vein

Lithology: **diorite** Observer:

Texture: granular Ave. grain size:

Detailed description: This domains is a diorite vein, which mainly consists of tabular plagioclase and subequant amphibole. The plagioclase displays magmatic twins.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	30		7.2	2		tabular	magmatic twins
Amphibole	70		5	4	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 80 Observer(s): TN

Detailed description Clinopyroxene is almost completely replased by brown amphibole. The brown amphibole has reddish brown spots and greenish brown rim, suggesting retrograde composition change. Plagioclase is replaced by secondary plagioclase near Amp vein and also near zeolite (?) vein.

Comment type	Comment
Mylonite comments:	Cpx, Pl neoblasts and porphyroclasts
Vein 1 minerals:	Brown Amp; each grain has green Amp rim
Vein 2 minerals:	zeolite?

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		95		70
Amphibole, brown	n/a	90	n/a	n/a
Amphibole, colorless		2		
Amphibole, green		8		
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Detailed description Porphyroclastic gabbro with elongated and recrystallized plagioclase grains parallel to foliation as well as statically replace clinopyroxene porphyroclasts and neoblasts.

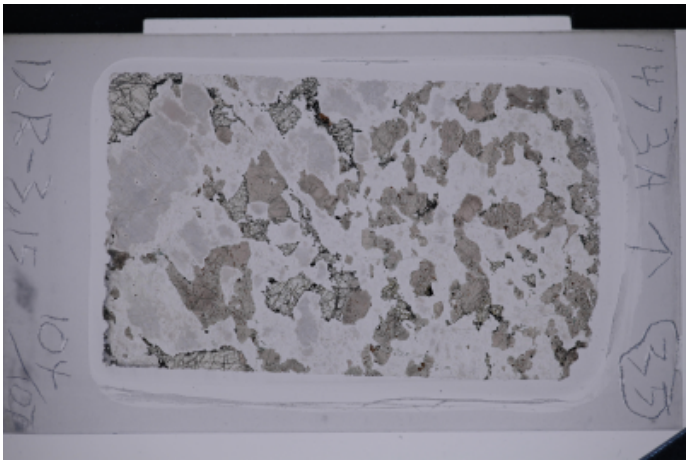
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Plagioclase:	Grain size: coarse- to medium-grained porphyroclasts, medium-grained neoblast; Grain shape: anhedral; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Subgrains: straight to curved boundaries; Texture: elongated porphyroclasts surrounded by medium-grained neoblasts
Clinopyroxene:	Grain size: coarse-grained porhyroclasts, medium-grained neoblasts; Grain shape: subhedral to anhedral Grain boundary: straight to curved Texture: amphibole-altered porphyroclasts and neoblasts
Oxide:	rare interstitial oxides

THIN SECTION LABEL ID: **360-U1473A-12R-3-W 104/107-TSB-TS_35** Piece no.: #15 TS no.: 35

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a porphyroclastic texture. Olivine is occasionally rimmed by orthopyroxene. Plagioclase commonly displays undulose extinction. Clinopyroxene is rimmed by brown amphibole and oxides. Opaque oxides mainly consist of ilmenite, with minor sulfides.
Metamorphic petrology:	Total static alteration intensity is moderate.
Structure:	Porphyroclastic with strongly recrystallized plagioclase and locally recrystallized olivine in association with clinopyroxene.

Plane-polarized



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Cross-polarized

32931991

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. Olivine is partly altered and recrystallized. Olivine porphyroclasts are occasionally rimmed by orthopyroxene and olivine neoblasts commonly surround clinopyroxene. Plagioclase is commonly recrystallized and displays undulose extinction. Deformation twins can be seen in some big plagioclase grains. Occasionally, clinopyroxene is rimmed by brown amphibole and oxides. The poikilitic texture is locally preserved in a few clinopyroxene porphyroclasts, as plagioclase is partly or fully enclosed. Brown amphibole also occurs as blebs within clinopyroxene, sometimes along the exsolution lamallae. Opaque oxides mainly consist of ilmenite, with minor sulfides. Intergrowth between ilmenite and sulfides can be observed.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6	0.4	0.4	3	anhedral	subequant	rimmed by orthopyroxene and partly altered.
Plagioclase	70	0.1	9	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	23.5	0.1	4.8	2.8	anhedral	subequant	Containing plagioclase chadacrysts. With blebs of amphibole/ilmenite along the exsolution lamallae.
Amphibole	0.2	0.05	0.4	0.2	anhedral	interstitial	commonly occurring at clinopyroxene rims.
Opaques	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Relatively fresh rock. Olivine is replaced by talc and serpentine. Clinopyroxene is replaced by mainly secondary clinopyroxene and brown amphibole.

Comment type	Comment
Alteration general comments:	Relatively fresh rock. Olivine is replaced by talc and serpentine. Clinopyroxene is replaced by mainly secondary clinopyroxene and brown amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	30		2
Amphibole, brown	n/a	25	n/a	n/a
Amphibole, colorless		5		
Amphibole, green		5		
Chlorite				90
Clay minerals	10			
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	10	5		n/a
Plagioclase, sec.	n/a	n/a	n/a	10
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

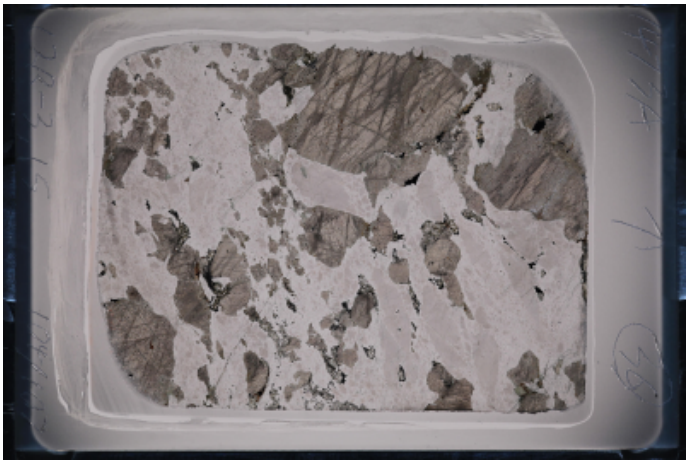
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclast to fine recrystallized Grain shape: anhedral Grain boundary: straight Undulose extinction: regular and common Subgrains: straight, in porphyroclasts Texture: fractured and partially altered, locally recrystallized in association with plg and cpx
Plagioclase:	Grain size: coarse porphyroclast to medium and fine recrystallized Grain shape: anhedral Grain boundaries: straight to curved Undulose extinction: irregular Texture: most recrystallized phase, presence of igneous porphyroclasts
Clinopyroxene:	Grain size: coarse porphyroclast to medium and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Texture: porphyroclasts include plg, recrystallized crystals are often in association with olivine (sometimes between ol and cpx porphyroclasts)

THIN SECTION LABEL ID: **360-U1473A-12R-4-W 60/64-TSB-TS_36** Piece no.: #08 TS no.: 36

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro. Primary magmatic texture is not preserved. Olivine commonly occurs as neoblasts around clinopyroxene. Plagioclase is partly recrystallized and displays undulose extinction. Clinopyroxene mainly occurs as porphyroclast. Opaque oxides are predominated by ilmenite, with minor sulfides.
Metamorphic petrology:	The alteration intensity of this thin section is moderate. Olivine developed mesh texture.
Structure:	Strongly recrystallized porphyroclastic olivine gabbro.

Plane-polarized



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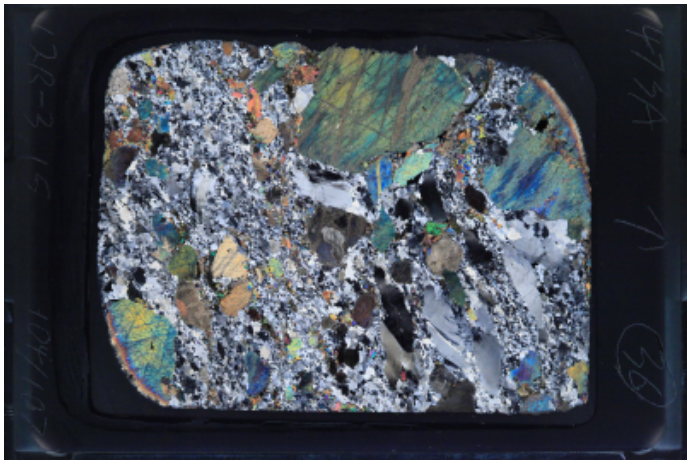
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine-bearing gabbro with a porphyroclastic texture. Olivine is weakly altered and commonly occurs as neoblasts around clinopyroxene. Plagioclase is partly recrystallized and the porphyroclasts are elongated. They display undulose extinction. Deformation twins can be seen in some big plagioclases. Clinopyroxene mainly occurs as porphyroclast and contains brown amphibole blebs. It has been moderately altered and replaced by green amphibole. Consertal intergrowth texture can be seen in clinopyroxene. Opaque oxides are predominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			0.8	anhedral	elongate	commonly occurs as neoblast around clinopyroxene
Plagioclase	74.5		12	0.4	anhedral	elongate	highly recrystallized
Clinopyroxene	22		18	10	anhedral	subequant	with blebs of brown amphibole
Orthopyroxene	0.5			0.6			
Amphibole	0.5		1.6	0.2	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): QM

Detailed description Olivine developed mesh texture. The mesh rim consist of clay, serpentine and oxides. Olivine also altered into talc and green amphibole. Clinopyroxene mainly altered into pale color, green and brown amphibole. Plagioclase were almost replaced by secondary plagioclase. There were minor chlorite and pale color amphibole occurring in the cleavages of plagioclase.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro characterized by recrystallization of Cpx, Pl and Ol into polygonal aggregates. Cpx neoblasts were associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	35	20		40
Amphibole, brown	n/a	25	n/a	n/a
Amphibole, colorless		50		5
Amphibole, green	5	25		
Chlorite				5
Clay minerals	25			
Oxide	25			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Strongly recrystallized porphyroclastic olivine gabbro with porphyroclastic plagioclase and pyroxene. The plagoiclase porphyroclasts have core and mantle structures, incipient brittle fractures, and subgrain development. Large porphyroclasts of pyroxene form pressure shadows near which the recrystallization of all phases is limited.

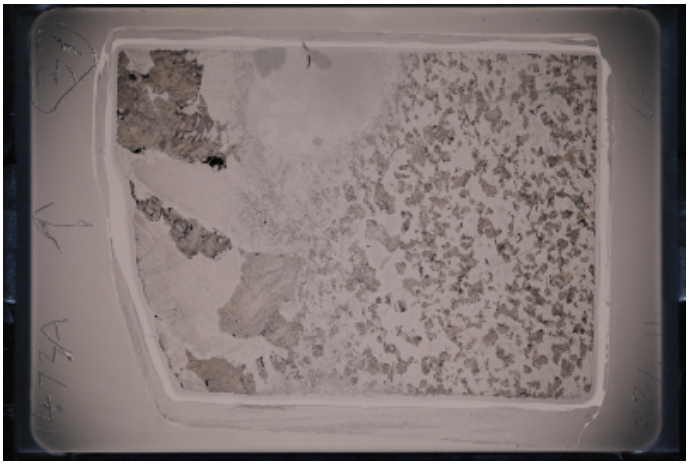
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: 1-2 mm. neoblasts: 0.1-0.3 mm. Grain shape: anhedral. Grain boundary: polygonal. Undulose extinction: better developed in porphyroclasts. Subgrains: poorly developed. Texture: Some porphyroclasts present, some with mantles of recrystallized grains, others without. The recrystallized grains occur in aggregates with not porphyroclast.
Plagioclase:	Grain size: porphyroclasts: 0.5-1.5 cm. neoblasts: 0.15-0.5 mm. Grain shape: anhedral, elongate Grain boundary: porphyroclasts: serrate. neoblasts: straight Twinning: tapered twins in porphyroclasts and larger neoblasts. Undulose extinction: complete in porphryoclasts and neoblasts. Subgrains: well developed in porphyroclats. Texture: core and mantle structures near porphyroblasts. Other areas are completely recrystallized, commonly away from the pyroxene porphyroclasts. The recrystallized zones form polygonal aggregates with undulose extinction and tapered twins. Some of the porphyroclasts have kinks and incipient fractures suggesting lower temperature deformation.
Clinopyroxene:	Grain size: porphyroclasts: 2-10 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular. Texture: Large porphryclasts that are undeformed. Smaller porphyroclasts are elongate parallel to the foliation that often have undulose extinction and kinked. The neoblasts form in aggregates commonly with neoblasts of olivine.
Oxide:	minor. near porphyroclasts of pyroxene.

THIN SECTION LABEL ID: **360-U1473A-13R-1-W 65/72-TSB-TS_37** Piece no.: #01 TS no.: 37

Group	Summary
Igneous petrology:	Contact between medium- and coarse-grained gabbros. The coarse-grained is a orthopyroxene, amphibole, and oxide-bearing olivine gabbro, and the medium-grained is a amphibole-bearing olivine gabbro. Deformation is weak and the contact is magmatic.
Metamorphic petrology:	The coarse-grained and fine-grained portions of the sample are variably altered, with the latter relatively fresher. Common replacement minerals are serpentine and oxide after olivine, different amphiboles after orthopyroxene and clinopyroxene, and 2nd plagioclase and chlorite after plagioclase.
Structure:	Irregular contact between medium and coarse grained olivine gabbro. The coarse grained gabbro is weakly recrystallized; the medium grained olivine gabbro has a weak crystal plastic overprint.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **2** Domain rel. abundance (%): 25 Domain name: coarse-grained

Lithology: **orthopyroxene, amphibole, and oxide-bearing olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1	anhedral	elongate	
Plagioclase	52		20	10		tabular	
Clinopyroxene	35		12	4.5	subhedral	subequant	
Orthopyroxene	3		1.2	1	subhedral	subequant	
Amphibole	2		0.3	0.1	anhedral	interstitial	brown amphibole is also present as blebs in Cpx
Opaques	3						

Interval domain no: **1** Domain rel. abundance (%): 75 Domain name: medium-grained

Lithology: **amphibole-bearing olivine gabbro** Observer: LF

Texture: granular Ave. grain size: medium grained [345]

Detailed description: Contact between medium- and coarse-grained gabbros. The coarse-grained is a orthopyroxene, amphibole, and oxide-bearing olivine gabbro, and the medium-grained is a amphibole-bearing olivine gabbro. Deformation is weak and the contact is magmatic

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	11.8			0.3	subhedral	subequant	
Plagioclase	46.5		3	1	subhedral	subequant	
Clinopyroxene	39.5		2.7	1	subhedral	subequant	
Amphibole	2		0.45	0.15	anhedral	interstitial	brown amphibole is also present as blebs in Cpx
Opaques	0.2						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name:

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description The coarse-grained portion of the sample is mostly composed of moderately altered grains of olivine, clinopyroxene and orthopyroxene. Olivine is altered into mostly serpentine and oxides in a mesh texture and is rimmed by talc and oxides. The pyroxenes are mostly altered into green amphibole. Plagioclase is slightly replaced by secondary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	20	25	3
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, green		80	100	
Chlorite				30
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	30	n/a		n/a
Subtotals replaced	100	100	100	100

Interval domain no: 2 Domain rel. abundance (%): 70 Domain name:

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description The fine-grained portion of the sample is less altered than the coarse-grained portion. Olivine is variably altered but overall alteration degree is only moderate with the serpentine-oxide assemblage being the dominant replacement minerals. Orthopyroxene and clinopyroxene grains are relatively fresh and is only slightly replaced by amphibole. Plagioclase is altered mostly into 2nd plagioclase and in microfractures, chlorite.

Comment type	Comment
Vein 1 minerals:	Small veins of chlorite were observed to cut across several grains of plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	10	3	10
Amphibole, brown	n/a	100	n/a	n/a
Amphibole, colorless	10			
Chlorite				40
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Talc	25	n/a	100	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: submagmatic Observer: JD

Detailed description Fine grained olivine gabbro in contact with coarse grained olivine gabbro. The coarse grained olivine gabbro is weakly recrystallized. The fine grained olivine gabbro is hypidiomorphic granular with a weak crystal plastic overprint.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	Grain size: neoblasts: ~0.3 mm. Grain shape: anhedral. Grain boundary: curved. Undulose extinction: irregular. Texture: low abundance, some recrystallization.
Plagioclase:	Grain size: porphyroclasts: ~1-1.5 cm. neoblasts: ~0.15 mm Grain shape: elongate, anhedral. Grain boundary: straight to curved. Twinning: primary and tapered. Undulose extinction: weak to patchy. Subgrains: weak Texture: weakly recrystallized coarse grained olivine gabbro.
Clinopyroxene:	Grain size: igneous: 1-3 mm. Grain shape: subhedral. Grain boundary: irregular. Texture: igneous crystals with limited if any recrystallization.
Oxide:	Present near pyroxene crystals.

Interval domain no: 2 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: magmatic Observer: JD

Detailed description Fine grained olivine gabbro in contact with coarse grained olivine gabbro. The coarse grained olivine gabbro is weakly recrystallized. The fine grained olivine gabbro is hypidiomorphic granular with a weak crystal plastic overprint.

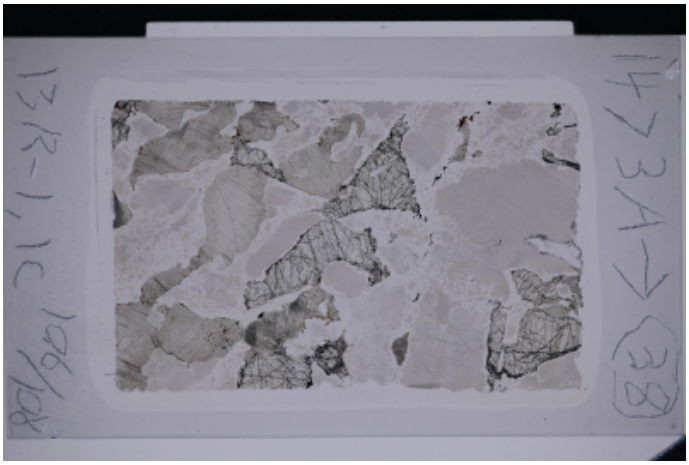
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: 0.3-2.5 mm. Grain shape: subhedral to anhedral. Grain boundary: Undulose extinction: complete, define subgrain boundaries. Texture: igneous with undulose extinction, no recrystallization.
Plagioclase:	Grain size: 0.3-2 mm. Grain shape: hypidiomorphic granular. Grain boundary: straight to curved. Twinning: tapered. Undulose extinction: patchy. Subgrains: weak Texture: fine grained hypidiomorphic granular olivine gabbro with weak crystal plastic overprint.
Clinopyroxene:	Grain size: 0.3-1 mm. Grain shape: subhedral. Grain boundary: straight. Texture: hypidiomorphic granular.

THIN SECTION LABEL ID: **360-U1473A-13R-1-W 106/108-TSB-TS_38** Piece no.: #01 TS no.: 38

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction and is strongly recrystallized. Clinopyroxene is commonly rimmed by brown/green amphiboles. Opaque minerals are dominated by ilmenite, with minor sulfides.
Metamorphic petrology:	Total static alteration intensity is slight. Small amounts of amphibole, chlorite, talc, serpentine and secondary plagioclase occur.
Structure:	Weak magmatic fabric overprinted by weak crystal plastic deformation. Plagioclase is recrystallized, and also clinopyroxene and olivine are locally recrystallized between deformed porphyroclasts of olivine and undeformed clinopyroxene porphyroclasts.

Plane-polarized



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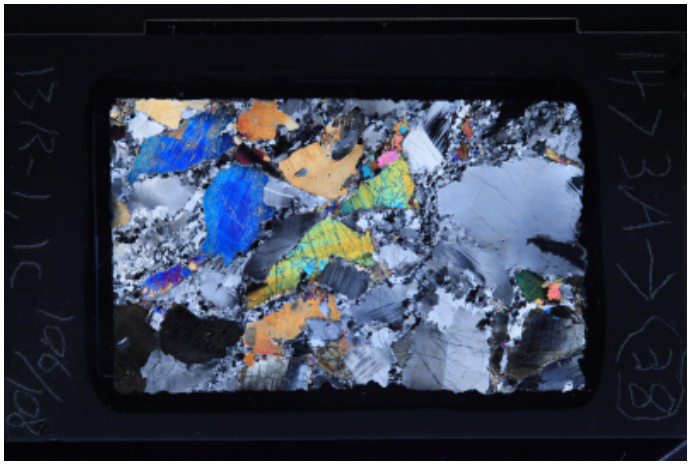
Cross-polarized



32931891

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is elongated and rimmed by orthopyroxene, which has been partly replaced by opaque oxides. Plagioclase commonly displays undulose extinction and is strongly recrystallized. Clinopyroxene with well-developed exsolution lamallae is rimmed by brown/green amphiboles. Brown amphibole also occurs as bleb within clinopyroxene. Consertal intergrowth texture is common in clinopyroxene. Opaque minerals are dominated by ilmenite, with minor sulfides. Intergrowth of ilmenite and sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10	0.4	0.4	2.8	anhedral	subequant	overgrown by orthopyroxene
Plagioclase	74	0.1	7	5	anhedral	tabular	undulose extinction
Clinopyroxene	15	0.2	7.2	6	anhedral	subequant	with blebs of brown amphibole and opaque oxides.
Amphibole	0.5	0.01	0.4	0.2	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): TN

Detailed description Olivine is replaced by talc at grain margin and by serpentine along fractures; clinopyroxene by secondary clinopyroxene patchily and by brown amphibole in parallel with cleavage surfaces; plagioclase by chlorite along microfractures.

Comment type	Comment
Alteration general comments:	Olivine is replaced by talc at grain margin and by serpentine along fractures; Cpx by secondary Cpx patchily and by brown amphibole in parallel with cleavage surfaces; Pl by Chl along microfractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		3
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, green		15		
Chlorite				100
Clay minerals	5			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	4	4		n/a
Sulfide	1	1		n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: straight Undulose extinction: common and regular Subgrains: common and straight Texture: fractured and partially altered
Plagioclase:	Grain size: coarse Grain shape: subhedral to anhedral Grain boundary: curved to serrate Twinning: igneous and mechanical Undulose extinction: irregular Texture: fractured and medium igneous grains included in cpx
Clinopyroxene:	Grain size: coarse Grain shape: subhedral to poikilitic Grain boundary: straight to serrate Texture: undulose extinction observed and include plg

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

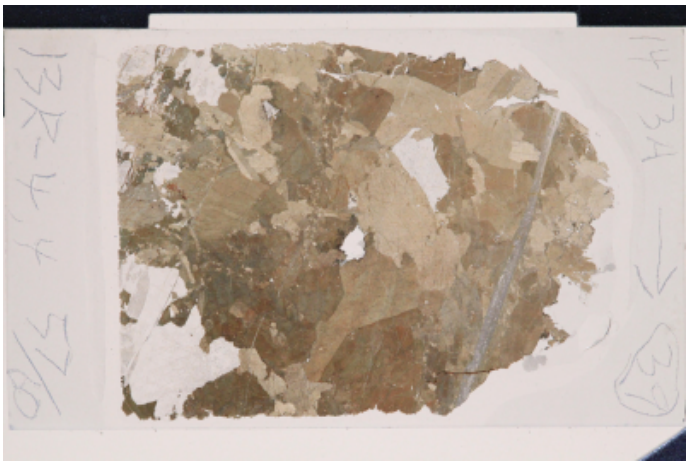
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: fine to medium Grain shape: anhedral Grain boundary: straight Undulose extinction: irregular Texture: recrystallize at ol porphyroclast grain boundary and locally between ol and cpx porphyroclast
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: straight Twinning: mechanical Undulose extinction: common and irregular Texture: recrystallized phase most abundant slightly elongated
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: straight Texture: locally recrystallized in association with ol and plg, often at ol and cpx porphyroclast grain boundary

THIN SECTION LABEL ID: **360-U1473A-13R-4-W 57/60-TSB-TS_39** Piece no.: #04 TS no.: 39

Group	Summary
Igneous petrology:	A coarse-grained diorite with a granular texture. It is predominated by subhedral amphibole, with minor plagioclase.
Metamorphic petrology:	The thin section mostly consists of a vein filled with massive brown-green Amp and minor Pl. Within the massive Amp vein, there is a band where the brown-green Amp is recrystallized into nearly polygonal aggregates made up of brown-green Amp. The massive Amp vein is crosscut by a ca. 1 mm thick vein mostly filled with epidote. Along the contact between the massive Amp vein and the epidote vein, there are locally fine-grained green amphiboles that are commonly aligned along the vein. Sub-parallel micro-fractures filled with green to pale Amp are also present within the massive Amp vein. Pl from the massive vein is partially altered into: (i) secondary Pl and pale green amphibole, locally in association with chlorite and/or epidote, or (ii) hydrogrossular and secondary Pl.
Structure:	Haloed and planar polycrystalline vein (amphibole and plagioclase), cross-cutted by 1 mm thick planar and polycrystalline vein (epidote and amphybole). Late stage polycrystalline branched fracture cross-cutting the amphibole vein is filled with alteration minerals.

Plane-polarized



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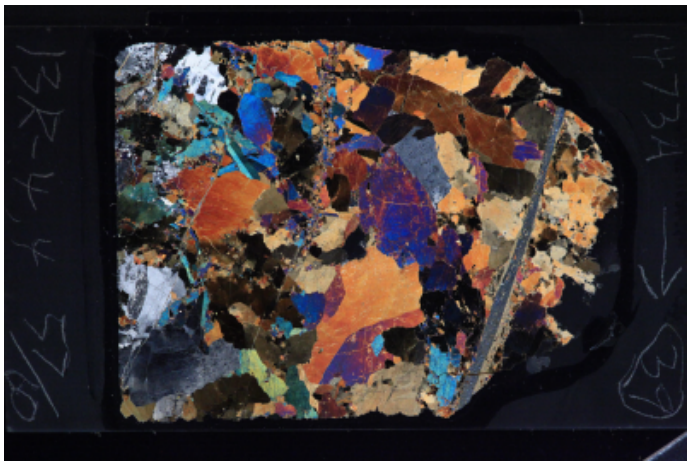
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained diorite with a granular texture. It is predominated by subhedral amphibole, with minor plagioclase. Plagioclase displays undulose extinction.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	5		8	4	subhedral	tabular	undulose extinction
Amphibole	95		15	8	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): Observer(s): RT

Detailed description

The thin section mostly consists of a vein filled with massive brown-green Amp and minor Pl. Within the Amp massive vein, there is a band where the brown-green Amp is recrystallized into nearly polygonal aggregates made up of brown-green Amp. The massive Amp vein is crosscut by a ca. 1 mm thick vein mostly filled with epidote. This vein also contains: (i) amphibole, which could at least partly related to a previous veining event, and (ii) late clay. Along the contact between the epidote vein and the host massive Amp vein, there are locally fine-grained green amphiboles that are commonly aligned along the vein. Sub-parallel micro-fractures filled with green to pale Amp are also present within the massive Amp vein. Pl from the massive vein is partially altered into: (i) secondary Pl and pale green amphibole, locally in association with chlorite and/or epidote, or (ii) hydrogrossular and secondary Pl.

Comment type	Comment
Vein 1 minerals:	The thin section mostly consists of a vein filled with massive brown-green Amp and minor Pl. Within the Amp massive vein, there is a band where the brown-green Amp is recrystallized into nearly polygonal aggregates made up of brown-green Amp. This band is in turn crosscut by a micro-vein filled with pale green Amp.
Vein 2 minerals:	The massive Amp vein is crosscut by a ca. 1 mm thick vein mostly filled with epidote. This vein also contains: (i) amphibole, which could at least partly related to a previous veining event, and (ii) late clay.
Vein 3 minerals:	Along the contact between the massive Amp vein and the epidote vein, there are locally fine-grained green amphiboles that are commonly aligned along the vein. Sub-parallel micro-fractures filled with green to pale Amp are also present within the massive Amp vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				50
Amphibole, colorless				10
Chlorite				5
Epidote/zoisite	n/a	n/a	n/a	5
Garnet	n/a	n/a	n/a	30
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: metamorphic Observer: CF

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Vein:	Massive vein filled with massive brown-green amphibole and minor plagioclase. Planar single vein, haloed with band of polygonal aggregates of brown-green amphibole; relationship with wall-rock is diffuse. The amphibole vein is cross-cut by 1 mm epidote vein that fracture coarse amphiboles; this vein is surrounded by layer of recrystallized oriented amphiboles. The halo of amphibole vein is cross-cut by fracture filled with alteration, that fracture coarse and medium grained amphibole.

THIN SECTION LABEL ID: **360-U1473A-14R-1-W 27/28-TSB-TS_40** Piece no.: #04 TS no.: 40

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro shows an igneous lamination, which is defined by the preferred orientation of elongated clinopyroxene and tabular plagioclase.
Metamorphic petrology:	Total alteration intensity is slight. Observed alteration minerals are mainly secondary clinopyroxene, amphibole, chlorite, talc serpentine and clay minerals.
Structure:	Strongly deformed, mylonitic with plagioclase completely recrystalllized. Olivine and clinopyroxene are locally associated recrystallized crystals. Porphyroclasts are mainly clinopyroxene.

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a granular texture. The igneous lamination is shown by the preferred dimensional orientation of elongated clinopyroxene and tabular plagioclase. Olivine is distributed along the lamination and is rimmed by orthopyroxene. Plagioclase displays undulose extinction and sometimes enclosed as inclusions within clinopyroxene. Abundant brown amphiboles are present and commonly occurs at the rim of clinopyroxene. Opaque minerals are composed of ilmenite and sulfides. Intergrowth of ilmenite with suflide, and also exsolution of chalcopyrite from pyrrhotite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			0.6	anhedral	subequant	commonly occurs as neoblasts around clinopyroxene and occasionally overgrown by orthopyroxene
Plagioclase	70		2.8	0.8	anhedral	tabular	undulose extinction
Clinopyroxene	17		2.8	1.6	anhedral	subequant	with plagioclase inclusions
Amphibole	1		0.4	0.2	anhedral	interstitial	occuring at the rim of clinopyroxene, sometimes together with olivine neoblasts
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): TN

Detailed description Olivine is replaced by talc, serpemtime and clays with mesh tetxture. Clinopyroxene is replaced by patchy secondary clinopyroxene and brown amphibole. Plagioclase has fractures filled with chlorite.

Comment type	Comment
Alteration general comments:	Olivine is replaced by talc, serpemtime and clays with mesh tetxture. Clinopyroxene is replaced by patchy secondary clinopyroxene and brown amphibole. Plagioclase has fractures filled with chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	3	5		2
Amphibole, brown	n/a	70	n/a	n/a
Amphibole, colorless	5	10		
Chlorite				100
Clay minerals	10			
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	5			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

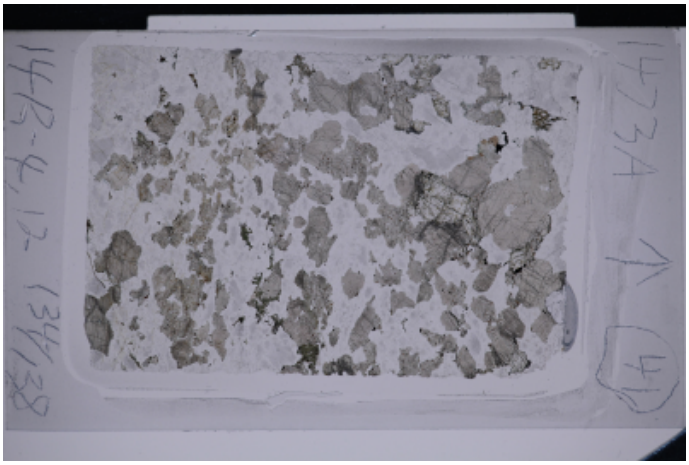
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: regular Texture: fractured, recrystalized in association with cpx
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular Texture: completely recrystallized
Clinopyroxene:	Grain size: medium porphyroclast to fine recrystallized Grain shape anhedral Grain boundaries: curved to straight Texture: recrystallize in association with ol. Elongated recrystallized crystal define foliation.

THIN SECTION LABEL ID: **360-U1473A-14R-4-W 134/138-TSB-TS_41** Piece no.: #12 TS no.: 41

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Primary magmatic texture is not preserved. Olivine is partly rimmed by orthopyroxene and brown amphibole. Plagioclase displays undulose extinction and is highly recrystallized. Clinopyroxene is rimmed by brown amphibole and ilmenite at the rim. Opaque minerals consist of ilmenite and sulfides.
Metamorphic petrology:	Total alteration intensity is slight. Mafic minerals are more intensely altered than plagioclase. Minerals indicate amphibolite to subgreenschist facies alteration.
Structure:	Weakly deformed with partially recrystallized plagioclase. Olivine and clinopyroxene are locally recrystallized.

Plane-polarized



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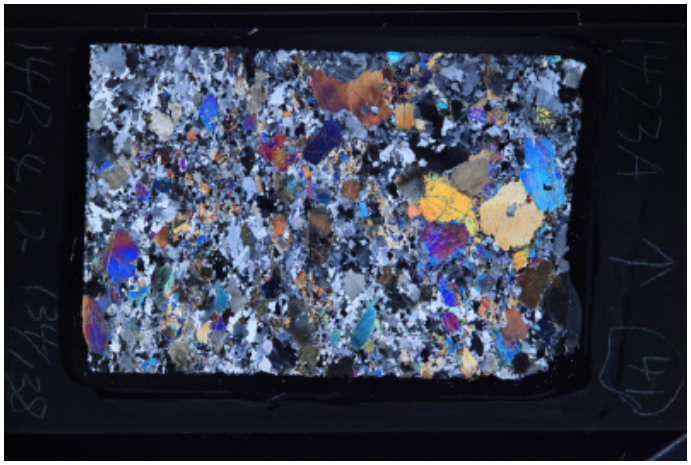
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro. Primary magmatic texture is not preserved. Olivine is partly rimmed by orthopyroxene and brown amphibole. Plagioclase displays undulose extinction and is commonly recrystallized. Clinopyroxene is rimmed by brown amphibole and ilmenite. It displays a consertal intergrowth texture and occasionally contains plagioclase inclusions. Opaque minerals consist of ilmenite and sulfides. Exsolution of chalcopyrite from the pyrite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5	0.2	0.2	0.4	anhedral	subequant	rimmed by orthopyroxene and brown amphibole
Plagioclase	60	0.1	3.6	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	34	0.2	5.6	2.5	anhedral	tabular	contain plagioclase inclusions
Amphibole	0.5	0.1	0.8	0.1	anhedral	interstitial	commonly occurs at rim of clinopyroxene
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Slightly altered rock. Small grains of olivine are completely replaced by greenish clay minerals. Clinopyroxene is replaced by secondary clinopyroxene and subordinate amounts of amphiboles. Plagioclase is fresh. Small amounts of fine-grained sulfides occur.

Comment type	Comment
Alteration general comments:	Slightly alteredrock. Small grains of olivine are completely replaced by greenish clay minerals. Clinopyroxene is replaced by secondary clinopyroxene and subordinate amounts of amphiboles. Plagioclase is fresh. Small amounts of fine-grained sulfides occur.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	10	5	2
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		10	50	
Amphibole, green		5	25	
Chlorite				90
Clay minerals	60			
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	10
Sulfide	1	1		n/a
Talc	20	n/a	10	n/a
Subtotals replaced	100	100	85	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

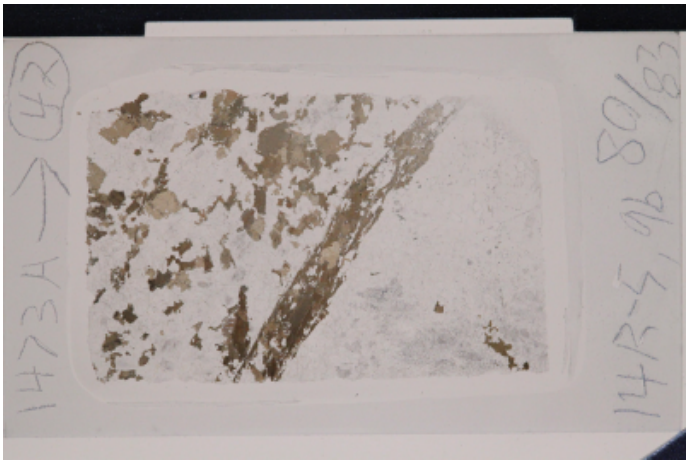
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclast, fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Subgrains: straight and common in porphyroclast Texture: locally recrystallized in association with cpx between porphyroclastic grains
Plagioclase:	Grain size: medium porphyroclast to medium and fine recrystallized Grain shape: subhedral porphyroclast, anhedral recrystallized Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular Texture: mainly recrystallized, locally fine grained and in association with cpx
Clinopyroxene:	Grain size: coarse porphyroclastic to medium and fine recrystallized Grain shape: subhedral porphyroclasts to anhedral recrystallized Grain boundary: straight to curved Texture: fractured and deformed porphyroclasts, locally recrystallized in association with ol

THIN SECTION LABEL ID: **360-U1473A-14R-5-W 80/83-TSB-TS_42** Piece no.: #09 TS no.: 42

Group	Summary
Igneous petrology:	This thin section consists of two domains, a medium-grained gabbro and felsic vein. A amphibole-rich halo is present between both domains.
Metamorphic petrology:	Static alteration intensity is substantial. Dominant alteration phase is brown amphibole with greenish rims. Alteration intensity and mineralogy are not clearly different between the two lithological domains.
Structure:	Diorite domain is porphyroclastic, weakly and locally recrystallized with anhedral plagioclase and clinopyroxene. The felsic vein is strongly deformed with plagioclase completely recrystallized. The contact between the two domain is cross-cutted by polycrystalline amphibole vein.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: vein

Lithology: **leucodiorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This is a felsic vein that contains 99% plagioclase and very few amphibole. Plagioclase displays undulose extinction.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	99		2.5	1	anhedral	tabular	undulose extinction
Amphibole	1		2.5	2.5	anhedral	interstitial	

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a medium-grained gabbro with a granular texture. Plagioclase displays undulose extinction and magmatic twins can be rarely seen. Clinopyroxene was completely replaced by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	80		2.4	1	subhedral	subequant	undulose extinction
Clinopyroxene	20		2.8	1.4	anhedral	subequant	completely replaced by amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Plagioclase is mainly altered to secondary plagioclase, which is locally associated with hydrogrossular. Brown amphibole commonly has greenish brown rim.

Comment type	Comment
Alteration general comments:	Plagioclase is mainly altered to secondary plagioclase, which is locally associated with hydrogrossular. Brown amphibole commonly has greenish brown rim.
Vein 1 minerals:	brown Amp + Pl

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		100		50
Amphibole, brown	n/a	90	n/a	n/a
Amphibole, colorless		5		
Amphibole, green		5		
Epidote/zoisite	n/a	n/a	n/a	1
Garnet	n/a	n/a	n/a	4
Plagioclase, sec.	n/a	n/a	n/a	95
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 5 Domain name: microfabric

Microstructure: metamorphic Observer: CF

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Vein:	Amphibole planar single vein, polycrystalline (amph, plg), uniform,clear cut with the wall-rock. It defines boundary between strongly foliated and weakly deformed gabbro

Interval domain no: 2 Domain rel. abundance (%): 55 Domain name: microfabric

Microstructure: submagmatic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse porphyroclast to fine recrystallized Grain shape: subhedral porphyroclast to anhedral recrystallized Grain boundary: straight to curved Twinning: mainly mechanical Undulose extinction: irregular with rare subgrains Texture: porphyroclastic partially recrystallized
Clinopyroxene:	Grain size: coarse porphyroclast to medium recrystallized Grain shape: subhedral porphyroclast to anhedral recrystallized Grain boundary: straight to curved Texture: porphyroclastic partially recrystallized, partially to totally altered, recrystallized locally in association with plg

Interval domain no: 3 Domain rel. abundance (%): 40 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

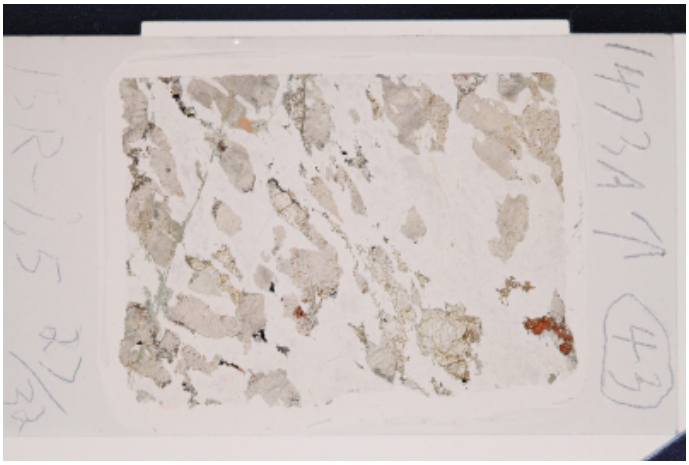
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular Texture: completely recrystallized

THIN SECTION LABEL ID: **360-U1473A-15R-1-W 27/32-TSB-TS_43** Piece no.: #05 TS no.: 43

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Although primary magmatic texture is not preserved, the protolith is very likely to display as subophitic texture, as euhedral to subhedral tabular is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is extensive.. Ol neoblast with green amphibole rim partly altered into pseudomorphic talc, which also replaced by clay. Most of brown amphibole occur in Cpx neoblast.
Structure:	Moderately deformed, porphyroclastic with completely recrystallized plagioclase. Clinopyroxene and olivine are deformed porphyroclasts and occur as partially and locally recrystallized crystals.

Plane-polarized



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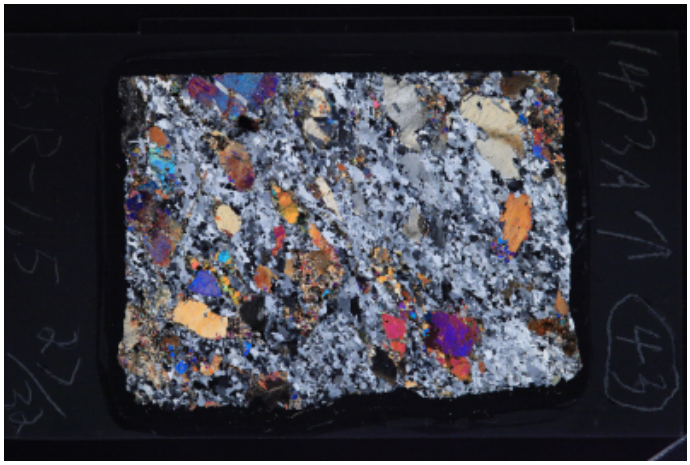
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. The foliation is shown by the preferred orientation of plagioclase and the elongated olivine. Olivine is rimmed by orthopyroxene and partly altered. Plagioclase displays undulose extinction and magmatic twins are not preserved. Euhedral to subhedral tabular plagioclase is partly to fully enclosed within. This indicates that the protolith might have a subophitic texture. Clinopyroxene displays a consertal intergrowth texture. Opaque minerals mainly consist of ilmenite, with minor sulfides. Intergrowth of ilmenite with sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	13			0.4	subhedral	elongate	partly altered and overgrown by opx
Plagioclase	65		3.6	0.4	anhedral	elongate	
Clinopyroxene	21		5.6	2.4			
Amphibole	0.8		1	0.1	anhedral	interstitial	Occurs at rims of cpx or associates with olivine neoblasts.
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): QM

Detailed description The alteration intensity of this thin section is extensive. Ol neoblasts with green amphibole rim partly altered into pseudomorphic talc, which also replaced by clay. Most of brown amphibole occur in Cpx neoblast. Pl mostly altered into secondary plagioclase. Green amphibole veins were observed.

Comment type	Comment
Alteration general comments:	Ol neoblast with green amphibole rim partly altered into pseudomorphic talc, which also replaced by clay. Most of brown amphibole occur in Cpx neoblasts which have green amphibole rim.
Mylonite comments:	Mylonitic olivine gabbro characterized by recrystallization of primary Pl, Ol and Cpx. Pl neoblast almost altered into secondary Pl; Cpx neoblast was often associated with brown amphibole
Vein 1 minerals:	green amphibole and pale color amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	35		70
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless		25		2
Amphibole, green	10	60		
Clay minerals	45			
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	98
Talc	25	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclast to medium recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: irregular Subgrains: curved Texture: fractured and partially altered porphyroclasts, porphyroclastic partially recrystallized
Plagioclase:	Grain size: medium to fine Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular Subgrains: curved Texture: completely recrystallized forming aggregates
Clinopyroxene:	Grain size: coarse porphyroclast to medium recrystallized Grain shape: subhedral to anhedral Grain boundary: curved Undulose extinction: irregular Texture: porphyroclastic partially recrystallized and partially altered porphyroclast, fractured

THIN SECTION LABEL ID: **360-U1473A-15R-1-W 69/73-TSB-TS_44** Piece no.: #09 TS no.: 44

Group	Summary
Igneous petrology:	A fine-grained gabbro with very little opaque oxides. The primary magmatic texture is not preserved. Plagioclase displays undulose extinction and clinopyroxene is pervasively replaced by amphibole.
Metamorphic petrology:	The mylonitic foliation is mostly shown by subparallel elongation of aggregates made up of Pl and Cpx. One portion of the thin section shows bending of the foliation and extensive development of brown Amp. There is a curved brown Amp vein, with the Amp grains commonly elongated along the direction of the vein. Near this vein, the clinopyroxene is pseudomorphycally replaced by brown to brown Amp. The background static alteration is moderate.
Structure:	Strongly deformed, mylonitic with completely recrystallized plagioclase. Olivine and clinopyroxene are partially recrystallized and define the crystal plastic foliation.

Plane-polarized

32954331

Cross-polarized

32954351

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: A foliated fine-grained gabbro. The primary magmatic texture is not preserved. Both plagioclase and clinopyroxene are elongated. The foliation is shown by the preferred orientation of clinopyroxene and plagioclase. Plagioclase displays undulose extinction and clinopyroxene is pervasively replaced by amphibole. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.5						completely altered and original shape is not preserved
Plagioclase	60		0.8	0.3	anhedral	elongate	undulose extinction
Clinopyroxene	38		4.8	0.5	anhedral	elongate	heavily replaced by amphibole
Amphibole	1		0.5	0.2	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): RT

Detailed description

The rock is a mylonitic gabbro with a foliation mostly shown by subparallel elongation of aggregates made up of Pl and Cpx. These aggregates show nearly polygonal structures. Neoblastic Cpx aggregates commonly include minor amounts of red-brown Amp and opaque phases, and are locally associated with porphyroclastic Cpx. One portion of the thin section shows bending of the foliation and extensive development of brown Amp. There is a curved brown Amp vein, with the Amp grains commonly elongated along the direction of the vein. Near this vein, the clinopyroxene is pseudomorphycally replaced by brown Amp. These micro-structures suggest that brown Amp developed in response to localized infiltration of aqueous fluids during the latest stage of ductile deformation. The alteration is overall moderate.

Comment type	Comment
Alteration general comments:	The background static alteration is moderate.
Mylonite comments:	The mylonitic foliation is mostly shown by subparallel elongation of aggregates made up of Pl and Cpx. These aggregates show nearly polygonal structures. Neoblastic Cpx aggregates commonly include minor amounts of red-brown Amp and opaque phases, and are locally associated with porphyroclastic Cpx. One portion of the thin section shows bending of the foliation and extensive development of brown Amp. There is a curved brown Amp vein, with the Amp grains commonly elongated along the direction of the vein. Near this vein, the clinopyroxene is pseudomorphycally replaced by brown Amp. These micro-structures suggest that brown Amp developed in response to localized infiltration of aqueous fluids during the latest stage of ductile deformation.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	20		5
Amphibole, colorless	10	55		40
Amphibole, green		20		
Chlorite	90	15		30
Clay minerals		10		30
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

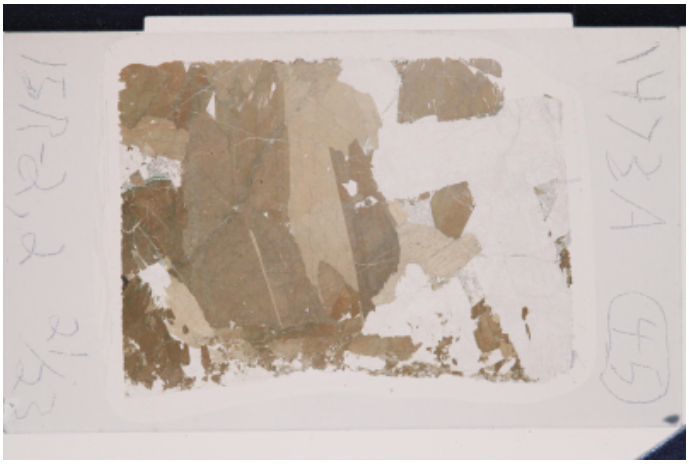
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclast to fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: fractured and partially recrystallized
Plagioclase:	Grain size: fine Grain shape: anheral Grain boundary: curved to straight, showing triple junction Twinning: mechanical Undulose extinction regular and common Texture: fractured, completely recrystallized
Clinopyroxene:	Grain size: coarse porphyroclasts to fine recrystallized Grain shape: subhedral to anhedral Grain boundary: straight to curved Texture: prophyroclastic recrystallized, define foliation, altered to amphibole

THIN SECTION LABEL ID: **360-U1473A-15R-2-W 21/23-TSB-TS_45** Piece no.: #02 TS no.: 45

Group	Summary
Igneous petrology:	A coarse-grained diorite with a granular texture. It consist of subhedral amphibole and tabular plagioclase.
Metamorphic petrology:	The sample is a coarse grained vein consisting of brown amphibole and plagioclase, both showing euhedral to subhedral habit. The thin section includes a thin area where the coarse grained amphibole is recrystallized. The vein shows a moderate background static alteration, which is attributed to greenschist facies conditions.
Structure:	Isotropic magmatic fabric.

Plane-polarized



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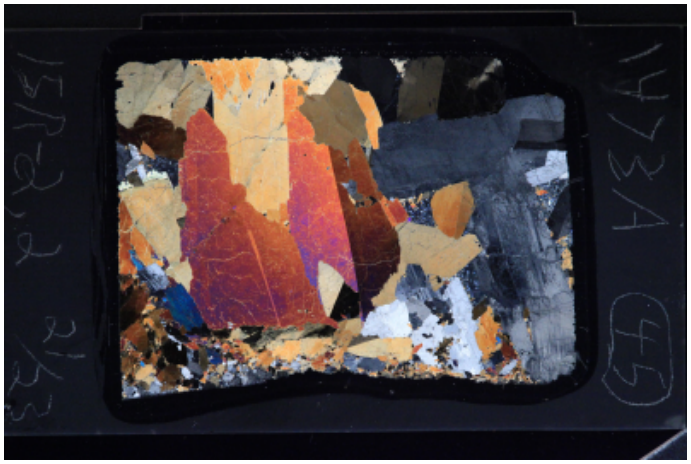
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained diorite with a granular texture. It consist of subhedral amphibole and tabular plagioclase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	30		12	8	euhedral	tabular	undulose extinction
Amphibole	70		17	10	euhedral	tabular	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL-RT

Detailed description The sample is a coarse grained vein consisting of brown amphibole and plagioclase, both showing euhedral to subhedral habit. The thin section includes a thin area where the brown amphibole is recrystallized. The Amp-Pl massive vein shows a moderate background static alteration, which is attributed to greenschist facies conditions. The brown amphibole is locally rimmed by green to pale amphibole, which in turn also occurs along micro-fractures. Pl is overall moderately altered, with variable alteration degree among plagioclase grains. Most grains are only slightly altered into secondary Pl along micro-veins. Some plagioclase laths, however, are completely altered into epidote and fibrous chlorite.

Comment type	Comment
Alteration general comments:	The Amp-Pl massive vein shows a moderate background static alteration, which is attributed to greenschist facies conditions.
Vein 1 minerals:	The sample is a coarse grained vein consisting of brown amphibole and plagioclase, both showing euhedral to subhedral habit. The thin section includes a thin area where the brown amphibole is recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		100		20
Amphibole, colorless		5		
Amphibole, green		95		
Chlorite				40
Epidote/zoisite	n/a	n/a	n/a	50
Plagioclase, sec.	n/a	n/a	n/a	10
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: magmatic — Amphibole observed and epidote as alteration product of plg in localized grain boundaries. — Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: subhedral to euhedral Grain boundary: straight Texture: altered

THIN SECTION LABEL ID: **360-U1473A-15R-2-W 47/50-TSB-TS_46** Piece no.: #07 TS no.: 46

Group	Summary
Igneous petrology:	This thin section consists of two domains, i.e., a gabbro and a diorite vein. The gabbro is highly deformed and primary magmatic texture is not preserved. It is crosscut by two parallel amphibole veins. The diorite displays a granular texture.
Metamorphic petrology:	The rocks exhibits a foliation defined by alternating aggregates mostly made up of plagioclase and brown amphibole. The foliation is perpendicularly crosscut by: (i) two veins filled with brown amphibole and accessory plagioclase, and (ii) a felsic vein consisting of plagioclase and minor brown amphibole. Plagioclase from these veins is lately transformed into chlorite, epidote and/or pale green amphibole. Brown amphibole from the veins and host rock is locally rimmed by green amphibole
Structure:	Strongly deformed, mylonitic with mostly recrystallized plagioclase and partially recrysatallized altered clinopyroxene.

Plane-polarized

32954131

Cross-polarized

32954181

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 20 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: The diorite vein is predominated by subhedral tabular plagioclase that displays undulose extinction, with minor subequant amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		3.6	1.6	euhedral	tabular	undulose extinction
Amphibole	10		0.8	0.6	subhedral	subequant	

Interval domain no: **2** Domain rel. abundance (%): 80 Domain name: lithology domain 1

Lithology: **gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: The gabbro is highly deformed and primary magmatic texture is not preserved. Plagioclase is completely recrystallized and displays undulose extinction. Clinopyroxene was pervasively replaced by amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		0.8	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	30		4.8	0.6	anhedral	elongate	completely replaced by amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): RT

Detailed description The rock has a mylonitic foliation defined by alternating aggregates mostly made up of plagioclase and brown amphibole. The plagioclase aggregates are nearly polygonal. The brown amphibole aggregates contain patches of red-brown amphibole. In addition, there are locally relatively large brown amphiboles that are most likely pseudomorphic after primary pyroxene. These large amphiboles are rimmed by neoblastic brown amphibole aggregates. The foliation is crosscut a right angle by two veins filled with brown amphibole and accessory plagioclase, which is now altered into chlorite. The brown amphibole from the vein is locally rimmed by green amphibole. The rock alteration is overall substantial.

Comment type	Comment
Alteration general comments:	The rock alteration is overall substantial.
Mylonite comments:	The foliation is defined by alternating aggregates mostly made up of plagioclase and brown amphibole. The plagioclase aggregates are nearly polygonal. The brown amphibole aggregates contain patches of red-brown amphibole. In addition, there are locally relatively large brown amphiboles that are most likely pseudomorphic after primary pyroxene. These large amphiboles are rimmed by neoblastic brown amphibole aggregates.
Vein 1 minerals:	The foliation is perpendicularly crosscut by two veins filled with brown amphibole and accessory plagioclase, which is now transformed into chlorite. The brown amphibole from the vein is locally rimmed by green amphibole.
Vein 2 minerals:	The foliation is perpendicularly crosscut by a felsic vein consisting of plagioclase and minor brown Amp. Plagioclase is locally transformed into epidote and minor chlorite and/or pale green amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		100		10
Amphibole, brown	n/a	100	n/a	n/a
Amphibole, colorless				20
Chlorite				40
Epidote/zoisite	n/a	n/a	n/a	40
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: magmatic Observer: GV

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: subhedral Grain boundary: straight Twinning: mechanical Undulose extinction: irregular Texture: fractured
Clinopyroxene:	Grain size: medium Grain shape: subhedral Grain boundary: straight Texture: fractured

Interval domain no: 2 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: crystal-plastic Observer: GV

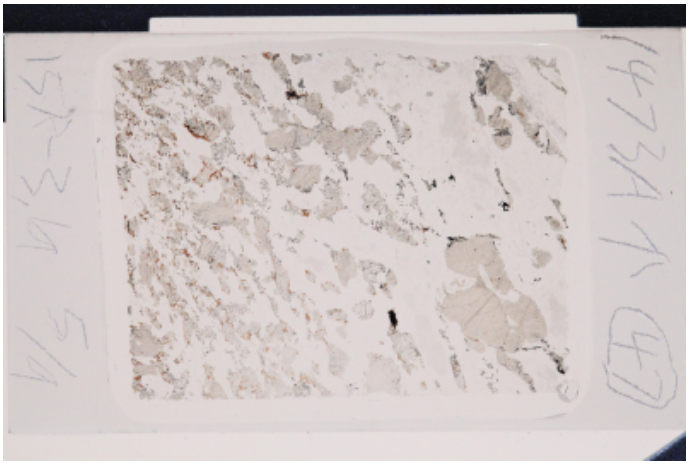
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved Twinning: mechanical, local occurrence Texture: totally recrystallized in aggregates and fractured
Clinopyroxene:	Grain size: medium porphyroclast to fine recrystallized Grain shape: subhedral to anhedral Grain boundary: straight to curved Texture: altered to amphibole, recrystallized crystal define foliation
Vein:	Metamorphic vein, planar, two parallel veins, polycrystalline (amphibole and cpx), uniform, clear cut the wall rock, dextral sense of shear

THIN SECTION LABEL ID: **360-U1473A-15R-3-W 5/9-TSB-TS_47** Piece no.: #01 TS no.: 47

Group	Summary
Igneous petrology:	A deformed olivine gabbro. The primary magmatic texture is not preserved. Olivine is occasionally rimmed by orthopyroxene. Plagioclase displays undulose extinction. Clinopyroxene shows a consertal intergrowth texture. Opaque minerals are dominated by ilmenite, with minor sulfides.
Metamorphic petrology:	Fresh mylonite showing the recrystallization of Pl, Ol and Cpx. Neoblastic Cpx is locally associated with red-brown Amp. The latter is also present as recrystallized coronas around ilmenite.
Structure:	Strongly deformed, porphyroclastic with plagioclase mainly recrystallized and fine grained olivine locally recrystallized in association with clinopyroxene along clinopyroxene porphyroclasts grain boundaries. Foliation defined by clinopyroxene and olivine elongated aggregates

Plane-polarized



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Cross-polarized

32954051

IGNEOUS PETROLOGY

Lithology: **disseminated oxide olivine gabbro** Observer: CL

Texture: poprhyroclastic Ave. grain size: medium grained [345]

Detailed description: A foliated olivine gabbro with a porphyroclastic texture. The foliation is shown by the preferred orientation of plagioclase. Olivine is partly altered and elongated. It is occasionally rimmed by orthopyroxene. Plagioclase is almost recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and the porphyroclasts display a consertal intergrowth texture. Sometimes, plagioclase is partly or fully enclosed within clinopyroxene porphyroclasts, indicating that the protolith might have a ophitic or subophitic texture. Brown amphibole commonly occurs at the rim of clinopyroxene and occasionally as corona of opaque minerals. Opaque minerals are dominated by ilmenite, with minor sulfides. Intergrowth between ilmenite and sulfides can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			0.2	anhedral	elongate	partly altered
Plagioclase	66		5	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	23		7	1	anhedral	subequant	containing plagioclase chadacrysts
Amphibole	0.5		2	0.4	anhedral	interstitial	commonly occurs at rim of olivine and clinopyroxene
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The rock is a fresh mylonite showing the recrystallization of Pl, Ol and Cpx. Neoblastic Cpx is locally associated with red-brown Amp. The latter is also present as recrystallized coronas around ilmenite.

Comment type	Comment
Alteration general comments:	The background static alteration is negligible.
Mylonite comments:	Mylonite showing the recrystallization of Pl, Ol and Cpx. Neoblastic Cpx is locally associated with red-brown Amp. The latter is also present as recrystallized coronas around ilmenite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	0		0
Oxide	10			n/a
Talc	60	n/a		n/a
Subtotals replaced	100			

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description The foliation is defined by clinopyroxene and olivine elongated aggregates.

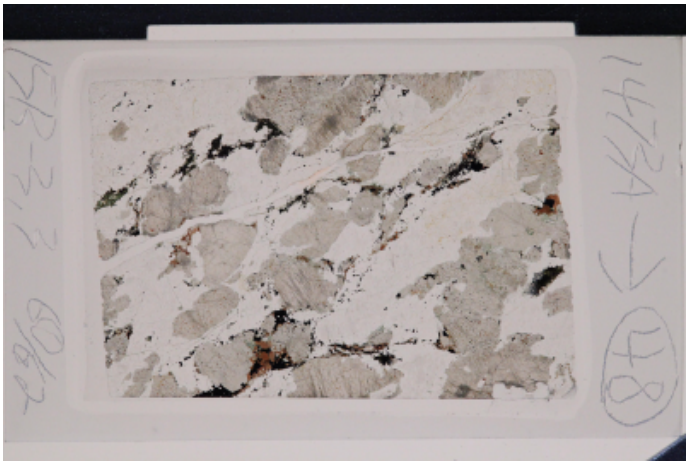
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: mainly recrystallized in association with cpx, at cpx porphyroclastic garins
Plagioclase:	Grain size: coarse porphyroclast to fine and medium recrystallized Grain shape: subhedral porphyroclast to anhedral recrystallized Grain boundary: curved Twinning: mechanical Undulose extinction: common and irregular Texture: strongly recrystallized, porphyroclasts grain boundaries are recrystallized
Clinopyroxene:	Grain size: coarse porphyroclast to fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: porphyroclastic recrystallized in association with ol, at cpx porphyroclastic grains. Porphyroclast include plg chadacrysts.

THIN SECTION LABEL ID: **360-U1473A-15R-3-W 60/62-TSB-TS_48** Piece no.: #03 TS no.: 48

Group	Summary
Igneous petrology:	A medium-grained oxide-bearing gabbro. The primary magmatic texture is not preserved. About 1% olivine was present but completely altered. Plagioclase is almost completely recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and the porphyroclasts contain plagioclase inclusions and abundant brown amphibole blebs. Opaque oxides are predominated by ilmenite, with very few sulfides, and commonly occur within the pressure shadows of clinopyroxene porphyroclasts.
Metamorphic petrology:	The alteration intensity of this thin section is extensive. Some olivine characterized by the replacement of green clay. Cpx mostly altered into brown amphibole with some chlorite.
Structure:	Porphyroclastic shear zone with completely recrystallized plagioclase and olivine. Fe-Ti oxide bands are in pyroxene pressure shadows and parallel to the foliation.

Plane-polarized



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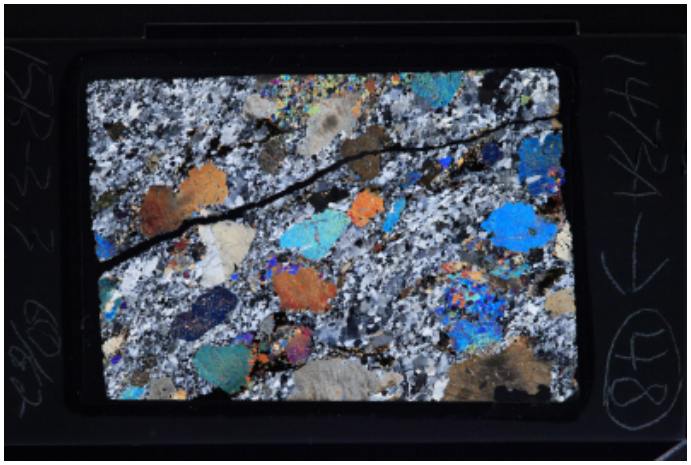
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **oxide-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained oxide-bearing gabbro, with a porphyroclastic texture. The primary magmatic texture is not preserved. About 1% olivine was present but completely altered. Plagioclase is almost completely recrystallized and elongated. It displays undulose extinction. Clinopyroxene is partly recrystallized and the neoblasts associate with tiny brown amphibole. Clinopyroxene porphyroclasts contain plagioclase inclusions and abundant brown amphibole blebs. Brown amphibole also occurs as patches together with opaque minerals. Opaque oxides are predominated by ilmenite, with very few sulfides. They commonly occur within the pressure shadows of clinopyroxene porphyroclasts. Some apatite associates with plagioclase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1						completely altered and original shape is not preserved
Plagioclase	60		2	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	35		6	4	anhedral	subequant	contain plagioclase inclusions and abundant blebs of brown amphibole
Amphibole	1		1.6	0.2	anhedral	interstitial	occurs as patches with opaque minerals
Opaques	3						
Ilmenite	3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): QM

Detailed description Some olivine characterized by the replacement of green clay. Cpx mostly altered into brown amphibole with some chlorite. Pl mainly altered into secondary plagioclase with minor reddish clay and chlorite in the cleavages.

Comment type	Comment
Mylonite comments:	The neoblasts of mylonitic olivine gabbro are composed of recrystallization Pl and Cpx. The Cpx neoblast is associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	90	20		80
Amphibole, brown	n/a	70	n/a	n/a
Amphibole, green		10		
Chlorite		20		5
Clay minerals	60			10
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description The sample is a porphyroclastic olivine gabbro with completely recrystallized olivine and plagioclase. Elongate porphyroclasts of pyroxene and neoblasts of plagioclase define the foliation. Fe-Ti oxide pods are in the pressure shadows of pyroxene and are elongate to the foliation.

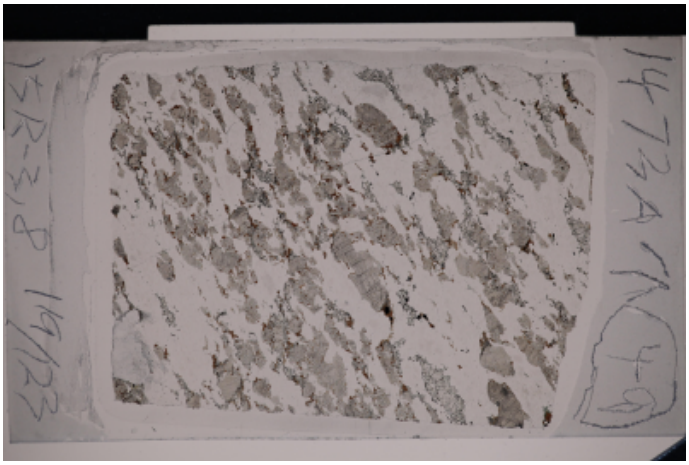
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a
Fault rock intensity:	undeformed	0

Type	Comment
Olivine:	Grain size: recrystallized is ~0.1 mm. Grain shape: subhedral to equigranular. Grain boundary: curved to straight. Undulose extinction: weak Subgrains: none Texture: completely recrystallized. typically recrytsallized aggregates are in between pyroxene crystals.
Plagioclase:	Grain size: 0.03-0.9 mm. Grain shape: subhedral to equigranular. Grain boundary: curved to serrate. Twinning: mechanical twinning present in all but the smallest neoblasts. Undulose extinction: more developed in larger neoblasts. Subgrains: weakly developed. Texture: completely recrystallized.elongate parallel to the foliation.
Clinopyroxene:	Grain size: porphyroclasts: ~3 mm; neoblasts: ~0.3 mm. Grain shape: subhedral. Grain boundary: straight. Texture: porphyroclasts with some recrystallization. oxide pods are in pressure shadows sometimes enclosing pyroxene neoblasts.
Oxide:	The oxides pods are parallel to the foliation typically in the pressure shadows of pyroxene. The pods sometimes enclose neoblasts of pyroxene. There are small bands of oxides that are oblique to the foliation.

THIN SECTION LABEL ID: **360-U1473A-15R-3-W 119/123-TSB-TS_49** Piece no.: #08 TS no.: 49

Group	Summary
Igneous petrology:	A medium-grained disseminated oxide olivine gabbro. The primary magmatic texture is not preserved. Plagioclase is partly enclosed within clinopyroxene, indicating that the protolith has a subophitic texture. Plagioclase is recrystallized and displays undulose extinction. Clinopyroxene displays a consertal intergrowth texture. Small amount of orthopyroxene are present. Opaque minerals are mainly composed of ilmenite, with minor sulfides.
Metamorphic petrology:	This mylonitic rock shows the neoblastic recrystallization of Ol, Pl and Cpx. Neoblastic Ol and Cpx are associated with relatively high amounts of red-brown Amp. In the least deformed domain of the rock, clinopyroxene is discontinuously rimmed by red-brown Amp, which in turn locally includes opaque phases. The background static alteration is negligible.
Structure:	Moderate to strongly recrystallized plagioclase and olivine. Pyroxene porphyroclasts are parallel to the foliation and have minor oxide pods along the crystal margins.

Plane-polarized



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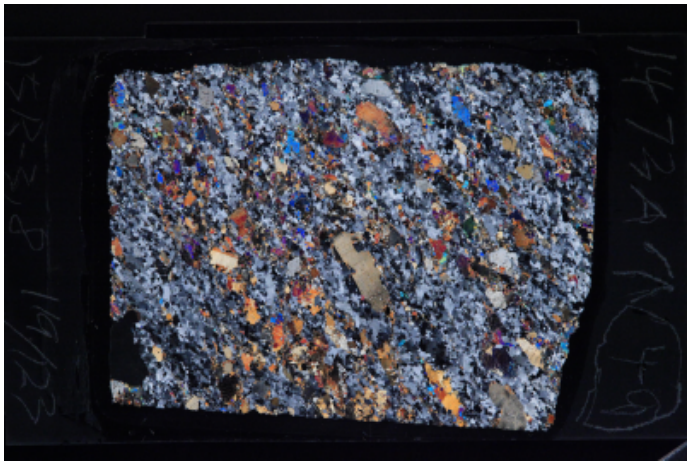
Cross-polarized



32953851

IGNEOUS PETROLOGY

Lithology: **disseminated-oxide, amphibole and orthopyroxene bearing olivine gabbro** Observer: LF

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained disseminated oxide olivine gabbro, with a porphyroclastic texture. The primary magmatic texture is not preserved. Plagioclase is partly enclosed within clinopyroxene, indicating that the protolith has a subophitic texture. Plagioclase is recrystallized and displays undulose extinction. Preferred orientation of clinopyroxene and plagioclase defines the foliation. Clinopyroxene displays a consertal intergrowth texture. Small amount of orthopyroxene are present. Opaque minerals are mainly composed of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10.5			0.4	subhedral	elongate	
Plagioclase	55		2	0.4	subhedral	subequant	undulose extinction
Clinopyroxene	30		7	3	subhedral	subequant	rare exsolutions of Opx
Orthopyroxene	1.5				subhedral	subequant	
Amphibole	2				anhedral	interstitial	brown amphibole is also present as blebs in Cpx
Opaques	1						
Ilmenite	0.9						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description The rock is a mylonite showing the neoblastic recrystallization of Ol, Pl and Cpx. Neoblastic Ol and Cpx are associated with relatively high amounts of red-brown amphibole. In the least deformed domain of the rock, clinopyroxene is discontinuously rimmed by red-brown amphibole, which in turn locally includes opaque phases. The static alteration is slight.

Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	The mylonite shows the neoblastic recrystallization of Ol, Pl and Cpx. Neoblastic Ol and Cpx are associated with relatively high amounts of red-brown amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		5
Amphibole, brown	n/a	100	n/a	n/a
Chlorite	20			100
Oxide	30			n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Recrytallization is moderate to strong with plagioclase, pyroxene, and olivine porphyroclasts. The phases present are elongate defining the foliation. The neoblasts of pyroxene and olivine form aggregates. Oxide is present, but in low abundances, typically in pressure shadows of pyroxene.

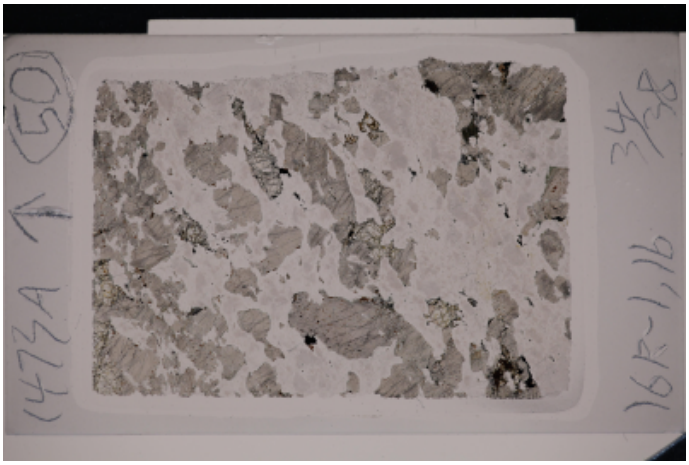
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	partial	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a
Fault rock intensity:	undeformed	0

Type	Comment
Olivine:	Grain size: 0.15-0.3 mm. Grain shape: anhedral to polygonal. Grain boundary: curved. Undulose extinction: present. Subgrains: defined by undulose extinction. Texture: completely recrystallized forming aggregates of neoblasts with neoblasts of pyroxene. Thin shear bands of olivine neoblasts surround pyroxene.
Plagioclase:	Grain size: neoblasts: 0.01-0.3 mm. prophyroclasts: ~1.2 mm. Grain shape: anhedral to polygonal. Grain boundary: curved. Twinning: Mechanical twinning in porphyroclasts and larger neoblasts. Undulose extinction: present in porphyroclasts and larger neoblasts. Subgrains: well developed in porphyroclasts. Texture: Strongly recrystallized with elongate porphyroclasts and neoblasts parallel to the foliation. Some porphyroclasts have mechanical twinning and are kinked.
Clinopyroxene:	Grain size: porphyroclasts: 1.5-4.5 mm; neoblasts: ~0.15 mm. Grain shape: elongate, subhedarl. Grain boundary: irregular Texture: elongate parallel to the foliation. minor recrystallization.
Oxide:	Present, but minor. Near mafic phases.

THIN SECTION LABEL ID: **360-U1473A-16R-1-W 34/38-TSB-TS_50** Piece no.: #01 TS no.: 50

Group	Summary
Igneous petrology:	An olivine gabbro. The primary magmatic texture is not preserved. Olivine is partly recrystallized and is rimmed by orthopyroxene. Plagioclase is partly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and the porphyroclasts display consertal intergrowth texture. Opaque oxides are predominated by ilmenite.
Metamorphic petrology:	Olivine altered into talc, serpentine, clay and oxides. Most of the plagioclase are replaced by secondary plagioclase. Clinopyroxene alered into pale color amphibole and brown amphibole.
Structure:	Deformed and strongly foliated with elongated clinopyroxene porphyroclasts parallel to foliation. Plagioclase is completely recrystallized and define the crystal plastic foliation, in association with olivine and clinopyroxene elongated aggregates.

Plane-polarized



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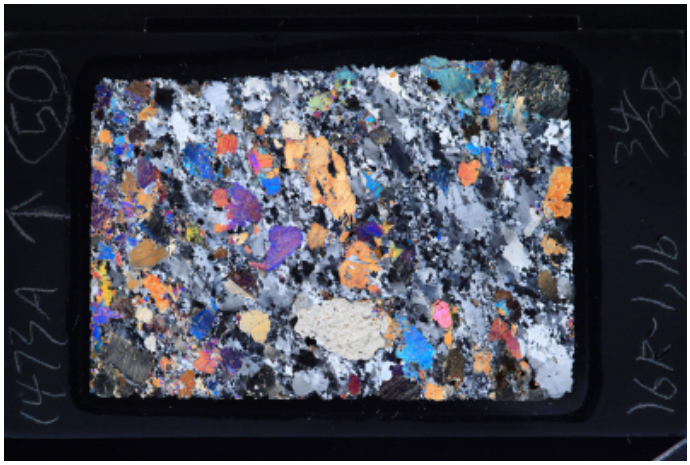
Cross-polarized



32974651

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: Porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Olivine is partly recrystallized and is rimmed by orthopyroxene. Plagioclase is partly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and the porphyroclasts display consertal intergrowth texture. It contains plagioclase inclusions and abundant blebs of brown amphibole. Brown amphibole also occurs at the rim of clinopyroxene. Opaque oxides are predominated by ilmenite, and intergrowth with sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.6	anhedral	subequant	partly recrystallized
Plagioclase	65		3.6	1	anhedral	elongate	undulose extinction
Clinopyroxene	28		8	4	anhedral	subequant	with blebs of brown amphibole
Amphibole	1		0.4	0.3	anhedral	interstitial	occurring at rim of clinopyroxene or blebs on clinopyroxene
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): QM

Detailed description Ol developed mesh texture with talc along the mineral boundary. The rim of mesh texture consist of serpentine, talc and oxides. Tiny mineral after Opx exsolution could be pale color amphibole. But it also could be other minerals. Pl are mostly replaced by secondary plagioclase and minor tiny pale color amphibole occur in the cleavage of plagioclase.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro characterized by neoblastic recrystallization of Cpx, Pl and Ol. Cpx neoblasts are often associated with small amount of brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	20	80	50
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		60	100	8
Chlorite				2
Clay minerals	30			
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	45	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Primary plg included in cpx, both with elongated and sigmoidal shape indicate re-orientation related to crystal-plastic deformation. Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Olivine:	Grain size: coarse porphyroclast to fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: regular and common Subgrains: straight in porphyroclast Texture: porphyroclast oriented parallel to foliation and locally recrystallized grains are in association with recrystallized cpx
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular and common Texture: mainly completely recrystallized, shape define foliation
Clinopyroxene:	Grain size: coarse porphyroclast to fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: regular in porphyroclast Texture: porphyroclast oriented parallel to foliation and locally recrystallized grains are in association with recrystallized ol. Orientation of recrystallized grains or elongated aggregates define foliation.

THIN SECTION LABEL ID: **360-U1473A-16R-2-W 74/78-TSB-TS_51** Piece no.: #09 TS no.: 51

Group	Summary
Igneous petrology:	Strongly recrystallized and foliated granular and fine-grained amphibole-bearing olivine gabbro
Metamorphic petrology:	Static background alteration intensity is slight. An amphibole vein is associated with halo more than ten times wider than the vein.
Structure:	Mylonite with completely recrystallized plagioclase, olivine and clinopyroxene. Foliation is defined by all recrystallized phases. Plagioclase show serrate grain boundaries indicating grain boundary migration.

Plane-polarized

32953571

Cross-polarized

32953681

IGNEOUS PETROLOGY

Lithology: **amphibole-bearing olivine gabbro** Observer: LF

Texture: granular Ave. grain size: fine grained [345]

Detailed description: A strongly recrystallized and foliated granular and fine-grained amphibole-bearing olivine gabbro.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5				subhedral	elongate	
Plagioclase	57.1		1.2	0.25	subhedral	subequant	
Clinopyroxene	35		1.6	0.6	subhedral	subequant	
Amphibole	2		0.3	0.15	anhedral	interstitial	brown amphibole is also present as blebs in Cpx
Opaques	0.9						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): TN

Detailed description Static alteration intensity is slight. Alteration minerals are small amounts of serpentine after olivine, brown amphibole after clinopyroxene and secondary plagioclase along fractures of primary plagioclase. Alteration intensity increases in a halo (up to 700 micron wide) near the amphibole vein (20-50 micron wide).

Comment type	Comment
Mylonite comments:	Fine-grained mylonite
Vein 1 minerals:	brown and green Amp
Vein 2 minerals:	Chl and carbonate; extension of Vein-1

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		2
Amphibole, brown	n/a	95	n/a	n/a
Amphibole, green		5		
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF, GV

Detailed description The foliation is defined by all recrystallized phases.

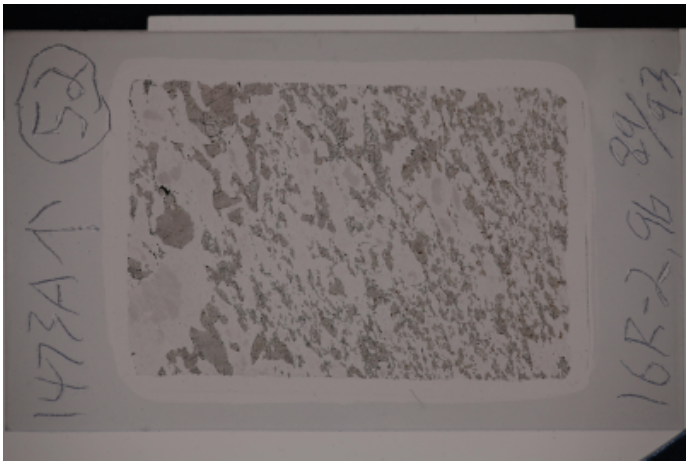
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: straight to curved Texture: completely recrystallized
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: serrate Texture: completely recrystallized with grain boundary migration (serrate boundaries and irregular shape) typical of high T deformation
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: straight to curved Texture: completely recrystallized

THIN SECTION LABEL ID: **360-U1473A-16R-2-W 89/93-TSB-TS_52** Piece no.: #09 TS no.: 52

Group	Summary
Igneous petrology:	A fine-grained olivine gabbro. Primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene and clinopyroxene is rimmed by brown amphibole. Plagioclase is almost completely recrystallized and displays undulose extinction. Opaque minerals consist of ilmenite and sulfides. Small amount of orthopyroxene maybe exist in this sample.
Metamorphic petrology:	Static background alteration degree is only slight with olivine and pyroxene exhibiting only minor secondary replacement.
Structure:	Strongly deformed, porphyroclastic. Plagioclase is mainly recrystallized, clinopyroxene and olivine form elongated aggregates of neoblasts that define the foliation. Porphyroclasts are deformed clinopyroxene and minor olivine and plagioclase.

Plane-polarized



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Cross-polarized

32974591

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: A fine-grained olivine gabbro with a porphyroclastic texture. It is weakly foliated, which is shown by the preferred orientation of olivine and plagioclase. Olivine is occasionally rimmed by orthopyroxene. Plagioclase is almost completely recrystallized and displays undulose extinction. Clinopyroxene occurs as porphyroclast and is rimmed by brown amphibole. Opaque minerals consist of ilmenite and sulfides. Intergrowth can be seen between these two minerals. Exsolution of chalcopyrite from the pyrrhotite can be seen. Small amount of orthopyroxene maybe exist in this sample.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.4	anhedral	subequant	overgrown by orthopyroxene
Plagioclase	70		4	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	24		2.4	0.8	anhedral	elongate	commonly with blebs of brown amphibole
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.3						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Sample is mylonitic olivine gabbro composed of plagioclase, clinopyroxene and olivine porphyroclasts and neoblasts. The sample is only slightly altered (~5% secondary minerals). Plagioclase are very fresh and olivine and pyroxene only exhibit minor static background alteration.

Comment type	Comment
Mylonite comments:	The sample is a very fresh mylonitic olivine gabbro composed of olivine, cpx and plagioclase porphyroclasts. The neoblasts are composed of polygonal aggregates of plagioclase, cpx and olivine, Also occurring in the neoblasts are brown-red amphibole grains. Opaques (oxides and minor sulfides) occur together in close association with brown-red hornblende as well within Cpx cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		3
Amphibole, brown	n/a	60	n/a	n/a
Clinopyroxene, sec.	n/a	40	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Olivine:	Grain size: coarse porphyroclastic to medium and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: regular Texture: very few porphyroclasts, mainly recrystallized in aggregates with cpx and might between plagioclase recrystallized
Plagioclase:	Grain size: coarse porphyroclastic to medium and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: regular in porphyroclasts and irregular in recrystallized Texture: very few porphyroclasts, mainly recrystallized, it defines foliation with cpx, ol aggregates
Clinopyroxene:	Grain size: coarse porphyroclastic fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Texture: porphyroclasts, also recrystallized in aggregates with ol and might between plagioclase recrystallized. Elongated aggregates define foliation

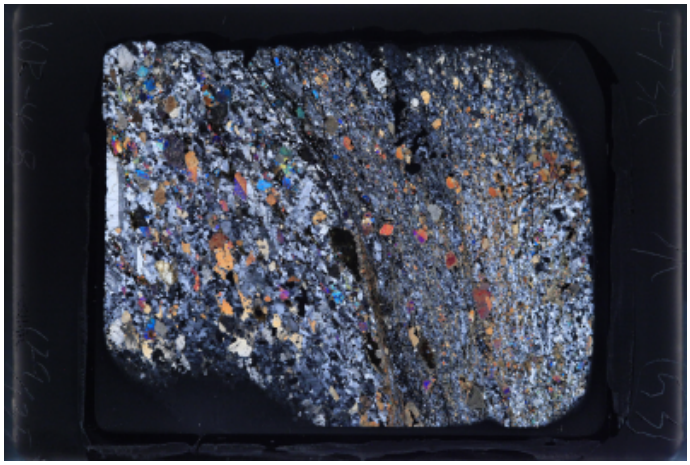
THIN SECTION LABEL ID: **360-U1473A-16R-4-W 129/135-TSB-TS_53** Piece no.: #08 TS no.: 53

Group	Summary
Igneous petrology:	There are two domains in the thin section, a medium-grained olivine gabbro and a oxide-bearing gabbro mylonite. Primary magmatic textures are not preserved in both domains.
Metamorphic petrology:	Mylonitic sample is substantially altered. Olivine grains are conspicuously replaced by reddish clays. Clinopyroxene grains are mostly replaced by brown and green amphibole, especially near the amphibole veins.
Structure:	Oxide-rich mylonitic contact between olivine gabbro and gabbro.

Plane-polarized

33014121

Cross-polarized



33014141

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: olivine gabbro

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: The domains is an olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is elongated and strongly altered. Plagioclase is commonly recrystallized and highly foliated. It shows undulose extinction. Clinopyroxene is aligned along the foliation and strongly altered.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2.8	anhedral	elongate	strongly altered
Plagioclase	70		8	1.6	anhedral	elongate	undulose extinction
Clinopyroxene	25		4	1.6	anhedral	subequant	
Opaques	0.5						
Ilmenite	0.5						

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: gabbro

Lithology: **oxide-bearing gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: This is the mylonitic disseminated oxide gabbro. Clinopyroxene has been completely replaced by amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		2.4	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	43		4	0.4	anhedral	elongate	completely altered
Opaques	2						
Ilmenite	2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%):

Observer(s): JL

Detailed description

The sample is an mylonitic olivine gabbro. Deformation is more intense in the middle part of the thin section, characterized by a decrease in grain size. Here, oxides and brown amphibole commonly occurs as neoblasts. Porphyroclastic brown amphibole were also observed in this part of the section. The rest of the section is dominated by plagioclase neoblasts. Other porphyroclastic grains are olivine, clinopyroxene and plagioclase. Alteration intensity is substantial. Clay overprint on olivine is conspicuous. Clinopyroxene has been mostly recrystallized to brown amphibole or rimmed by brown and green amphibole. Plagioclase are moderately replaced by mostly 2nd plagioclase.

Comment type	Comment
Mylonite comments:	The mylonite consists of porphyroclastic olivine, clinopyroxene, amphibole and plagioclase. Neoblastic olivine, plagioclase, clinopyroxene, brown amphibole and oxides were observed. Oxides and brown amphibole neoblasts usually occur together.
Vein 1 minerals:	Brown and brown green amphibole veins cross-cut the mylonitic foliation. Secondary replacement on all primary minerals are more pronounced near these veins.
Vein 2 minerals:	Empty linear features were also observed. They either a result of specimen fracturing during sample preparation or clay loss, also during the sample preparation.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	50		20
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, green	20	20		
Clay minerals	80	20		30
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description

Mylonitic contact between olivine gabbro and gabbro. The olivine gabbro is moderately recrystallized forming a porphyroclastic shear zone. The contact is mylonitic with a concentration of oxides which form a network vein parallel to the contact. The top part of the sample is cut by steeply dipping amphibole veins.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Olivine:	absent
Plagioclase:	Grain size: porphyroclasts: ~0.6 mm. neoblasts: ~0.01-0.1 mm Grain shape: elongate, anhedral. Grain boundary: curved to straight. Twinning: tapered. Undulose extinction: complete in porphyroclasts and larger neoblasts Subgrains: not well developed. Texture: very fine grained zone of recrystallized plagioclase.
Clinopyroxene:	Grain size: porphyroclasts: ~1.5 mm. neoblasts: ~0.3 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: porphyroclastic with neoblasts intermixed with neoblasts of plagioclase.
Oxide:	The oxide bands are parallel to the mylonitic zone forming a network vein. Plagioclase and pyroxene neoblasts are completely surrounded by oxide when the oxide abundance is high. The oxide bands are concentrated within the shear zone, however present in limited abundances in the surrounding sample near porphyroclasts of pyroxene.
Vein:	Near the top of the section there are amphibole veins that crosscut the crystal plastic fabric at a high angle.

Interval domain no: 2 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Mylonitic contact between olivine gabbro and gabbro. The olivine gabbro is moderately recrystallized forming a porphyroclastic shear zone. The contact is mylonitic with a concentration of oxides which form a network vein parallel to the contact. The top part of the sample is cut by steeply dipping amphibole veins.

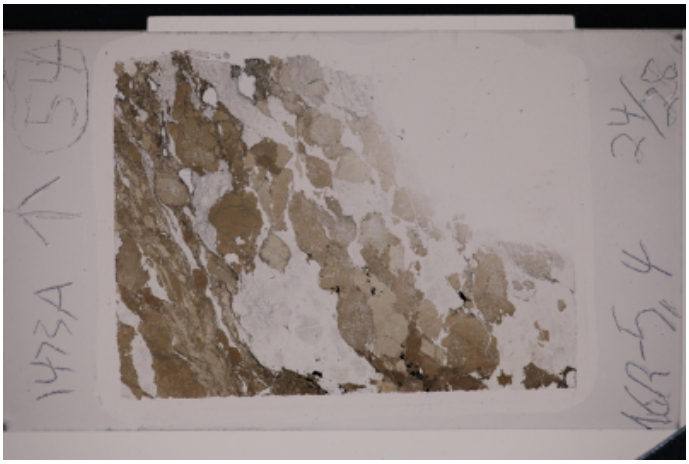
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~2.5 mm. neoblasts: ~0.3 mm. Grain shape: elongate, anhedral. Grain boundary: straight to curved. Undulose extinction: better developed in porphyroclasts. Texture: elongate, weakly recrystallized olivine. The olivine neoblasts occur around the porphyroclasts and in aggregrates with neoblasts of pyroxene.
Plagioclase:	Grain size: porphyroclasts: 1-6 mm. neoblasts: ~0.3 mm Grain shape: elongate, anhedral. Grain boundary: curved to straight. Twinning: tapered. Undulose extinction: complete in porphyroclasts and larger neoblasts Subgrains: developed in porphyroclasts. Texture: Porphyroclastic plagioclase with subgrain development, undulose extinction, and locally fracture.
Clinopyroxene:	Grain size: porphyroclasts: ~2 mm. neoblasts: ~0.3 mm. Grain shape: subhedral, elongate. Grain boundary: irregular. Texture: porphyroclastic with limited recrystallization.
Oxide:	Limited abundance near porphyroclasts of pyroxene.

THIN SECTION LABEL ID: **360-U1473A-16R-5-W 24/28-TSB-TS_54** Piece no.: #04 TS no.: 54

Group	Summary
Igneous petrology:	A deformed and highly altered gabbro. Primary magmatic texture is not preserved. Clinopyroxene is completely replaced by amphibole and plagioclase displays undulose extinction.
Metamorphic petrology:	In this sample, primary clinopyroxene is almost completely replaced by brown amphibole. There is a foliation that is for instance defined by preferred orientation of augen-shaped brown Amp and porphyroclastic Pl. In one portion of the thin section, the foliation is defined by alternating bands made up of brown amphibole and Pl. In this domain, brown Amp and Pl are relatively fine grained and aligned along the foliation,
Structure:	Weakly deformed background with locally recrystallized plagioclase. This structure locally show increase of deformation to mylonitic foliation defined by strongly recrystallized plagioclase. Porphyroclasts are mainly clinopyroxene replaced by amphibole.

Plane-polarized



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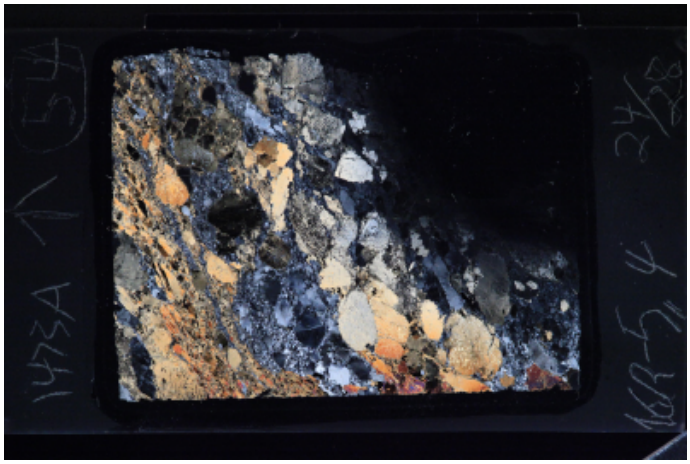
Cross-polarized



32974551

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A deformed and highly altered gabbro. Primary magmatic texture is not preserved. Clinopyroxene occurs as porphyroclast and is completely replaced by amphibole. Plagioclase is partly recrystallized and shows undulose extinction. Deformation twins can be seen in some plagioclases.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	54		2.4	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	45		5	2.4	anhedral	elongate	completely replaced by amphibole
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Interval domain no: Domain rel. abundance (%): 45 Domain name:

Total rock alteration estimate (%): Observer(s): RT

Detailed description In this sample, primary clinopyroxene is almost completely replaced by brown amphibole. The foliation is mainly defined by preferred orientation of augen-shaped brown Amp and porphyroclastic Pl. The brown amphibole frequently contains clinopyroxene blebs sharing the same extinction angle. In one portion of the thin section, the foliation is defined by alternating bands made up of brown amphibole and Pl. In this domain, brown Amp and Pl are relatively fine grained and aligned along the foliation. The fine grained plagioclase aggregates contain in places zoisite.

Comment type	Comment
Alteration general comments:	The sample is an amphibole mylonite (i.e., amphibolite) in which primary clinopyroxene is almost completely replaced by brown amphibole.
Mylonite comments:	The foliation is mainly defined by preferred orientation of augen-shaped brown Amp and porphyroclastic Pl. The brown amphibole frequently contains clinopyroxene blebs with the same extinction angle. In one portion of the thin section, the foliation is defined by alternating bands made up of brown amphibole and Pl. In this domain, brown Amp and Pl are relatively fine grained and aligned along the foliation, The fine grained plagioclase aggregates contain in places zoisite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		90		
Amphibole, brown	n/a	10	n/a	n/a
Subtotals replaced		10		

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic background Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse porphyroclast to fine recrystallized Grain shape: subhedral porphyroclastic to anhedral recrystallized Grain boundary: straight to curved Twinning: rare tapered in porphyroclasts Undulose extinction: irregular Texture: locally recrystallized between porphyroclasts
Clinopyroxene:	Grain size: coarse porphyroclast Grain shape: subhedral Grain boundary: straight to curved Texture: completely replaced by amphibole

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

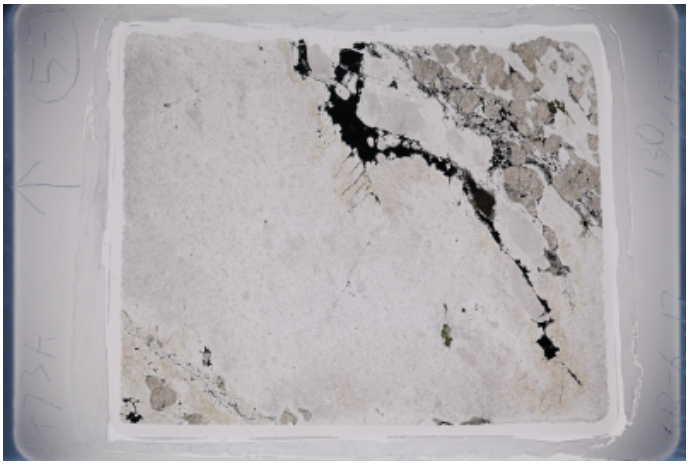
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Plagioclase:	Grain size: coarse porphyroclast to fine recrystallized Grain shape: subhedral porphyroclastic to anhedral recrystallized Grain boundary: straight to curved Twinning: rare tapered in porphyroclasts Undulose extinction: irregular Texture: intensively recrystallized
Clinopyroxene:	Grain size: coarse porphyroclast and fine recrystallized Grain shape: subhedral porphyroclastic anhedral recrystallized Grain boundary: straight to curved Texture: locally recrystallized between along a level but completely replaced by amphibole

THIN SECTION LABEL ID: **360-U1473A-16R-6-W 130/137-TSB-TS_55** Piece no.: #17 TS no.: 55

Group	Summary
Igneous petrology:	A disseminated oxide gabbro intruded by a felsic vein. Primary magmatic texture of the gabbro is not preserved. The felsic veins is also foliated.
Metamorphic petrology:	Sample consist of a moderately altered and mylonitized host rock and a felsic vein with plagioclase in both having similar degree of alteration and replacing minerals. Olivine and clinopyroxene in the host rock are extensively and moderately altered, respectively.
Structure:	Recrystallized anorthositic layer and host gabbro with oxide-rich contacts.

Plane-polarized



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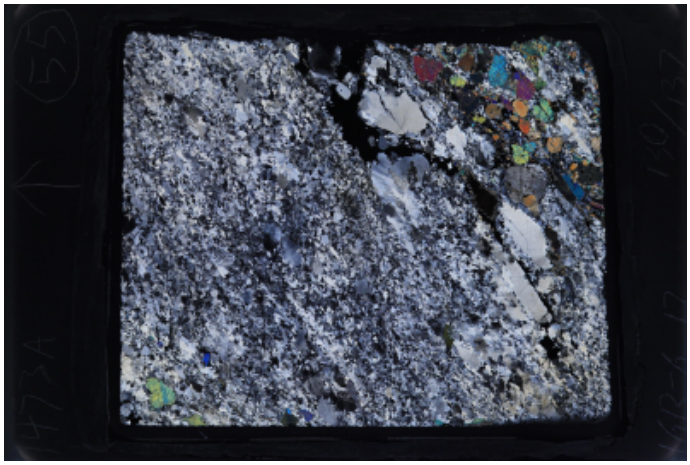
Cross-polarized



33014061

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): Domain name: lithology

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is a gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is highly recrystallized and foliated. It shows undulose extinction. Clinopyroxene is partly altered and aligned to the foliation. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	40		2	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	59		4.8	3	anhedral	subequant	
Opaques	1						
Ilmenite	1						

Interval domain no: **2** Domain rel. abundance (%): Domain name: vein

Lithology: **oxide-bearing leucodiorite** Observer: CL

Texture: granular Ave. grain size: fine grained [345]

Detailed description: The felsic vein is mainly composed of plagioclase, which is highly elongated and displays undulose extinction. Small amount of opaque minerals are concentrated in the boundary between gabbro and felsic vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	95		2	0.4	anhedral	elongate	undulose extinction
Opaques	5						
Ilmenite	4.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): JL

Detailed description

Sample consist of a mylonitic olivine gabbro and a felsic vein. The mylonite is composed of deformed plagioclase, clinoyproxene, olivine and oxide crystals. Recrystallized plagioclase and clinopyroxene make up aggregates of polygonal crystals. Olivine neoblasts are hard to discern due to the degree of alteration. Overall, the background static alteration is moderate. Olivine is extensively altered into mostly clay and talc. Clinopyroxene is partially replaced by mostly brown amphibole and clay while plagioclase is partially replaced by mostly secondary plagioclase. Plagioclase in both the host rock and the felsic vein are oriented in the same direction, suggesting both were deformed at the same time at some point.

Comment type	Comment
Mylonite comments:	The sample is mylonitized with porphyroclasts of clinopyroxene, olivine and plagioclase. Recrystallized clinopyroxene and plagioclase are conspicuous throughout the sample as aggregates of polygonal crystals. Olivine neoblasts are hard to discern due to the high degree of alteration. Oxides are deformed as well. Plagioclase crystals in the felsic vein are deformed parallel to those in the host rock, suggesting that both the felsic vein and host rock were deformed at the same time.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	90	20		30
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless	5			
Amphibole, green		20		
Chlorite				10
Clay minerals	45	40		10
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	40	n/a		n/a
Other			100	100
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description

Anorthositic layer that intruded into the host gabbro. The anorthosite has recrystallized plagioclase with irregular boundaries, undulose extinction, and well developed sub grains. The host gabbro has elongate porphyroclasts of plagioclase and pyroxene. The neoblasts of plagioclase form polygonal aggregates. The neoblasts of pyroxene form around the porphyroclasts of pyroxene sometimes with olivine. The oxide pods form on both contacts of the anorthositic layer, surrounding neoblasts of plagioclase and in some instances has fractured plagioclase porphyroclasts. The textural difference between recrystallized plagioclase in the anorthosite (e.g., irregular boundaries, subgrain development) and the host gabbro (e.g., polygonal boundaries, poor subgrain development) may suggest that the host gabbro was deforming before the anorthosite intruded into the system, then both were plastically deformed.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: porphyroclasts: 1-6 mm. neoblasts: 0.01-1 mm. Grain shape: elongate and anhedral. Grain boundary: irregular, serrate. Twinning: tapered, mostly in porphyroclasts. Undulose Extinction: complete in all grain sizes. Subgrains: well developed in porphyroclasts.some in neoblasts. Texture: Anorthositic layer with strongly recrystallized plagioclase. There are not many porphyroclasts remaining. The neoblasts form elongate clasts with undulose extinction and irregular boundaries.
Oxide:	Oxide pods form on both contacts of the anorthositic layer and the host gabbro. The oxide pods are parallel to the foliation and the contact. The oxide pods enclose recrystallized plagioclase and in some cases fracture the plagioclase. Oxide is almost absent, other than a few tendrils, in the anorthositic layer.

Interval domain no: 2 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description

Anorthositic layer that intruded into the host gabbro. The anorthosite has recrystallized plagioclase with irregular boundaries, undulose extinction, and well developed sub grains. The host gabbro has elongate porphyroclasts of plagioclase and pyroxene. The neoblasts of plagioclase form polygonal aggregates. The neoblasts of pyroxene form around the porphyroclasts of pyroxene sometimes with olivine. The oxide pods form on both contacts of the anorthositic layer, surrounding neoblasts of plagioclase and in some instances has fractured plagioclase porphyroclasts. The textural difference between recrystallized plagioclase in the anorthosite (e.g., irregular boundaries, subgrain development) and the host gabbro (e.g., polygonal boundaries, poor subgrain development) may suggest that the host gabbro was deforming before the anorthosite intruded into the system, then both were plastically deformed.

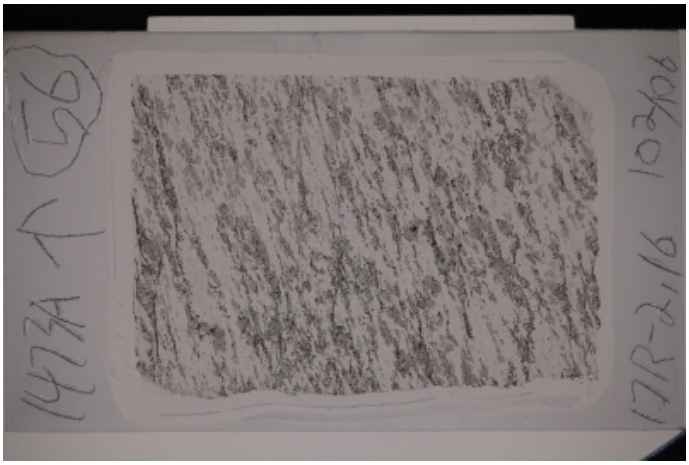
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: porphyroclasts: 1-6 mm. neoblasts: 0.01-0.3 mm. Grain shape: anhedral, equant. Grain boundary: straight to curved. Twinning: tapered in porphyroclasts and larger neoblasts. Undulose Extinction: better developed in porphyroclasts and larger neoblasts. Subgrains: not well developed. Texture: polygonal to elongate neoblasts that have variably developed undulose extinction and subgrains.
Clinopyroxene:	Grain size: porphyroclasts: 1.5-3.5 mm. neoblasts: ~0.5 mm. Grain shape: subhedral. Grain boundary: straight. Texture: elongate parallel to the foliation. The neoblasts form aggregates in pressure shadows near the porphyroclasts. Some of the aggregates have neoblasts of olivine.

THIN SECTION LABEL ID: **360-U1473A-17R-2-W 102/106-TSB-TS_56** Piece no.: #16 TS no.: 56

Group	Summary
Igneous petrology:	A foliated olivine gabbro. The primary magmatic texture is not preserved. Plagioclase is elongated and shows undulose extinction.
Metamorphic petrology:	Total static alteration intensity is slight. Partial replacement of clinopyroxene by brown amphibole, and olivine by talc and serpentine are dominant.
Structure:	Deformed and strongly foliated with oriented recrystallized clinopyroxene and oxide bands. Plagioclase is completely recrystallized and parallel to foliation.

Plane-polarized



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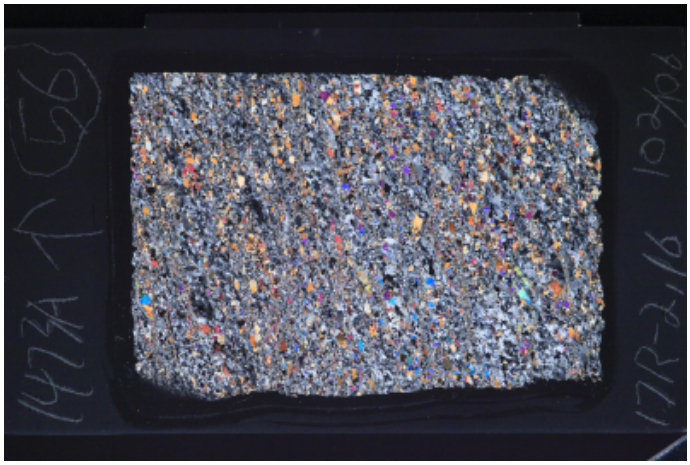
Cross-polarized



32974511

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: A foliated olivine gabbro. Primary magmatic texture is not preserved. The foliation is defined by the preferred orientation of plagioclase and olivine. Olivine is strongly recrystallized. Plagioclase is elongated and shows undulose extinction. Clinopyroxene is also elongated along the foliation. Brown amphibole occurs either with olivine neoblasts or at the rim of clinopyroxene. Opaque minerals consist of ilmenite and sulfides. Exsolution of chalcopyrite from pyrrhotite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	14			0.1	anhedral	subequant	strongly recrystallized
Plagioclase	70		1	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	15		1	0.4	anhedral	elongate	
Amphibole	0.5		0.2	0.1	anhedral	interstitial	associates with olivine neoblasts or occurs at the rim of clinopyroxene
Opaques	0.5						
Ilmenite	0.3						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): TN

Detailed description Olivine is partially replaced by talc at rim and by serpentine along fractures. Clinopyroxene is mainly replaced by brown amphibole. Plagioclase microfractures are filled with chlorite.

Comment type	Comment
Mylonite comments:	Ol, Cpx, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		2
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, colorless		10		
Amphibole, green		5		
Chlorite				70
Clinopyroxene, sec.	n/a	2	n/a	n/a
Oxide	4	2		n/a
Plagioclase, sec.	n/a	n/a	n/a	30
Sulfide	1	1		n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: altered and recrystallized in association with oxide bands
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved to staright Twinning: mechanical Undulose extinction: irregular Subgrain: curved Texture: common fracture, completely recrystallized
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: curved to straight Texture: recrystallized, oriented and associate with oxides layers; define foliation
Oxide:	thin elongated bands in association with cpx, parallel to foliation, associated to alteration (amph)

Interval domain no: 2 Domain rel. abundance (%): 20 Domain name: microfabric

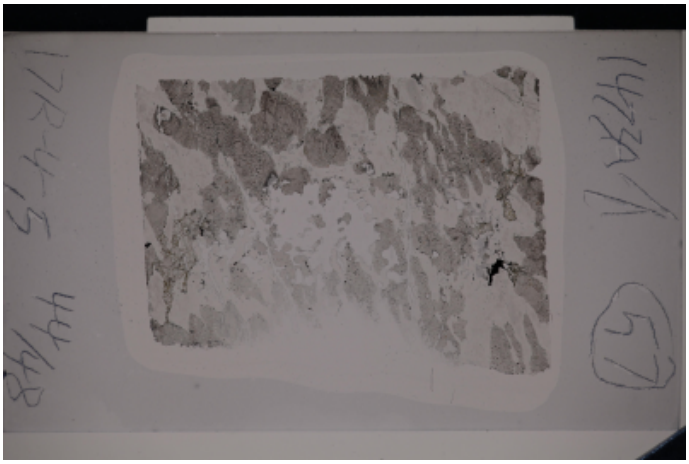
Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

THIN SECTION LABEL ID: **360-U1473A-17R-4-W 44/48-TSB-TS_57** Piece no.: #05 TS no.: 57

Group	Summary
Igneous petrology:	An olivine-bearing gabbro. Primary magmatic texture is not preserved. Plagioclase is deformed and shows undulose extinction. Clinopyroxene is elongated and displays a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfides.
Metamorphic petrology:	Fresh mylonite showing the recrystallization of primary Pl and Cpx into nearly polygonal aggregates. The Cpx neoblasts are frequently associated with minor amounts of red-brown Amp and opaque phases.
Structure:	Porphyroclastic with clinopyroxene and minor deformed plagioclase porphyroclasts.Plagioclase is mainly recrystallized. Clinopyroxene recrystallized along porphyroclasts grain boundaries.

Plane-polarized



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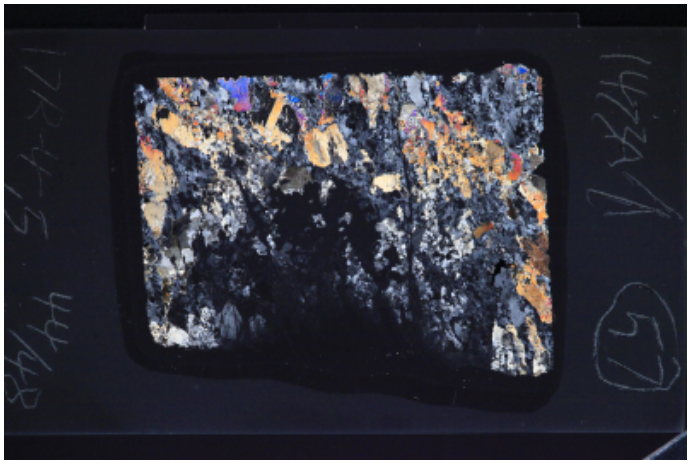
Cross-polarized



32974471

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine-bearing gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is deformed and shows undulose extinction. Clinopyroxene is elongated and displays a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfides. Intergrowth of ilmenite with sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			2	anhedral	elongate	
Plagioclase	60		4	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	37		4	1.6	anhedral	elongate	with consertal intergrowth texture
Amphibole	0.5		0.1	0.05	anhedral	interstitial	associates with clinopyroxene neoblasts
Opaques	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): RT

Detailed description The rock shows to have experienced crystal-plastic deformation associated with recrystallization of primary Pl and Cpx into nearly polygonal aggregates. The Cpx neoblasts are frequently associated with minor amounts of red-brown Amp and opaque phases. The static alteration is slight. In particular, the Pl alteration is restricted to micro-veins.

Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	Mylonite showing the recrystallization of primary Pl and Cpx into nearly polygonal aggregates. The Cpx neoblasts are frequently associated with minor amounts of red-brown Amp and opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		5
Amphibole, colorless		80		
Amphibole, green		15		100
Oxide	20	5		n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse to medium relict of porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical Undulose extinction: irregular Texture: mainly recrystallized, minor relicts of porphyroclasts
Clinopyroxene:	Grain size: coarse porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Texture: Porphyroclastic recrystallized, mainly at porphyroclasts grain boundary or forming aggregates substituting porphyroclast

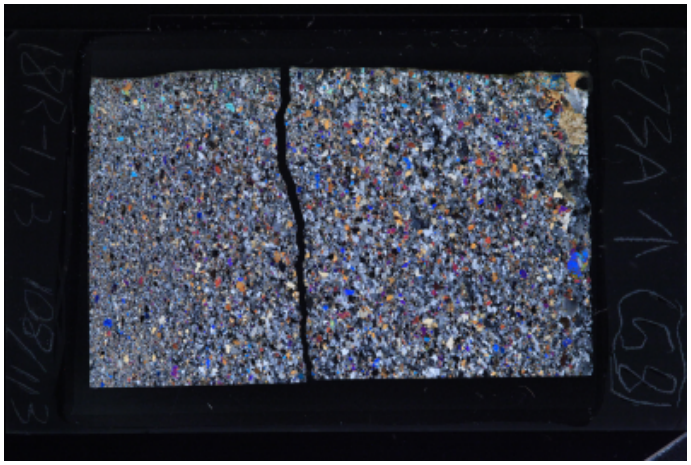
THIN SECTION LABEL ID: **360-U1473A-18R-1-W 108/113-TSB-TS_58** Piece no.: #13 TS no.: 58

Group	Summary
Igneous petrology:	An olivine gabbro with a granular texture. The igneous lamination is shown by the preferred orientation of clinopyroxene and plagioclase.
Metamorphic petrology:	This thin section showed extensive alteration. It could be related to the low temperature alteration as clay occured in olivine, clinopyroxene and plagioclase.
Structure:	Strongly deformed and foliated. Plagioclase is maily recrystallized and olivine in association may recrystallize in elongated aggregates that define the foliation.

Plane-polarized

32992821

Cross-polarized



32992841

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained [345]

Detailed description: An olivine gabbro with a granular texture. The igneous lamination is shown by the preferred orientation of clinopyroxene and plagioclase. Olivine is rimmed by orthopyroxene. The tabular plagioclase commonly shows undulose extinction and magmatic twins can be occasionally seen. Brown amphibole commonly associates with olivine neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			0.1	anhedral	subequant	almost completely recrystallized and neoblasts are parallel to the foliation
Plagioclase	60		1	0.4	anhedral	tabular	undulose extinction
Clinopyroxene	24		2.8	0.4	anhedral	subequant	
Amphibole	0.8		0.4	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 65 Observer(s): QM

Detailed description Olivine mainly altered into talc and clay. Clinopyroxene altered into brown and pale color amphibole. Plagioclase are almost replaced by secondary plagioclase, also some clay. The extensive alteration of this thin section could contribute in the low temperatue alteration, because clay occured in these three minerals.

Comment type	Comment
Mylonite comments:	Mylonitic olivine microgabbro characterized by recrystallization of Cpx, Pl and Ol into aggregates. Cpx neoblasts are more or less related to brown amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	35	20		90
Amphibole, brown	n/a	25	n/a	n/a
Amphibole, colorless		60		
Chlorite				10
Clay minerals	40	15		10
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	45	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

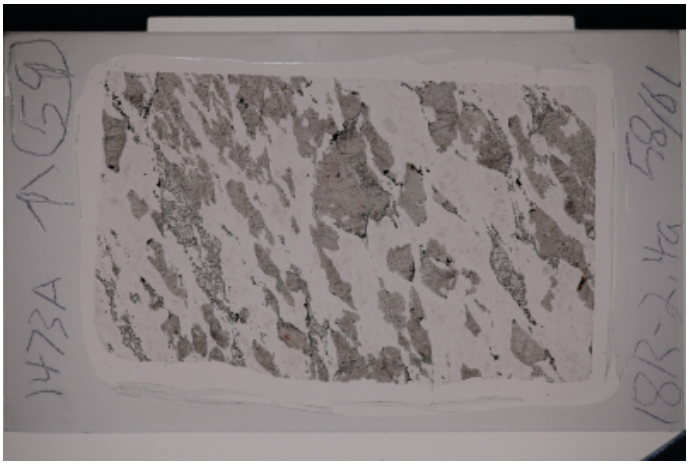
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Olivine:	Grain size: coarse minor porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular in porphyroclast Texture: mainly recrystallized, often in elongated aggregates with cpx
Plagioclase:	Grain size: minor coarse to medium porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular in porphyroclast Texture: almost completely recrystallized recrystallized, often in elongated aggregates with cpx
Clinopyroxene:	Grain size: medium minor porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: porphyroclastic recrystallized, often in elongated aggregates with ol, that define the foliation

THIN SECTION LABEL ID: **360-U1473A-18R-2-W 58/61-TSB-TS_59** Piece no.: #04 TS no.: 59

Group	Summary
Igneous petrology:	An olivine gabbro. Primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction, and is partly or fully enclosed within clinopyroxene. Clinopyroxene is rimmed by clinopyroxene neoblasts together with brown amphibole. Opaque minerals consist of ilmenite and sulfide.
Metamorphic petrology:	The mylonite shows the dynamic recrystallization of primary Ol, Pl and Cpx. It includes fine grained bands made up of plagioclase and olivine. The static alteration is mostly restricted to olivine, that is locally weakly transformed into talc and oxides. In addition, the clinopyroxene porphyroclasts locally show a patchy transformation into secondary clinopyroxene and red-brown amphibole.
Structure:	Strongly deformed olivine gabbro with clinopyroxene porphyroblasyt exhibiting dynamic recrystallization.

Plane-polarized



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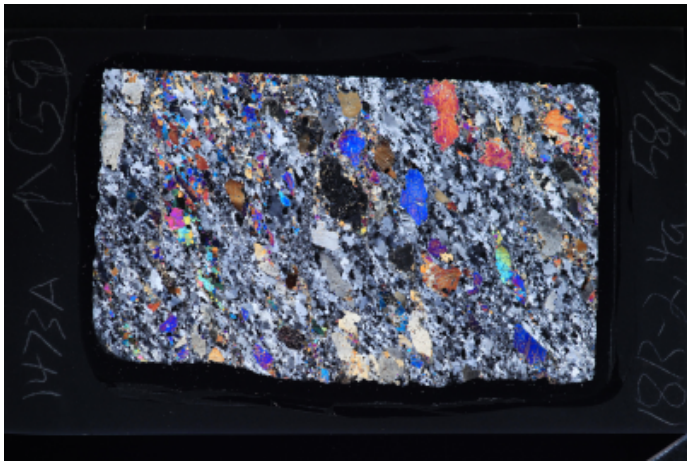
Cross-polarized



32974431

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. It is weakly foliated, as shown by the preferred orientation of olivine and plagioclase. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction. Occasionally, it is partly or fully enclosed within clinopyroxene. Clinopyroxene is rimmed by clinopyroxene neoblasts together with brown amphibole. Opaque minerals consist of ilmenite and sulfide, with intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	14			0.6	anhedral	elongate	overgrown by orthopyroxene
Plagioclase	65		2	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	20		4	2.4	anhedral	elongate	rimmed by clinopyroxene neoblasts and brown amphibole
Amphibole	0.5		1	0.1	anhedral	interstitial	occasionally associates with opaque minerals
Opaques	0.5						
Ilmenite	0.3						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description The rock shows the dynamic recrystallization of primary Ol, Pl and Cpx. It also includes fine grained bands made up of plagioclase and olivine. The static alteration is mostly restricted to olivine, which is locally transformed into talc and oxides. In addition, the clinopyroxene porphyroclasts locally show a patchy transformation into secondary clinopyroxene and red-brown amphibole.

Comment type	Comment
Alteration general comments:	The static alteration is mostly restricted to olivine, that is locally weakly transformed into talc and oxides. In addition, the clinopyroxene porphyroclasts locally show a patchy transformation into secondary clinopyroxene and red-brown amphibole.
Mylonite comments:	The mylonite shows the dynamic recrystallization of primary Ol, Pl and Cpx. It includes fine grained bands made up of plagioclase and olivine.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		
Amphibole, brown	n/a	30	n/a	n/a
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic presence of exsolved cpx in opx Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclast, medium recrystallized Grain shape: subhedral porphyroclast, anhedral recrystallized Grain boundary: curved Undulose extinction: straight Texture: fractured, porphyroclast parallel to foliation, recrystallized grains in aggregates with cpx parallel to foliation
Plagioclase:	Grain size: medium Grain shape: anhedral Grain boundary: curved Twinning: mechanical Undulose extinction: irregular Texture: fractured, completely recrystallized; very fine grained in bands parallel to foliation and in association with ol
Clinopyroxene:	Grain size: coarse porphyroclast, fine recrystallized Grain shape: subhedral porphyroclast, anhedral recrystallized Grain boundary: curved to irregular Undulose extinction: absent to irregular Texture: fractured, porphyroclast (sub)parallel to foliation with inclusions of plg, recrystallized grains in aggregates with ol parallel to foliation
Oxide:	along grain boundaries of cpx and clivage plane

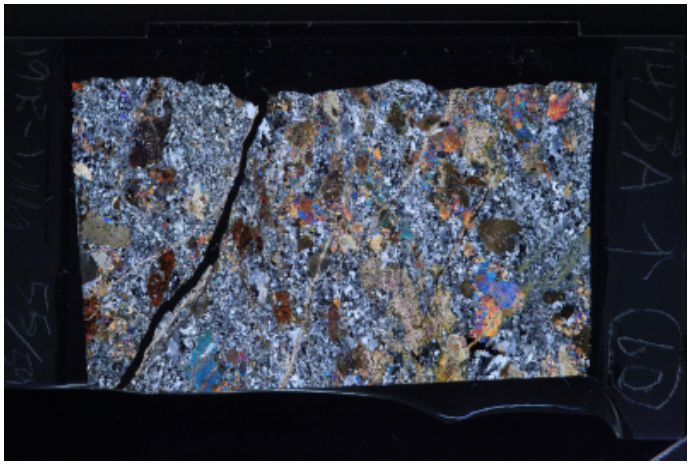
THIN SECTION LABEL ID: **360-U1473A-19R-1-W 55/59-TSB-TS_60** Piece no.: #11 TS no.: 60

Group	Summary
Igneous petrology:	An olivine gabbroe. Primary magmatic texture is not preserved. Olivine is completely altered. Plagioclase shows undulose extinction. Clinopyroxene is heavily altered and partly recrystallized.
Metamorphic petrology:	Sample is mylonitized and extensively altered into mostly clay minerals, talc and secondary plagioclase. Carbonate and tremolite veins were also observed.
Structure:	Strongly deformed, mylonitic foliation. clinopyroxene and olivine porphyroclast are parallel to the foliation. Plagioclase is completely recrystallized in medium to fine crystals.

Plane-polarized

32992781

Cross-polarized



32992801

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is completely altered. Plagioclase shows undulose extinction, and is partly or fully enclosed within clinopyroxene. Clinopyroxene is heavily altered and partly recrystallized. It contains brown amphibole blebs. Few orthopryoxene may exist.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5						completely altered
Plagioclase	60		1.6	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	35		4	2	anhedral	subequant	heavily altered
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 70 Observer(s): JL

Detailed description The sample is an extensively altered mylonitic olivine gabbro composed of olivine, plagioclase and clinopyroxene porphyroclast and neoblast. Olivine and clinopyroxene are completely and partially replaced by secondary minerals, respectively. Clay and talc are common olivine replacement minerals. Cpx and Opx are mostly replaced by clay while plagioclase is mostly replaced by secondary plagioclase. The sample is also marked by tremolite veins and late-stage carbonate-clay veins.

Comment type	Comment
Mylonite comments:	The sample consist of clinopyroxene, plagioclase and olivine porphyroclasts. Neoblasts are also composed of the same abovementioned minerals. Neoblasts are made up of mostly monomineralic aggregrates (altered olivine neoblasts sometimes occur together with Cpx neoblasts). Some red-brown hornblende neoblasts coexisting with Cpx neoblasts were observed.
Vein 1 minerals:	The sample consist of several carbonate veins that often branches into smaller veins. The carbonate veins usually has reddish clay components which are often found in the vein edges. The vein is mostly made up of coarse-grained aggregates of carbonate crystals and often minor fine-grained aggregates. These carbonate-clay veins cut he mylonite foliation obliquely.
Vein 2 minerals:	A pale yellow amphibole vein was observed and it cross cuts the mylonite foliation. It is made up of fine-grained acicular crystals characteristic of tremolite. There are also minor high-relief non-acicular grains of probably epidote.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50	95	50
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		20		
Chlorite				10
Clay minerals	50	70		
Oxide	10		100	n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	45	n/a		n/a
Subtotals replaced	105	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a

Type	Comment
Olivine:	porphyroclasts completely altered
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: straight to curved Twinning: mechanical, observed in medium grained Undulose extinction: regular Texture: completely recrystallized, locally very fine grained form bands subparallel to foliation
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Texture: partially altered, porphyroclastic partially recrystallized. Recrystallize locally along porphyroclasts grain boundary
Vein:	filled fractures with alteration products

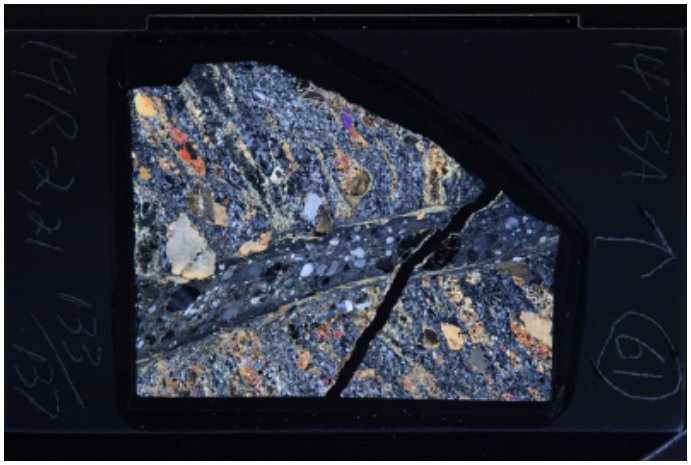
THIN SECTION LABEL ID: **360-U1473A-19R-2-W 133/137-TSB-TS_61** Piece no.: #21 TS no.: 61

Group	Summary
Igneous petrology:	A gabbro intruded by a mylonitic felsic vein. The gabbro is foliated and its primary magmatic texture of the gabbro is not preserved. The foliation is defined by the preferred orientation of plagioclase and elongated clinopyroxene. Plagioclase displays undulose extinction. Clinopyroxene is pervasively replaced by amphibole. The felsic vein is mylonitized and contains abundant zircons.
Metamorphic petrology:	The gabbro mylonitic foliation is associated with recrystallization of Pl and Cpx. This mylonitic foliation is crosscut at a high angle by a felsic vein showing a mylonitic foliation that is subparallel to vein elongation. The static background alteration is substantial. The thin section is entirely crosscut a by calcite vein.
Structure:	Mylonite defined by completely recrystallized plagioclase and partially recrystallized altered clinopyroxene. The mylonite is cross-cut at high angle by a felsic vein.

Plane-polarized

32992671

Cross-polarized



32992761

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: A gabbro intruded by a mylonitic felsic vein. The gabbro is foliated and its primary magmatic texture of the gabbro is not preserved. The foliation is defined by the preferred orientation of plagioclase and elongated clinopyroxene. Plagioclase displays undulose extinction. Clinopyroxene is pervasively replaced by amphibole. The felsic vein is mylonitized and contains abundant zircons.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		0.6	0.3	anhedral	elongate	undulose extinction
Clinopyroxene	40		4.4	2	anhedral	elongate	heavily replaced by green amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): RT

Detailed description The gabbro mylonitic foliation is associated with recrystallization of Pl and Cpx; the latter is associated with minor amounts of red-brown Amp. This mylonitic foliation is crosscut at a high angle by a zircon-bearing felsic vein showing a mylonitic foliation that is subparallel to the elongation of the felsic vein. The mylonitic foliation of the felsic dyke is therefore at a high angle with respect to the dominant mylonitic foliation of the host gabbro. The mylonitic foliation of the felsic dyke is characterized by fine grained Pl most likely associated with green Amp. The recrystallization of Pl into fine grained neoblastic aggregates is locally observed also in the host mylonitic gabbro. The static background alteration is overall substantial and is mostly associated with Ol and Cpx. The Pl alteration essentially occurs along micro-veins and along neoblast grain boundaries. The thin section is entirely crosscut a by calcite vein.

Comment type	Comment
Alteration general comments:	The static background alteration is overall substantial and is mostly associated with Ol and Cpx.
Mylonite comments:	The gabbro mylonitic foliation is associated with recrystallization of Pl and Cpx; the latter is associated with minor amounts of red-brown Amp. This mylonitic foliation is crosscut at a high angle by a zircon-bearing felsic vein showing a mylonitic foliation that is subparallel to the elongation of the felsic vein. The mylonitic foliation of the felsic dyke is therefore at a high angle with respect to the dominant mylonitic foliation of the host gabbro. The mylonitic foliation of the felsic dyke is characterized by fine grained Pl most likely associated with green Amp. The recrystallization of Pl into fine grained neoblastic aggregates is locally observed also in the host mylonitic gabbro.
Vein 1 minerals:	The thin section is entirely crosscut a by calcite vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	35		5
Amphibole, colorless	10	35		50
Amphibole, green		35		
Chlorite	65			50
Clay minerals	10	30		
Oxide	5			n/a
Talc	10	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved Twinning: mechanical Texture: Completely recrystallized in medium to fine grained levels, where very fine levels form bands parallel to foliation
Clinopyroxene:	Grain size: coarse porphyroclast to fine recrystallized Grain shape: anhedral and elongated Grain boundary: curved Texture: Porphyroclastic recrystallized in medium to fine grained crystals, porphyroclasts are parallel to foliation, and recrystallization often occur along grain boundaries of porphyroclasts.
Vein:	felsic vein cross-cut mylonitic foliationat high angle with dextral shear sense; mylonitic foliation is observed in this vein with foliation subparallel to elongation of the vein

THIN SECTION LABEL ID: **360-U1473A-20R-1-W 129/135-TSB-TS_62** Piece no.: #14 TS no.: 62

Group	Summary
Igneous petrology:	A disseminated oxide gabbro crosscut by a mylonite. Primary magmatic texture is not preserved. Olivine is elongated and partly altered. Plagioclase displays undulose extinction and is partly enclosed in clinopyroxene porphyroclasts. Opaque minerals are mainly composed of ilmenite, with minor sulfides.
Metamorphic petrology:	The rock shows a foliation characterized by recrystallization of Pl, Ol and Cpx. This foliation is overprinted at a high angle by a mylonitic foliation characterized by the association of brown Amp and fine-grained plagioclase; the brown Amp typically shows irregular green Amp rims. The overall background alteration of the rock is moderate. Cpx is mostly replaced by pale green Amp along rims and micro-fractures. In the Amp-Pl mylonite, Cpx is commonly partly replaced by brown amphibole. Pl alteration is restricted to clay developing in micro-fractures and along the grain boundaries among the Pl neoblasts. Ol is substantially altered, particularly into talc and clay; it is locally replaced by calcite.
Structure:	Steep porphyroclastic shear zone in an olivine gabbro crosscut by a sub-horizontal mylonite.

Plane-polarized

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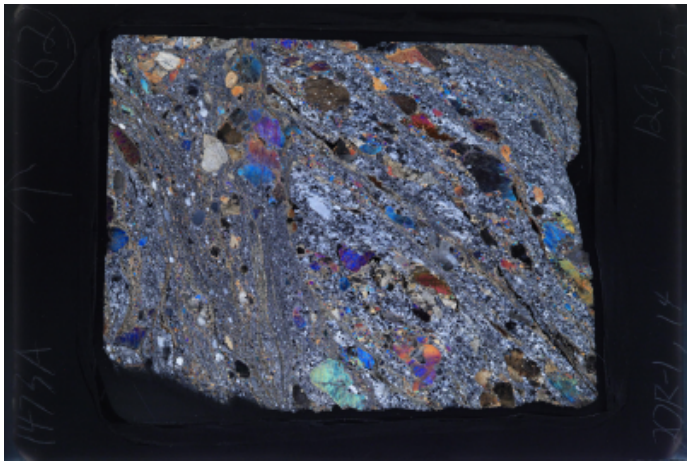
Cross-polarized



33013881

IGNEOUS PETROLOGY

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: mylonitic Ave. grain size: medium grained [345]

Detailed description: A foliated disseminated oxide gabbro crosscut by a mylonite. Small amount of olivine are present. Olivine is elongated and partly altered. Plagioclase is completely recrystallized and displays undulose extinction. It is partly enclosed in clinopyroxene porphyroclasts, which are distributed along the foliation. Opaque minerals are mainly composed of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1			5	anhedral	elongate	
Plagioclase	55		2.8	0.1	anhedral	elongate	undulose extinction
Clinopyroxene	43		8	4	anhedral	elongate	
Opaques	1						
Ilmenite	0.9						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): RT

Detailed description The rock shows a foliation characterized by recrystallization of Pl, Ol and Cpx. This foliation is overprinted at a high angle by a mylonitic foliation characterized by the association of brown Amp and fine-grained plagioclase; the brown Amp typically shows irregular green Amp rims. The overall background alteration of the rock is moderate. Cpx is mostly replaced by pale green Amp along rims and micro-fractures. In the Amp-Pl mylonite, Cpx is commonly partly replaced by brown amphibole. Pl alteration is restricted to clay developing in micro-fractures and along the grain boundaries among the Pl neoblasts. Ol is substantially altered, particularly into talc and clay; it is locally replaced by calcite.

Comment type	Comment
Alteration general comments:	The overall background alteration of the rock is moderate.
Mylonite comments:	The rock shows a foliation characterized by recrystallization of Pl, Ol and Cpx. This foliation is overprinted at a high angle by a mylonitic foliation characterized by the association of brown Amp and fine-grained plagioclase; the brown Amp typically shows irregular green Amp rims.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	20		5
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	20	80		
Carbonate	5	n/a	n/a	n/a
Clay minerals	30			100
Oxide	5			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 40 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Steep porphyroclastic shear zone in an olivine gabbro crosscut by a sub-horizontal mylonite. The porphyroclastic shear zone has a reverse sense of shear. The mylonite has a normal sense of shear.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: 1-3.5 mm. neoblasts: ~0.15 mm. Grain shape: subhedral, elongate. Grain boundary: straight. Undulose extinction: complete in porphyroclasts. Subgrains: defined by undulose extinction. Texture: Elongate porphyroclasts and aggregates of neoblasts.
Plagioclase:	Grain size: porphyroclasts: 1.5-3.5 mm. neoblasts: 0.01-0.3 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: rare. Undulose extinction: developed in all grain sizes. Subgrains: developed in all grain sizes. Texture: aggregates of very fine grain recrystallized plagioclase.
Clinopyroxene:	Grain size: porphyroclasts: 1-6 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: straight. Texture: kinked porphyroclasts with aggregates of neoblasts.
Oxide:	Minor oxide bands parallel to the foliation.

Interval domain no: 2 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~2 mm. neoblasts: ~0.15 mm Grain shape: porphyroclasts: elongate. neoblasts: equant. Grain boundary: straight. Undulose extinction: well developed in porphyroclasts. Subgrains: defined by undulose extinction. Texture: porphyroclastic.
Plagioclase:	Grain size: porphyroclasts: 0.6-2 mm. neoblasts: 0.01-0.15 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered in porphyroclasts and larger neoblasts. Undulose extinction: developed in all grain sizes. Subgrains: developed in all grain sizes. Texture: porphyroclastic with some zones of very fine grained recrystallization.
Clinopyroxene:	Grain size: Grain shape: Grain boundary: Texture:
Oxide:	More than in the mylonite. Bands parallel to the foliation near porphyroclasts of olivine and pyroxene.

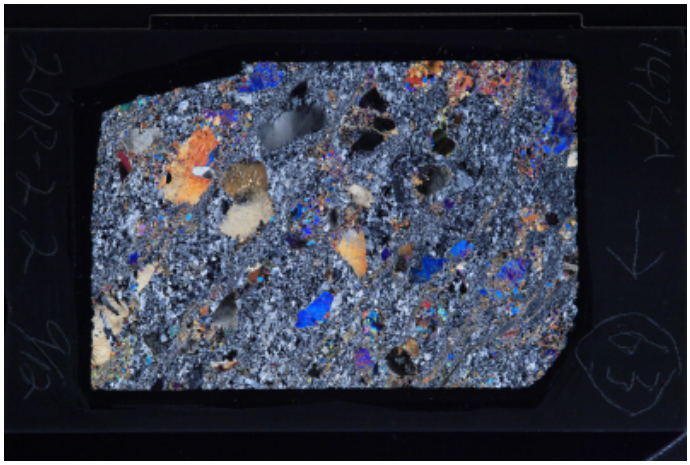
THIN SECTION LABEL ID: **360-U1473A-20R-2-W 9/12-TSB-TS_63** Piece no.: #02 TS no.: 63

Group	Summary
Igneous petrology:	An olivine gabbro. Primary magmatic texture is not preserved. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is strongly recystallized and displays undulose extinction. Tabular plagioclase is partly enclosed within clinopyroxene. Clinopyroxene also displays a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfides.
Metamorphic petrology:	Granulite facies dynamic recrystallization is overprinted by amphibolite to subgreenschist facies static alteration.
Structure:	Strongly deformed, mylonitic foliation. Porphyroclasts of olivine, clinopyroxene and plagioclase are parallel to the foliation. Plagioclase is almost completely recystallized and form levels of extremely fine grained neoblasts that define the foliation. Olivine and clinopyroxene often recrystallize along grain boundaries.

Plane-polarized

32992631

Cross-polarized



32992651

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: An olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. The foliation shown by the preferred orientation of plagioclase and clinopyroxene. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is strongly recystallized and displays undulose extinction. Tabular plagioclase is partly enclosed within clinopyroxene, indicating that the protolith had an ophitic or subophitic texture. Clinopyroxene occurs as porphyroclast and are surrounded by neoblasts of olivine and clinopyroxene. Brown amphibole and opaque minerals are associated with the neoblasts. Clinopyroxene also displays a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfides. Intergrowth of both can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1	anhedral	subequant	partly recrystallized and altered
Plagioclase	70		4.8	0.3	anhedral	elongate	undulose extinction
Clinopyroxene	21		5	3	anhedral	subequant	with a consertal intergrowth texture
Amphibole	0.5		0.8	0.1	anhedral	interstitial	commonly occurs togther with opaque minerals at rim of clinopyroxene
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Dynamic recrystallization formed olivine, clinopyroxene and plagioclase neoblasts. Secondary clinopyroxene in porphyroclasts is bended. Brown amphibole staticaly replases clinopyroxene and overgrown by green and colorless amphiboles. Plagioclase fracures are filled by chlorite.

Comment type	Comment
Mylonite comments:	Ol, Cpx and Pl porphyroclasts and neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	15		3
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		10		
Amphibole, green		5		
Chlorite				90
Clay minerals	10			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	4	5		n/a
Plagioclase, sec.	n/a	n/a	n/a	10
Sulfide	1			n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Porphyroclastic recrystallized, where very fine grained neoblasts of plagioclase and clinopyroxene form segregated levels that define foliation. Clinopyroxene and olivine often recrystallize along porphyroclasts grain boundaries Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclast, fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: porphyroclastic recrystallized, porphyroclasts are parallel to foliation and show elongated tails of neoblasts recrystallized ol. Also recrystallize in association with cpx forming elongated aggregates.
Plagioclase:	Grain size: coarse porphyroclast, medium to define fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: irregular Subgrains: straight Texture: porphyroclastic recrystallized, porphyroclasts are rare and parallel to foliation. Neoblasts define the foliationand recrystallize in levels of fine grained and levels of medium; fine grained are in segregates levels where only plg recrystallize
Clinopyroxene:	Grain size: coarse porphyroclast, medium to fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: porphyroclastic recrystallized, porphyroclasts are parallel to foliation and may show elongated tails of neoblasts recrystallized cpx. Also recrystallize in association with ol forming elongated aggregates. Medium grained recrystallize along grain boundaries of porphyroclasts

THIN SECTION LABEL ID: **360-U1473A-20R-2-W 68/74-TSB-TS_64** Piece no.: #09 TS no.: 64

Group	Summary
Igneous petrology:	This thin section has two domains, i.e., a coarse-grained olivine gabbro and a mylonite. Primary magmatic textures of both domains are not preserved. In the coarse-grained olivine gabbro, tabular plagioclase is partly enclosed within clinopyroxene, indicating the protolith has a subophitic to ophitic texture.
Metamorphic petrology:	This is a mylonitized gabbro showing the recrystallization of Pl, Ol and Cpx, and including a mm-scale felsic vein. Within the felsic vein, there are relics of gabbro material, consisting of Pl and mafic mineral aggregates. The Pl aggregates are fine grained and nearly polygonal, and the mafic mineral aggregates consist mainly of neoblastic Cpx aggregates mantled by brown to green Amp. The static alteration is overall moderate and restricted to Ol and Cpx.
Structure:	Vertical porphyroclastic fabric crosscut by a lower angle mylonitic shear band.

Plane-polarized

33013781

Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 20 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained [345]

Detailed description: This domain is a coarse-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine in a subequant shape is partly altered. Plagioclase is commonly recrystallized and displays undulose extinction. Subhedral tabular plagioclase is partly enclosed in clinopyroxene. Clinopyroxene is modertaly altered and contains plagioclase inclusions.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			5	anhedral	subequant	partly altered
Plagioclase	50		3.6	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	40		10	6	anhedral	subequant	
Amphibole	0.1		0.2	0.05	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.2						

Interval domain no: **2** Domain rel. abundance (%): 80 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: This domain is the olivine gabbro mylonite. Primary magmatic texture is not preserved. Olivine is elongated and partly altered. Plagioclase is completely recrystallized and displays undulose extinction. Clinopyroxene occurs as the porphyroclasts and is heavily replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			0.4	anhedral	elongate	partly altered
Plagioclase	58		1.2	0.1	anhedral	elongate	undulose extinction
Clinopyroxene	36		5.6	3	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): RT

Detailed description Most of the thin section surface consists of a mylonitized gabbro showing the recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are associated with minor amounts of red-brown Amp and/or opaque phases. The gabbro mylonite foliation is crosscut by a mm-scale felsic vein. Pl grains from the felsic vein are frequently elongated along the direction of the vein. In some segments of the vein, Pl is euhedral to subhedral and associated with minor amounts of subhedral brown Amp and with accessory amounts of Qtz. Within the felsic vein, there are relics of gabbro material, consisting of Pl and mafic mineral aggregates. The Pl aggregates are fine grained and nearly polygonal, and include in places trace amounts of brown amphibole and oxides. The mafic mineral aggregates consist mainly of neoblastic Cpx aggregates mantled by brown to green Amp. There are also Ol relics that are rimmed by biotite aggregates and green to pale-green amphiboles, The static alteration is overall moderate and restricted to Ol and Cpx. Olivine is typically rimmed by pale-green Amp coronas, locally associated with biotite; it is also locally pseudomorphycally transformed into talc and oxides. Cpx is moderately replaced, particularly at its rims, by brown to green and pale-green Amp.

Comment type	Comment
Alteration general comments:	The static alteration is overall moderate and restricted to Ol and Cpx.
Mylonite comments:	Most of the thin section surface consists of a mylonitized gabbro showing the recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are associated with minro amounts of red-brown Amp and/or opaque phases.
Vein 1 minerals:	The gabbro mylonite foliation is crosscut by a mm-scale felsic vein. Pl grains from the felsic vein are frequently elongated along the direction of the vein. In some segments of the vein, Pl is euhedral to subhedral and associated with minor amounts of subhedral brown Amp and with accessory amounts of Qtz. Within the felsic vein, there are relics of gabbro material, consisting of Pl and mafic mineral aggregates. The Pl aggregates are fine grained and nearly polygonal, and include in places trace amounts of brown amphibole and oxides. The mafic mineral aggregates consist mainly of neoblastic Cpx aggregates mantled by brown to green Amp. There are also Ol relics that are rimmed by biotite aggregates and green to pale-green amphiboles,

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	20		
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	45	20		
Amphibole, green		30		
Oxide	10			n/a
Talc	30	n/a		n/a
Other	15			
Subtotals replaced	100	100		

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Vertical porphyroclastic fabric crosscut by a lower angle mylonitic shear band. Along the margins of the shear band there are less deformed plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Plagioclase:	Grain size: ~0.01 mm. Grain shape: equigranular. Grain boundary: straight to curved. Twinning: not common, if so, tapered. Undulose extinction: present, but not complete. Subgrains: minor in larger neoblasts. Texture: Very fine grained aggregates of recrystallized plagioclase.
Clinopyroxene:	Grain size: porphyroclasts: ~1 mm. neoblasts: 0.01-0.15 mm. Grain shape: elongate, subhedral. Grain boundary: straight to curved. Texture: in higher strain zone the pyroxene is in recrystallized aggregates. along the margins there are porphyroclasts with core and mantle structure.
Oxide:	In very localized pockets near pyroxene and with altered olivine.

Interval domain no: 2 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Vertical porphyroclastic fabric crosscut by a lower angle mylonitic shear band. Along the margins of the shear band there are less deformed plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: neoblasts: ~0.15 mm. porphyroclasts: ~1-3 mm. Grain shape: elongate, anhedral. Grain boundary: straight to curved. Undulose extinction: better developed in porphyroclasts, somewhat in larger neoblasts. Subgrains: defined by undulose extinction. Textures: Elongate porphyroclasts, many of which are surrounded by aggregates of neoblasts of olivine.
Plagioclase:	Grain size: porphyroclasts: 1-4.5 mm. neoblasts: 0.01-0.3 mm. Grain shape: subhedral to anhedral. Grain boundary: serrate to curved. Twinning: tapered in porphyroclasts and larger neoblasts. Undulose extinction: in porphyroclasts and larger neoblasts. Subgrains: developed in porphyroclats. Texture: porphyroclastic plagioclase with bands of finely recrystallized grains.
Clinopyroxene:	Grain size: porphyroclasts: 1-6 mm. neoblasts: 0.01-0.15 mm. Grain shape: elongate, subhedral. Grain boundary: straight to curved. Texture: large porphyroclasts of pyroxene with local aggregates of recrystallizated pyroxene and olivine.

THIN SECTION LABEL ID: **360-U1473A-21R-1-W 12/15-TSB-TS_65** Piece no.: #03 TS no.: 65

Group	Summary
Igneous petrology:	An oxide gabbro. Primary magmatic texture is not preserve. Plagioclase displays undulose extinction. Small plagioclase crystals with magmatic twins are included within clinopyroxene. Clinopyroxene is rimmed by brown amphibole. Small amount of orthopyroxene is present. Opaque minerals occur at the pressure shadows of clinopyroxene and are predominated by ilmenite.
Metamorphic petrology:	This thin section showed extensive alteration. It is characterized by two types ateration of Opx.
Structure:	Strongly foliated, mylonitic foliation. Porphyroclasts are clinopyroxene and plagioclase is completely recrystallized. Oxides occur as interstitial between neoblast clinopyroxene and minor plagioclase, they also form a band parallel to the foliation.

Plane-polarized

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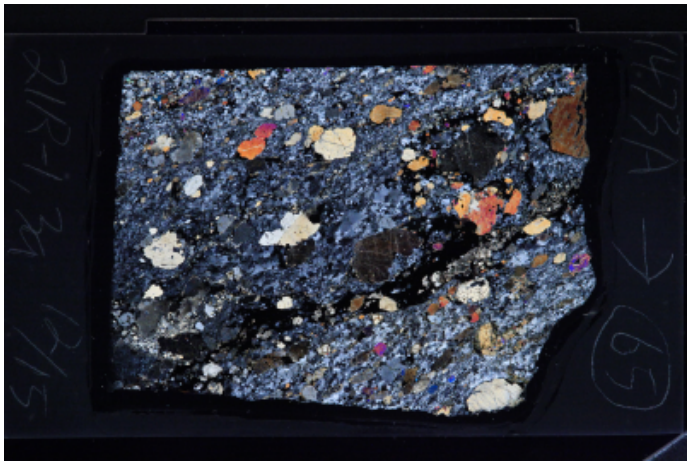
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An oxide gabbro with a porphyroclastic texture. Primary magmatic texture is not preserve. A foliation is defined by the preferred orientation of elongated plagioclase and clinopyroxene. Plagioclase displays undulose extinction. Small plagioclase crystals with magmatic twins are included within clinopyroxene. Clinopyroxene with well-developed exsolution lamallae occurs as porphyroclast and is rimmed by brown amphibole. Small amount of orthopyroxene is present, which is elongated along the foliation. Opaque minerals are distributed along the foliation and occur at the pressure shadows of clinopyroxene. They are predominated by ilmenite, which are commonly intergrowed with magnetite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	53		1.6	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	30		4.8	2	anhedral	elongate	with plagioclase inclusions
Orthopyroxene	1		2.4	1.2	anhedral	elongate	crosscut by opaque minerals
Amphibole	1		0.3	0.2	anhedral	interstitial	commonly occurs together with opaque minerals at the rim of clinopyroxene
Opaques	15						
Magnetite	1						
Ilmenite	13						
Sulfide	1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): QM

Detailed description Opx in the oxide band altered into talc, sometimes with pseudomorphic talc. Opx in the porphyroclasts and neoblasts developed with green amphibole coronas. Cpx mainly altered into pale color, green and brown amphibole. Pl were almost replaced by secondary plagioclase.

Comment type	Comment
Mylonite comments:	Mylonitic oxide gabbro charaterized by recrystallization of Opx and Pl. Opx neoblasts are associated with green amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		10	30	70
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless		40	5	5
Amphibole, green		40	50	
Clay minerals		5	5	10
Plagioclase, sec.	n/a	n/a	n/a	85
Talc		n/a	40	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Plagioclase is completely recrystallized, and define foliation. Oxides are in association with cpx. Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Twinning: rare tapered Undulose extinction: regular to irregular Texture: completely recrystallized in oriented neoblast that define the foliation, locally veru fine grained plg occur at porphyroclasts grain boundary
Clinopyroxene:	Grain size: coarse porphyroclasts, fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Texture:partially recrystallized, neoblast occur often at porphyroclasts grain boundaries. An ox rich band is in association with medium to fine cpx
Oxide:	interstitial at cpx porphyroclast grain boundary and in band parallel to foliation.

THIN SECTION LABEL ID: **360-U1473A-21R-2-W 22/26-TSB-TS_66** Piece no.: #02 TS no.: 66

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Primary magmatic texture is not preserved. Olivine is partly recrystallized as neoblasts that commonly surround clinopyroxene. Plagioclase is mostly recrystallized and displays undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture. Opaque minerals equally consist of ilmenite and sulfide.
Metamorphic petrology:	Static background alteration intensity as a whole is moderate. Most of the alteration is associated with olivine which is rimmed by either tremolite or talc. Neoblasts of olivine, clinopyroxene and plagioclase were observed
Structure:	Strongly deformed with porphyroclastic foliation defined by recrystallized elongated anhedral plagioclase. Porphyroclasts are olivine, clinopyroxene and plagioclase. Clinopyroxene and olivine recrystallize in aggregates along or between porphyroclasts grain boundaries.

Plane-polarized

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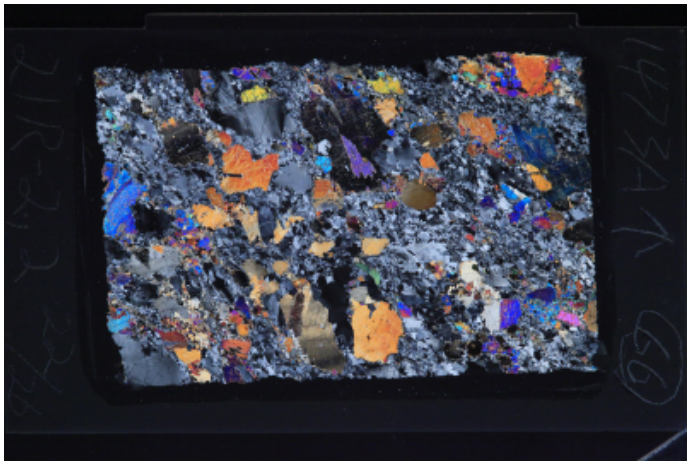
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyrclastic texture. Primary magmatic texture is not preserved. Olivine is partly recrystallized as neoblasts that commonly surround clinopyroxene. Plagioclase is mostly recrystallized and displays undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene, indicating the protolith had a subophitic to ophitic texture. Clinopyroxene occasionally displays a consertal intergrowth texture and rimmed by brown amphibole and opaque minerals. Opaque minerals equally consist of ilmenite and sulfide. Exsolution of chalcopyrite from pyrrhotite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			0.8	anhedral	subequant	partly recrystallized
Plagioclase	60		4.2	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	31		9	2.4	anhedral	subequant	with plagioclase inclusions
Amphibole	0.8		0.4	0.05	anhedral	interstitial	occurs at the rim of clinopyroxene or together with neoblasts
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description The neoblastic components of the sample consists of recrystallized olivine, clinopyroxene and plagioclase. Brown-red amphibole also occur as a neoblastic grain associated with clinopyroxene. Alteration as a whole is moderate, with olivine being altered the most. Olivine is either rimmed by a oxide-rich talc rim or an tremolite rim.

Comment type	Comment
Mylonite comments:	The mylonite is composed of olivine, clinopyroxene and plagioclase porphyroclasts. Neoblasts are mostly made up of the same assemblages mentioned above, often as monomineralic aggregates. Red-brown amphibole are common in the edges and cleavage planes of porphyroclastic Cpx as well as occurring as an entire neoblastic grain.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	15		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	40	15		
Chlorite				60
Clay minerals	10			
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	15	5		n/a
Plagioclase, sec.	n/a	n/a	n/a	40
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Recrystallized clinopyroxene and oliivne occur along porphyroclasts grain boundaries, and polagioclase defines the foliation. Neoblasts of very fine grained plagioclase are observed as thin levels along porphyroclasts grain boundaries. Observer: CF

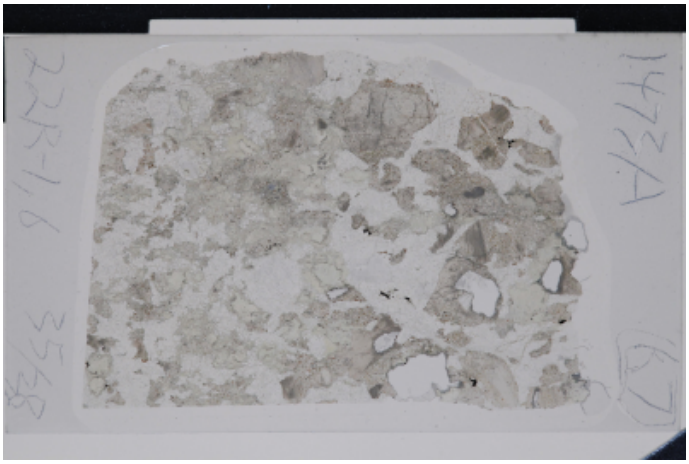
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: medium porphyroclast, fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: common and regular Subgrains: straight Texture: Deformed porphyroclasts and minor recrystallized in association with cpx in aggregates
Plagioclase:	Grain size: coarse porphyroclast, medium to fine recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: common tapered Undulose extinction: irregular Texture: Deformed porphyroclasts and major recrystallized elongated neoblasts that define the foliation.
Clinopyroxene:	Grain size: coarse porphyroclast, medium to fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: common and regular Texture: Deformed porphyroclasts and minor recrystallized in association with ol in aggregates. Neoblasts are along porphyroclasts grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-22R-1-W 35/38-TSB-TS_67** Piece no.: #06 TS no.: 67

Group	Summary
Igneous petrology:	A medium-grained gabbro. Primary magmatic texture is not preserved. Plagioclase is commonly recrystallized and displays undulose extinction. Some grains still preserve magmatic twins. Clinopyroxene is heavily altered but a consertal intergrowth texture can be seen.
Metamorphic petrology:	Intense overprinting of greenschist facies mineral assemblages, including actinolite, chlorite, secondary plagioclase, zoisite (tiny grains in plagioclase) and titanite.
Structure:	Strongly deformed with porphyroclastic foliation. Porphyroclasts are clinopyroxene, and plagioclase is almost completely recrystallized. Neoblats of clinopyroxene occur at porphyroclasts grain boundaries

Plane-polarized



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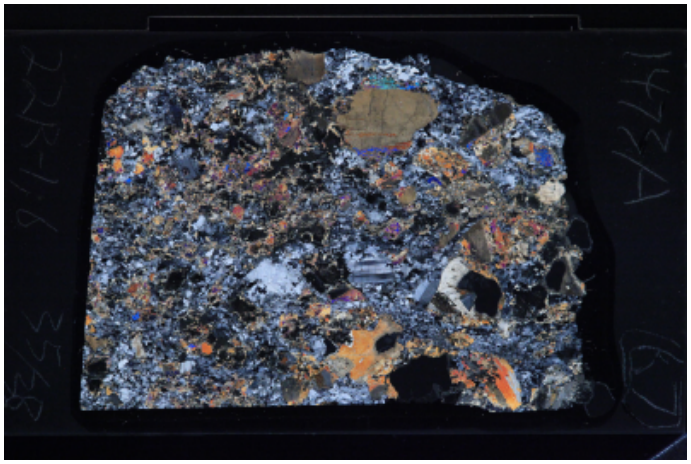
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is commonly recrystallized and displays undulose extinction. Some grains still preserve magmatic twins. Clinopyroxene is heavily altered but a consertal intergrowth texture can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	35		2.8	0.3	anhedral	subequant	undulose extinction
Clinopyroxene	65		6	0.8	anhedral	subequant	heavily altered
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 80 Observer(s): TN

Detailed description Clinopyroxene is replaced by secondary clinopyroxene and brown, green and colorless amphiboles, and chlorite with a trace amount of titanite; plagioclase is replaced by chlorite and secondary plagioclase containing tiny zoisite (?) inclusions.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		80		80
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		20		
Amphibole, green		5		
Chlorite		20		8
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide		4		n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Zeolite	n/a	n/a	n/a	2
Other		1		
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Very altered, porphyroclasts are cpx and plg is mainly recrystallized Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Twinning: rare tapered Undulose extinction: irregular and common Texture: mainly recrystallized, rare porphyroclasts. Very fined grained levels are observed where only recrystallized plg is observed.
Clinopyroxene:	Grain size: coarse porphyroclasts to fine recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: straight to curved Undulose extinction: regular (when porphyroclast partially preserved) Texture: partially to completely altered, porphyroclasts show grain boundaries of cpx neoblasts, rare recrystallized cpx is in plg matrix

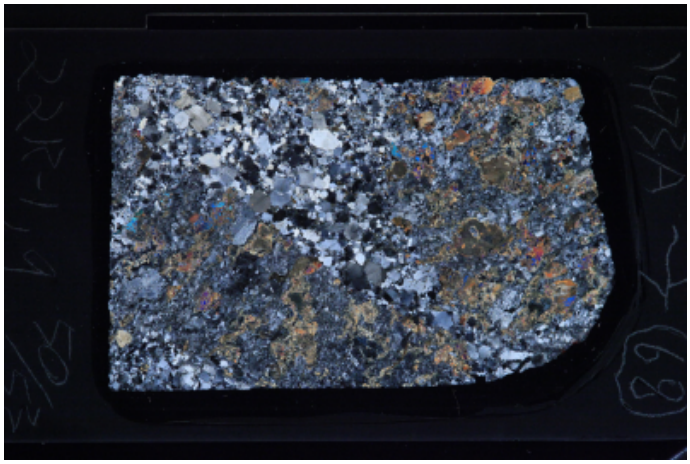
THIN SECTION LABEL ID: **360-U1473A-22R-1-W 50/53-TSB-TS_68** Piece no.: #09 TS no.: 68

Group	Summary
Igneous petrology:	A medium-grained gabbro intruded by a felsic vein. Primary magmatic texture of the medium-grained gabbro is not preserved. The felsic vein displays a granular texture.
Metamorphic petrology:	The gabbro hosting the felsic vein is unequally altered: cpx is strongly replaced by mainly actinolite, clinozoisite and chlorite, while plagioclase is mostly recrystallized to secondary plagioclase; grain boundaries of the cataclastic matrix are overgrown by actinolite, clinozoisite and chlorite. The plagioclase of the felsic vein is slightly altered, with a high amount of recrystallization, often in a microcrystalline cataclastic pattern; actinolite, clinozoisite and titanite often fill the cataclastic interstices of the felsic vein.
Structure:	This rock consists of a medium-grained gabbro cut by a felsic vein. The microstructure in the host rock is highly altered, observed mainly in cpx grains being replaced by amphibole and/or chlorite (?). The felsic vein consists of medium grained recrystallized plagioclase in a polygonal texture.

Plane-polarized

32992471

Cross-polarized



32992491

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: Ave. grain size: medium grained [345]

Detailed description: This domain is a medium-grained gabbro. Primary magmatic texture is not preserved. Plagioclase is completely recrystallized and displays undulose extinction. It is occasionally enclosed within clinopyroxene. Clinopyroxene is pervasively replaced by green amphibole, but a consertal intergrowth can be occasionally seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		0.8	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	45		3.6	1.6	anhedral	subequant	completely altered

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **leuco-diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: The felsic vein is a leucodiroite, which is predominated by subhedral plagioclase, with interstitial amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		1.6	1	subhedral	equant	undulose extinction
Amphibole	10		0.4	0.2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: gabbro

Total rock alteration estimate (%): Observer(s): JK

Detailed description The gabbro hosting the felsic vein is unequally altered: cpx is strongly replaced by mainly actinolite, clinozoisite and chlorite, while plagioclase is mostly recrystallized to secondary plagioclase; grainboundaries of the cataclastic matrix are overgrown by actinolite, clinozoisite and chlorite. The plagioclase of the felsic vein is slightly altered, with a high amount of recrystallization, often in a microcrystalline cataclastic pattern; actinolite, clinozoisite and titanite often fill the cataclastic interstices of the felsic vein.

Comment type	Comment
Mylonite comments:	probably strong mylonitization befor cataclastic event; several porphyroclasts of cpx and plag are present
Cataclasite comments:	experienced moderately cataclasis; after a weak crystal-plastic deformation
Vein 1 minerals:	veins composed of clinozoisite, actinolite and chlorite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		70		
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		30		10
Amphibole, green		10		
Chlorite		20		10
Clinopyroxene, sec.	n/a	10	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	10
Plagioclase, sec.	n/a	n/a	n/a	70
Other		20		
Subtotals replaced		100		100

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: leucodiorite

Total rock alteration estimate (%): 10 Observer(s): JK

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary); metamorphic minerals in the interstices: clinozoisite, actinolite, titanite (leukoxene)
Mylonite comments:	experienced moderately cataclasis; after a weak plasic deformation
Cataclasite comments:	experienced moderately cataclasis; after a weak crystal-plastic deformation

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				10
Amphibole, colorless				30
Epidote/zoisite	n/a	n/a	n/a	70
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description This rock consists of a medium-grained gabbro cut by a felsic vein. The microstructure in the host rock is highly altered, observed mainly in cpx grains being replaced by amphibole and/or chlorite (?). The felsic vein consists of medium grained recrystallized plagioclase in a polygonal texture.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	grain size: coarse (gabbro) to medium (vein) grain shape: anhedral grain boundaries: straight to curved twinning: tapered undulose extinction: common and irregular in both domains subgrains: straight boundaries in the vein texture: recrystallized in both domains (gabbro and vein). Altered in the host rock.
Clinopyroxene:	size: coarse to medium grained shape: anhedral boundaries: curved, corroded due to alteration fractures: common texture: highly altered
Vein:	there is a felsic vein composed mostly of recrystallized plagioclase and minor amphibole at plagioclase grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-22R-2-W 32/34-TSB-TS_69** Piece no.: #04 TS no.: 69

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene and the neoblasts are aggregated around clinopyroxene. Plagioclase displays undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture.
Metamorphic petrology:	The alteration intensity of this thin section is substantial. Chlorite veins were observed.
Structure:	Porphyroclastic foliation, where porphyroclasts are deformed olivine, plagioclase and clinopyroxene. Recrystallized plagioclase define the foliation and neoblasts of clinopyroxene and olivine form aggregates at porphyroclasts grain boundaries.

Plane-polarized

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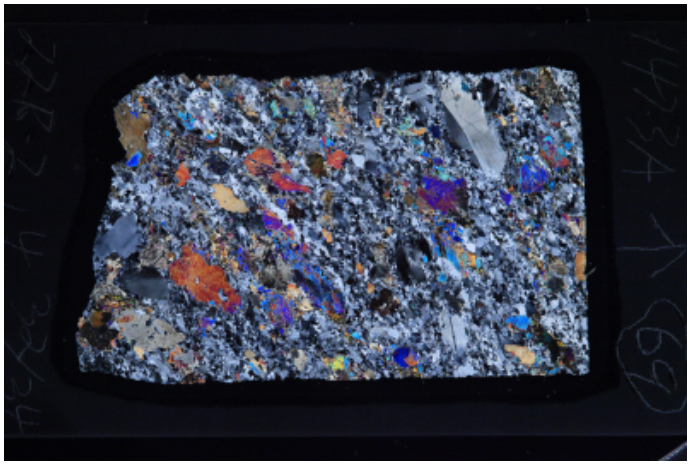
Cross-polarized



32992421

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is partly recrystallized and the neoblasts are commonly aggregated around clinopyroxene. It is occasionally rimmed by orthopyroxene. Plagioclase is mostly recystallized and displays undulose extinction. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Deformation twins can be seen in big plagioclase grains. Clinopyroxene is partly recrystallized and the neoblasts commonly associate with tiny brown amphibole. The consertal intergrowth texture is common in clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			0.2	anhedral	subequant	partly recrystallized
Plagioclase	60		7	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	31		4.4	1.2	anhedral	subequant	with a consertal intergrowth texture
Amphibole	0.9		0.1	0.05	anhedral	interstitial	commonly associates with neoblasts
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): QM

Detailed description Ol showed typical alteration with pseudomorphic talc and oxides, as well as green amphibole along the crystal boundary. Cpx mainly altered into pale color, green and brown amphibole. Opx as exsolution of Cpx were totally replaced by talc and chlorite. Pl were almost replaced by secondary plagioclase. Several miro-veins were filled in with chlorite.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro characterized by recrystallization of Cpx, Pl and Ol into aggregates. Cpx neoblasts were associated with brown amphibole and oxides.
Vein 1 minerals:	several microveins filled in with chlorite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	20	100	65
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless		45		4
Amphibole, green	20	35		
Chlorite	3		50	6
Clay minerals	7	5		
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	45	n/a	50	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Porphyroclasts of ol, plg, cpx in plg recrystallized matrix. Ol+cpx neoblasts aggregates at grain boundaries. Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: coarse to medium porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: observed in preserved crystals Subgrains: straight Texture: porphyroclastic recrystallized, neoblast observed in aggregates at porphyroclasts grain boundaries, rare aggregates in association with cpx
Plagioclase:	Grain size: coarse porphyroclast and fine recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinning: tapered Undulose extinction: irregular and common Texture: porphyroclastic recrystallized, neoblast fine to medium grained define the foliation as elongated crystals (matrix)
Clinopyroxene:	Grain size: coarse to medium porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: observed in porphyroclasts Texture: porphyroclastic recrystallized, neoblast observed in aggregates at porphyroclasts grain boundaries, aggregates in association with ol

THIN SECTION LABEL ID: **360-U1473A-23R-1-W 83/90-TSB-TS_70** Piece no.: #14 TS no.: 70

Group	Summary
Igneous petrology:	A coarse-grained gabbro intruded by a felsic vein. Primary magmatic texture of the gabbro is not preserved. Plagioclase is foliated and displays undulose extinction. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is heavily altered and displays a consertal intergrowth texture.
Metamorphic petrology:	The mylonite foliation is characterized by recrystallization of Pl and Cpx. The mylonitic foliation is crosscut by a felsic vein. The Cpx from the gabbro, near the contact with the felsic vein, is transformed into brown Amp. The rock overall shows moderate alteration, which is confined to Ol and Cpx.
Structure:	Porphyroclastic olivine gabbro crosscut by felsic vein.

Plane-polarized

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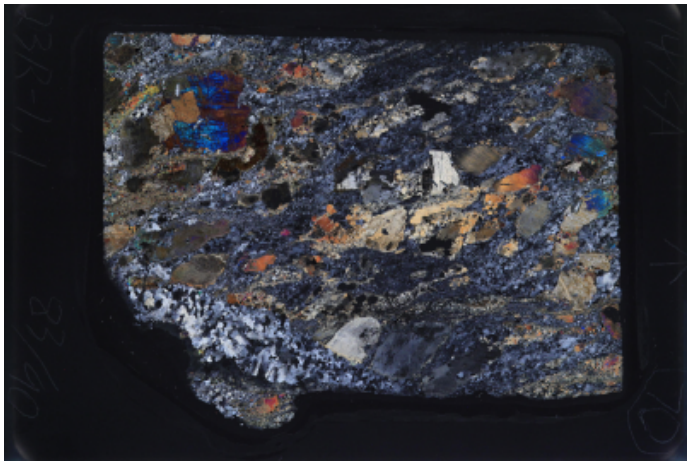
Cross-polarized



33013741

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 90 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is a coarse-grained gabbro. Primary magmatic texture is not preserved. Plagioclase is foliated and displays undulose extinction. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is heavily altered and displays a consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	45		0.8	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	55		10	6	anhedral	elongate	strongly altered and with plagioclase inclusions

Interval domain no: **2** Domain rel. abundance (%): 10 Domain name: vein

Lithology: **leucodiorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: The felsic vein is a leucodiorite and solely composed of plagioclase. Small zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	100		2	1.6	anhedral	elongate	undulose extinction

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): RT

Detailed description The mylonite foliation is characterized by recrystallization of Pl and Cpx. The Cpx neoblasts are typically associated with minor amounts of red-brown Amp. The mylonitic foliation is crosscut by a felsic vein. The Pl grains from the vein are locally slightly elongated and aligned normally to the contact with the host gabbro. The Cpx from the gabbro, near the contact with the felsic vein, is transformed into brown Amp. The rock overall shows moderate alteration, which is confined to Ol and Cpx. The Pl alteration is restricted to micro-veins made up of green to pale-green Amp or clay.

Comment type	Comment
Alteration general comments:	The rock overall shows moderate alteration, which is essentially confined to Ol and Cpx.
Mylonite comments:	The mylonite foliation is characterized by recrystallization of Pl and Cpx. The Cpx neoblasts are typically associated with minor amounts of red-brown Amp.
Vein 1 minerals:	The mylonitic foliation is crosscut by a felsic vein. The Pl grains from the vein are locally slightly elongated and aligned normally to the contact with the host gabbro. The Cpx from the gabbro, near the contact with the felsic vein, is transformed into brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	35		5
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		10		25
Amphibole, green		50		25
Clay minerals	40	20		50
Talc	30	n/a		n/a
Subtotals replaced	100	90		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 5 Domain name: microfabric

Microstructure: magmatic Observer: JD

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	Undulose extinction with some subgrain development. No recrystallization.

Interval domain no: 2 Domain rel. abundance (%): 95 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Felsic vein crosscut porphyroclastic olivine gabbro. The vein has amphibole and plagioclase that has limited deformation. The host olivine gabbro has mostly recrystallized plagioclase and porphyroclasts of pyroxene.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: altered porphyroclasts: ~3 mm. neoblasts: ~0.15 mm. Grain shape: equigranular. Grain boundary: straight to curved. Undulose extinction: limited Subgrains: limited Texture: recrystallized aggregates.
Plagioclase:	Grain size: porphyroclasts: ~1 mm. neoblasts: 0.01-0.15 mm. Grain shape: anhedral to polygonal. Grain boundary: straight to curved. Twinning: tapered in porphyroclasts and larger neoblasts. Undulose extinction: developed in most grain sizes. Subgrains: developed in porphyroclasts and larger neoblasts. Texture: Equigranular recrystallized aggregates of plagoiclase with medium grained porphyroclasts.
Clinopyroxene:	Grain size: 1-6 mm. Grain shape: subhedral. Grain boundary: straight. Texture: porphyroclasts of pyroxene with limited recrystallization.

THIN SECTION LABEL ID: **360-U1473A-23R-2-W 71/73-TSB-TS_71** Piece no.: #13 TS no.: 71

Group	Summary
Igneous petrology:	A gabbro mylonite. Both plagioclase and clinopyroxene have been strongly deformed and recrystallized. Clinopyroxene is completely replaced by green and brown amphiboles.
Metamorphic petrology:	The rock shows the dynamic replacement of Cpx by brown Hbl. The latter is associated with fine grained Pl neoblasts and, locally, with oxide neoblasts. The static background alteration is moderate and mostly confined to Ol and Cpx.
Structure:	this mylonite is composed of a fine grained matrix consisting of recrystallized plagioclase, cpx, brown amphibole and oxides, that contains porphyroclasts of coarse grained cpx and plag. the mylonitic foliation is formed by oriented, locally lens-shaped, amphibole, cpx and plag grains that can be observed in alternating "layers" of plagioclase and layers of cpx+plag+amphibole+oxides. Tentative shear sense from porphyroclast-tail asymmetry is dextral.

Plane-polarized

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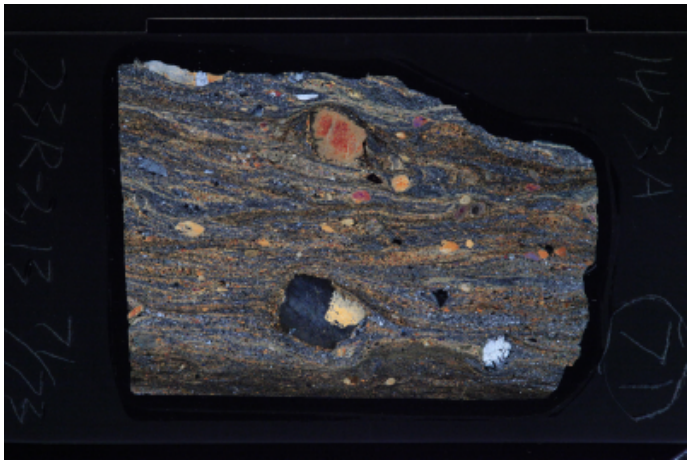
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: A gabbro mylonite. Both plagioclase and clinopyroxene have been strongly deformed and recrystallized. Clinopyroxene is completely replaced by green and brown amphiboles.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		2	0.1	anhedral	elongate	undulose extinction
Clinopyroxene	45		5.6	0.2	anhedral	elongate	completely replaced by amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): RT

Detailed description The rock shows the dynamic replacement of Cpx by brown Hbl. The latter is associated with fine grained Pl neoblasts and, locally, with oxide neoblasts. The thin section includes an area with nearly polygonal Cpx aggregates, which could represent relics of previous mylonitic assemblage. The static background alteration is moderate and mostly confined to Ol and Cpx.

Comment type	Comment
Alteration general comments:	The static background alteration is moderate and mostly confined to Ol and Cpx.
Mylonite comments:	The rock shows the dynamic replacement of Cpx by brown Hbl. The latter is associated with fine grained Pl neoblasts and, locally, with oxide neoblasts. The thin section includes an area with nearly polygonal Cpx aggregates, which could represent relics of previous mylonitic assemblage.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	35		5
Amphibole, brown	n/a	70	n/a	n/a
Amphibole, colorless	10			
Amphibole, green		20		
Chlorite	45			
Clay minerals	20	10		100
Oxide	5			n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description this mylonite is composed of a fine grained matrix consisting of recrystallized plagioclase, cpx, brown amphibole and oxides, that contains porphyroclasts of coarse grained cpx and plag. the mylonitic foliation is formed by oriented, locally lens-shaped, amphibole, cpx and plag grains that can be observed in alternating "layers" of plagioclase and layers of cpx+plag+amphibole+oxides. Tentative shear sense from porphyroclast-tail asymmetry is dextral.

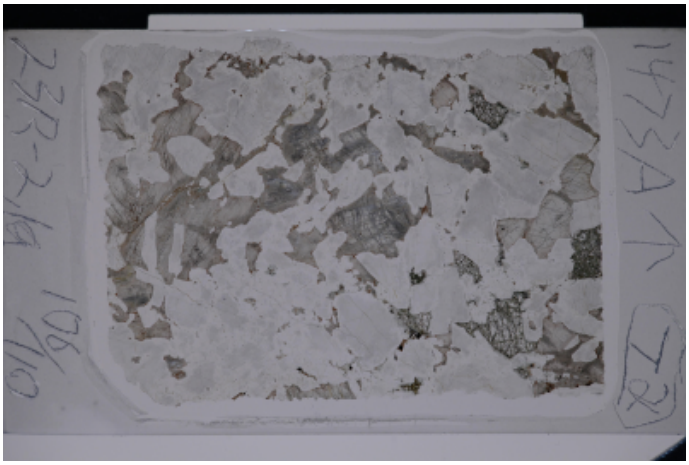
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	sinistral	n/a

Type	Comment
Plagioclase:	size: fine grained - recrystallized shape: anhedral boundaries: curved to straight twinning: tapered in porphyroclasts undulose extinction: regular in porphyroclasts subgrains: curved to straight, observed in clasts texture: completely recrystallized to a fine grained matrix and also present as medium grained porphyroclasts
Clinopyroxene:	size: fine-grained matrix and medium grained clasts shape: anhedral boundaries: straight to curved fractures: common texture: present as highly altered porphyroclasts and as fine grained recrystallized grains
Oxide:	geometry: thin bands texture: observed as bands contained in the fine grained foliated matrix, and also as fringes around cpx and plag porphyroclasts

THIN SECTION LABEL ID: **360-U1473A-23R-2-W 106/110-TSB-TS_72** Piece no.: #19 TS no.: 72

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro with a subophitic texure.
Metamorphic petrology:	Sample is moderately altered. Olivine is rimmed by talc and pale green amphibole while clinopyroxene is partially replaced by brown and pale brown amphibole.
Structure:	Weakly deformed with coarse porphyroclasts of strongly deformed plagioclase, olivine and weakly deformed clinopyroxene.Plagioclase is partially recrystallized.

Plane-polarized



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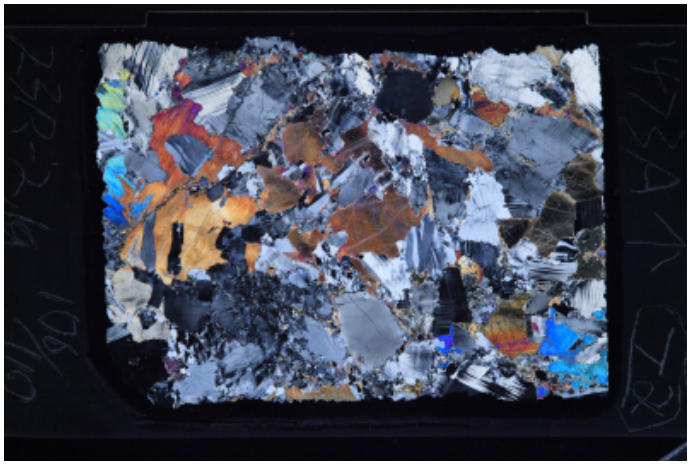
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine-bearing gabbro with a subophitic texure. Olivine is partly altered and rimmed by orthopyroxene. Plagioclase displays undulose extinction. Recrystallized plagioclase neoblasts occur at the margin of big plagioclase grains. Tabular plagiolcase is partly or fully enclosed within clinopyroxene, which is partly rimmed by brown amphibole. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	4			2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	80		5.6	4	anhedral	subequant	undulose extinction
Clinopyroxene	16		7.2	4	anhedral	interstitial	
Amphibole	0.4		0.4	0.2	anhedral	interstitial	occurs at rim of clinopyroxene
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): Observer(s): JL

Detailed description Overall, the sample is moderately altered. Olivine is usually surrounded by a talc and oxide-rich rim. Clinopyroxene is replaced by mostly brown and pale brown amphibole. Plagioclase is altered into secondary plagioclase and is rimmed by chlorite in contacts with mafic minerals. A small chlorite vein caused a more intense amphibole and secondary plagioclase replacement in surrounding clinopyroxene and plagioclase grains, respectively.

Comment type	Comment
Vein 1 minerals:	A small vein (<3 mm) in width was observed cutting through plagioclase and clinopyroxene grains. The vein is made up of low birefrigence and low relief minerals. The vein was identified as a chlorite vein, probably altered into clay. Plagioclase and clinopyroxene grains around this vein are more altered than the rest of the sample with more pronounced secondary plagioclase and pale brown amphibole occurrence

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	25	30		20
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, colorless	40	20		
Chlorite				20
Clay minerals	5			
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Weakly deformed, only plg recrystallized Observer: CF

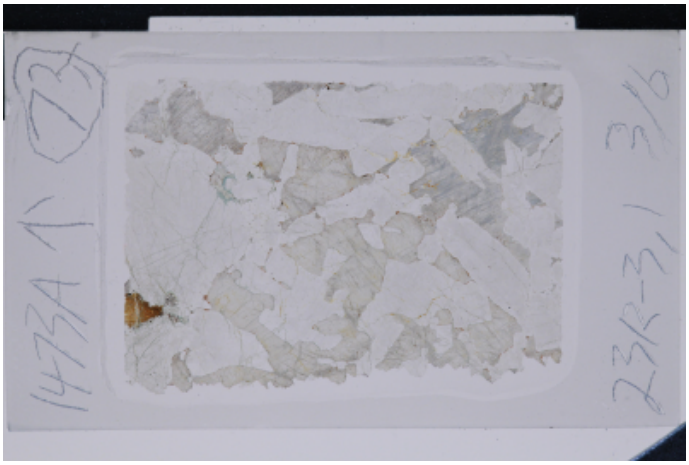
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: porphyroclasts
Plagioclase:	Grain size: coarse porphyroclast and fine recrystallized Grain shape: subhedral to anhedral Grain boundary: curved Twinning: tapered Undulose extinction: irregular and coomon Texture: porphyroclastic recrystallized, neoblast observed locally recrystallized
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Undulose extinction: rare Texture: porphyroclasts preserving magmatic texture, they often include subhedral plg.

THIN SECTION LABEL ID: **360-U1473A-23R-3-W 3/6-TSB-TS_73** Piece no.: #01 TS no.: 73

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing gabbro with a subophitic texture. Plagioclase is tabular and sometimes partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is moderate. Olivine developed mesh texture. Clay minerals presented in olivine, clinopyroxene and plagioclase.
Structure:	Weakly deformed with partially and locally recrystallization of plagioclase. COarse oikocrysta clinopyroxene include euhedral plagioclase that is not recrystallized.

Plane-polarized



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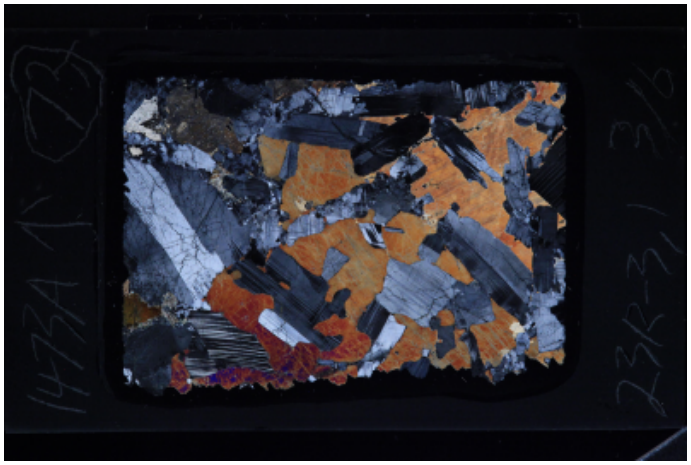
Cross-polarized



33013181

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine-bearing gabbro with a subophitic texture. Olivine has been completely altered and the original shape is not preserved. Plagioclase is tabular and sometimes partly or fully enclosed within clinopyroxene. Clinopyroxene is partly altered and replaced by green amphibole. It is also rimmed by brown amphibole. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			2			Only one grained is present on the thin section, which is completely altered.
Plagioclase	80		8	6	subhedral	tabular	
Clinopyroxene	18		7.2	6	anhedral	subequant	with plagioclase chadacryst
Amphibole	0.5		0.2	0.05	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): QM

Detailed description Ol developed pseudomorphic talc with oxides and mesh texture which mainly consist of clay and serpentine. Cpx mainly altered into pale color amphibole. Pl were replaced by secondary plagioclase and chlorite. Chlorite occurred in the boundary and cleavages of Pl. Minor clay minerals also presented in Cpx and Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	10		20
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		85		5
Chlorite		5		30
Clay minerals	45			5
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	completely altered
Plagioclase:	Grain size: coarse porphyroclasts, fine recrystallized Grain shape: euhedral porphyroclasts and anhedral recrystallized Grain boundary: straight, curved recrystallized Twinning: mechanical Undulose extinction: regular and common Texture: partially and locally recrystallized, recrystallization occur mostly around cpx oikocryst, plg chadacryst show no recrystallization
Clinopyroxene:	Grain size: coarse Grain shape: anhedral, oikocryst Grain boundary: straight Texture: large oikocryst crystal including euhedral plagioclase

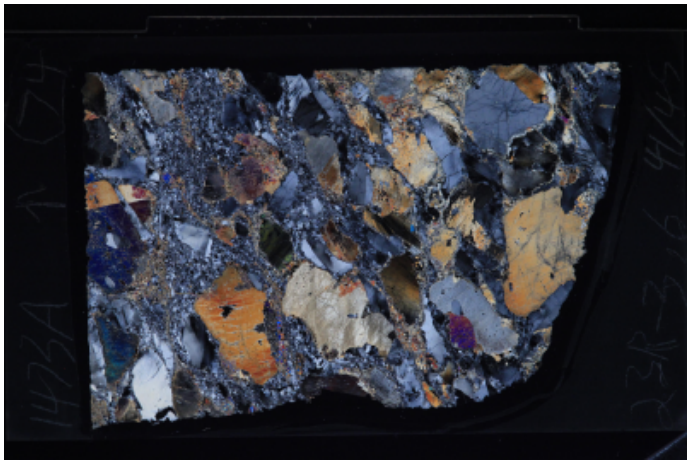
THIN SECTION LABEL ID: **360-U1473A-23R-3-W 41/45-TSB-TS_74** Piece no.: #06 TS no.: 74

Group	Summary
Igneous petrology:	A deformed olivine gabbro. Primary magmatic texture is not preserved.
Metamorphic petrology:	Neoblasts by dynamic recrystallization consist of olivine, clinopyroxene and plagioclase. Slight to moderate degree of static alteration indicates amphibolite to subgreenschist facies conditions.
Structure:	Strongly foliated with plagioclase neoblasts that define foliation. Plagioclase and olivine are deformed and clinopyroxene is slightly deformed. Clinopyroxene and olivine are also partially recrystallized along porphyroclasts grain boundaries.

Plane-polarized

33013201

Cross-polarized



33013221

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained [345]

Detailed description: A deformed olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene and is partly altered. Plagioclase displays undulose extinction and is strongly recrystallized. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture. It contains plagioclase inclusions and brown amphibole blebs. Opaque minerals are composed of ilmenite and sulfide. Exsolution of chalcopyrite from pyrrhotite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			3	anhedral	subequant	partly recrystallized
Plagioclase	40		4.4	0.5	anhedral	elongate	undulose extinction
Clinopyroxene	47		8	6	anhedral	subequant	with plagioclase inclusions and brown amphibole blebs
Amphibole	0.8		0.4	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Olivine is replaced by colorless amphibole and talc along rim; and by clay and serpentine along fractures. Clinopyroxene is staticaly replaced by secondary clinopyroxene and brown, green and colorless amphiboles. Plagioclase is replaced by secondary plagioclase, chlorite and green amphibole along fractures. Neoblasts by dynamic recrystallization consists of olivine, clinopyroxene and plagioclase.

Comment type	Comment
Mylonite comments:	Ol, Cpx, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	20		5
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	35	5		
Amphibole, green		10		20
Chlorite				60
Clay minerals	15			
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Sulfide	1	1		n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: porphyroclast parallel to foliation, rare neoblasts at porphyroclasts grain boundary
Plagioclase:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: subhedral porphyroclasts to anhedral recrystallized Grain boundary: curved Twinning: tapered Undulose extinction: irregular Texture: porphyroclast parallel to foliation, neoblasts define foliation and compose the matrix
Clinopyroxene:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: straight to curved Undulose extinction: weak Texture: porphyroclast parallel to foliation, neoblasts along porphyroclasts grain boundary

THIN SECTION LABEL ID: **360-U1473A-23R-3-W 52/55-TSB-TS_75** Piece no.: #07 TS no.: 75

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro is intruded by a diorite vein. Primary magmatic texture of the olivine gabbro is not preserved.
Metamorphic petrology:	The gabbro hosting the felsic vein is strongly unequally altered; cpx is strongly replaced by mainly actinolite; plagioclase is mostly recrystallized to secondary plagioclase; olivine is sometimes completely altered; cpx in contact with the felsic vein are converted to brown-green amphibole. The felsic vein shows a mylonitic part arranged in a zone parallel to the vein and a part not deformed with polygonal patterns of quartz bearing fluid inclusions. Euhedral amphiboles within the veins are slightly replaced by actinolite and chlorite; the vein shows a slight background alteration mostly on grain boundaries consisting of actinolite and chlorite.
Structure:	olivine gabbro crosscut by a fine-grained shear zone. The gabbro shows a coarse foliation composed of recrystallized plagioclase and olivine and cpx porphyroclasts. The shear zone is mostly composed of fine-grained recrystallized plagioclase present as matrix and also as fragments derived from fracturing of large grains.

Plane-polarized

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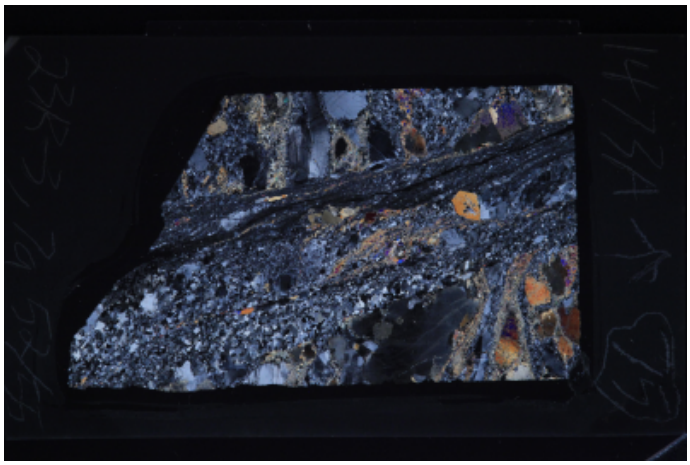
Cross-polarized



33013261

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is a medium-grained olivine gabbro. Primary magmatic texture is not preserved. Olivine is partly altered. Plagioclase is recrystallized and foliated. Clinopyroxene is strongly replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			4	anhedral	subequant	
Plagioclase	50		5	0.3	anhedral	elongate	
Clinopyroxene	45		11	5	anhedral	subequant	heavily replaced by green amphibole

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: mylonite Ave. grain size: fine grained [345]

Detailed description: This domain is the fine-grained diorite, which is predominated by plagioclase. Small amount of subhedral amphibole are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	85		1.2	0.4	anhedral	elongate	
Amphibole	15		1.6	0.2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 45 Domain name: olivine gabbro

Total rock alteration estimate (%): Observer(s): JK

Detailed description the gabbro hosting the felsic vein is strongly unequally altered; cpx is strongly replaced by mainly actinolite, plagioclase is mostly recrystallized to secondary plagioclase; olivine is sometimes completely altered; cpx in contact with the felsic vein are converted to brown-green amphibole. The felsic vein shows a mylonitic part arranged in a zone parallel to the vein and a part not deformed with nice polygonal patterns of quartz bearing fluid inclusions. Euhedral amphiboles within the veins are slightly replaced by actinolite and chlorite; the vein shows a slight background alteration mostly on grain boundaries consisting of actinolite and chlorite.

Comment type	Comment
Alteration general comments:	Rock is very heterogenous altered; some phases are altered completely other are pretty fresh: thus, estimation of the intensity of individual primary minerals is not possible. Cpx is replaced by amphibole of different colors and chlorite; cpx porphyroclasts are rimmed by brown-green amphibole; olivine is replaced by cololress amphibole, talk, chlorite, serpentine; plag is often secondary altered and slighly replaced by chlorite
Mylonite comments:	host gabbro is a mylonite

Interval domain no: 2 Domain rel. abundance (%): 55 Domain name: quartz tonalite

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	quartz is arranged in undeformed polygonal pattens and bear fluid inclusions. Cpx in contact with the vein are transformed to brown-green amph; euhedral amphiboles within the veins are slightly replaced by actinolite and chlorite; the felsic vein shows a slight background alteration mostly on grain boundaries consisting of actinolite and chlorite.
Mylonite comments:	felsic vein shows a mylonitic part arranged in a zone parallel to the vein and a parts not deformed with nice polygonal patterns of quartz

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description olivine gabbro crosscut by a fine-grained shear zone. The gabbro shows a coarse foliation composed of recrystallized plagioclase and olivine and cpx porphyroclasts. The shear zone is mostly composed of fine-grained recrystallized plagioclase present as matrix and also as fragments derived from fracturing of large grains.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Olivine:	size: coarse porphyroclasts in olivine gabbro shape: anhedral boundaries: curved undulose extinction: regular subgrains: curved texture: present as porphyroclasts in the olivine gabbro, altered.
Plagioclase:	size: coarse porphyroclasts in the olivine gabbro, fine-grained in the shear zone shape: anhedral boundaries: curved in the porphyroclasts, straight in the fine grains. twinning: tapered undulose extinction: irregular, mostly on clasts subgrains: observed in clasts and in fragments included in the shear zone texture: coarse porphyroclasts with tapered twins in the gabbro, and fine-grained recrystallized crystals in the shear zone. Fractures are common.
Clinopyroxene:	size: coarse porphyroclasts in the gabbro. shape: subhedral to anhedral boundaries: straight to curved. fractures: common texture: coarse porphyroclasts partially altered in the olivine gabbro.

THIN SECTION LABEL ID: **360-U1473A-23R-3-W 65/72-TSB-TS_76** Piece no.: #07 TS no.: 76

Group	Summary
Igneous petrology:	A mylonitic olivine-bearing gabbro crosscut by two ultramylonite veins. Primary magmatic texture is not preserved.
Metamorphic petrology:	The sub-horizontal foliation is characterized by the local recrystallization of Pl and Cpx, with the neoblastic Cpx associated with minor amounts of red-brown Amp. The sub-vertical mylonitic bands include fine-grained Pl, brown Amp, Cpx, oxide phases and quartz. The static alteration is overall moderate.
Structure:	Sub-horizontal reverse-sense porphyroclastic shear zone cut by a sub-vertical normal sense porphyroclasts/ultramylonitic shear band.

Plane-polarized

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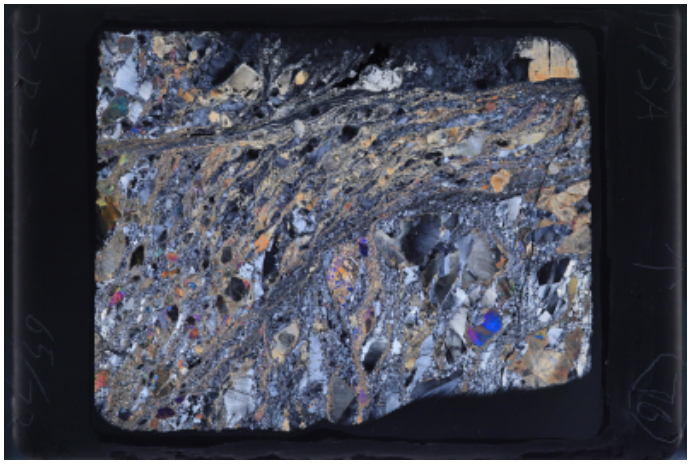
Cross-polarized



33013701

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: mylonitic Ave. grain size: medium grained [345]

Detailed description: A mylonitic olivine-bearing gabbro crosscut by two ultramylonite veins. All minerals have been highly deformed and recrystallized. Primary magmatic texture is not preserved. Plagioclase is highly recrystallized and the porphyroclasts displays undulose extinction and deformation twins. Clinopyroxene is completely replaced by green amphibole. Opaque oxides are dominated by magnetite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			2.8	anhedral	elongate	
Plagioclase	50		6	0.2	anhedral	elongate	with deformation twins
Clinopyroxene	46		6	0.2	anhedral	elongate	
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Magnetite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): RT

Detailed description The sub-horizontal foliation is characterized by local recrystallization of Pl and Cpx, with the neoblastic Cpx associated with minor amounts of red-brown Amp. The sub-vertical mylonitic bands include fine-grained Pl, brown Amp, Cpx, oxide phases and quartz. The static alteration is overall moderate.

Comment type	Comment
Alteration general comments:	The alteration is overall moderate.
Mylonite comments:	The sub-horizontal foliation is characterized by the local recrystallization of Pl and Cpx, with the neoblastic Cpx associated with minor amounts of red-brown Amp. The sub-vertical mylonitic bands include fine-grained Pl, brown Amp, Cpx, oxide phases and quartz.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	65	60		5
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	25			50
Amphibole, green		50		
Chlorite	15			50
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Sub-horizontal reverse-sense porphyroclastic shear zone cut by a sub-vertical normal sense porphyroclasts/ultramylonitic shear band. The sub-vertical shear band in contact with the porphyroclastic shear zone is ultramylonitic, with one margin with oxide bands. The porphyroclastic shear zone has a lower proportion of amphibole compared to the vertical shear band. Both shear bands are overprinted by brittle deformation with plagioclase offset by fractures filled with amphibole.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fault sense of shear:	reverse-sinistral	n/a

Type	Comment
Olivine:	Very low abundance. Grain size: porphyroclasts: ~3 mm. neoblasts: ~0.3 mm. Grain shape: elongate, anhedral. Grain boundary: irregular, altered. Undulose extinction: complete. Texture: porphyroclastic olivine with neoblasts within aggregates of recrystallized pyroxene.
Plagioclase:	Grain size: porphyroclasts: 1.5-4.5 mm. neoblasts: 0.01-0.5 mm. Grain shape: porphyroclasts and neoblasts: elongate, anhedral. Grain boundary: serrate. Twinning: tapered in porpyroclasts and large neoblasts. Undulose extinction: complete Subgrains: irregular. Texture: Porphyroclastic plagioclase with discrete bands of neoblasts. The porphyroclasts have a brittle overprint with many of the clasts being offset by fractures.
Clinopyroxene:	Grain size: porphyroclasts: 2-5 mm. neoblasts: ~0.3 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: porphyroclastic pyroxene with recrystallized aggregrates altering to amphibole.

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Sub-horizontal reverse-sense porphyroclastic shear zone cut by a sub-vertical normal sense porphyroclasts/ultramylonitic shear band. The sub-vertical shear band in contact with the porphyroclastic shear zone is ultramylonitic, with one margin with oxide bands. The porphyroclastic shear zone has a lower proportion of amphibole compared to the vertical shear band. Both shear bands are overprinted by brittle deformation with plagioclase offset by fractures filled with amphibole.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	normal-dextral	n/a

Type	Comment
Plagioclase:	Grain size: porphyroclasts: ~1.5 mm. neoblasts: ~0.01 mm. Grain shape: porphyroclasts are elongate and anhedral. neoblasts are anhedral. Grain boundary: serrate Twinning: tapered in porphyroclasts. Undulose extinction: irregular in all grain sizes. Subgrains: in porphyroclasts and larger neoblasts. Texture: Strongly recrystallized shear band with very fine grained margins. Within the shear band the plagioclase is porphyroclastic.
Clinopyroxene:	Grain size: porphyroclasts:~1.5. neoblasts: ~0.3 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: porphyroclastic pyroxene with recrystallized aggregrates altering to amphibole.
Oxide:	Forms elongate bands parallel to the ultramylonitic vertical shear bands, only along one margin.

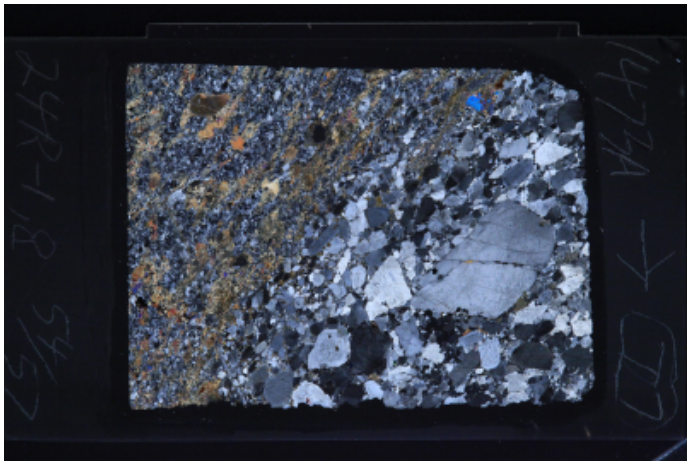
THIN SECTION LABEL ID: **360-U1473A-24R-1-W 54/57-TSB-TS_77** Piece no.: #08 TS no.: 77

Group	Summary
Igneous petrology:	A mylonitic gabbro intruded by a leucodiorite vein. The primary magmatic texture of the gabbro is not preserved. The vein displays a granular texture.
Metamorphic petrology:	The gabbro shows a foliation mainly defined by the preferred orientation of augen-shaped Px porphyroclasts. The foliated gabbro is crosscut by a felsic vein (leucodiorite) that is subparallel to the foliation of the host gabbro. The thin section also includes a small vein consisting of brown Amp and Pl, both showing euhedral to subhedral morphology, which crosscuts the foliation of the host gabbro at a right angle. The gabbro shows a substantial static alteration.
Structure:	This is a medium- to fine grained deformed gabbro in contact with a coarse grained felsic vein. Plagioclase in the gabbro is completely recrystallized and forms the matrix, while cpx is observed as elongate crystals defining the foliation and as porphyroclasts that are altered to green amphibole. At the contact with the vein the grain size of the gabbro is further reduced and there is a zone of foliated green amphibole and oxides.

Plane-polarized

33013281

Cross-polarized



33013301

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: This domain is a mylonitic gabbro. The primary magmatic texture is not preserved. The foliation is defined by the elongated plagioclase and clinopyroxene. Clinopyroxene is strongly altered and contains plagioclase inclusions.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		0.4	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	30		2.4	0.8	anhedral	elongate	strongly altered and porphyroclast contain plagioclase chadacryst

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: vein

Lithology: **leucodiorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is the leucodiorite vein with a granular texture. Plagioclase is commonly subhedral and rare displays an oscillatory zoning. It commonly shows undulose extinction and crosscut by green amphibole veins. Zircon is present in the vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	95		8	0.6	subhedral	tabular	undulose extinction
Amphibole	5				anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 40 Domain name: gabbro

Total rock alteration estimate (%): 80 Observer(s): JK-RT

Detailed description The gabbro hosting the vein was first sheared at high temperatures and then intenseley altered, mostly by brown-green amphibole overgrowth and secondary plagioclase formation. Plagioclase is typically recrystallized and intensely filled with cloudy, dusty material, sometimes in a sieve structure manner. Cataclastic matrix of the felsic vein consists of green amphibole, zoisite, clinozoisite, clay minerals.

Comment type	Comment
Alteration general comments:	The gabbro hosting the vein was first sheared at high temperatures and then intenseley altered, mostly by brown-green amphibole overgrowth and secondary plagioclase formation
Mylonite comments:	The gabbro shows a foliation mainly defined by the preferred orientation of augen-shaped Px porphyroclasts. Primary Pl is almost entirely recrystallized into neoblastic Pl grains showing different grain size and grain boundary relationships. Primary pyroxene is partly recrystallized into nearly polygonal Cpx aggregates.
Vein 1 minerals:	brown green amph
Vein 2 minerals:	clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		80		80
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, green		55		10
Clay minerals		20		20
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide		5		n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Subtotals replaced		100		100

Interval domain no: 2 Domain rel. abundance (%): 60 Domain name: leucodiorite

Total rock alteration estimate (%): Observer(s): JK-RT

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material, defects; sometimes in a sieve structure manner; cataclastic matrix consisting of green amphibole, zoisite, clinozoisite, clay minerals which also overgrow the grain boundaries.
Mylonite comments:	weak plastic deformation
Cataclasite comments:	experienced a moderate cataclasis; after a weak plasic deformation
Vein 1 minerals:	brown green amphibole
Vein 2 minerals:	clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				80
Amphibole, green				10
Clay minerals				10
Plagioclase, sec.	n/a	n/a	n/a	80
Subtotals replaced				100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic

This is a medium- to fine grained deformed gabbro in contact with a coarse grained felsic vein. Plagioclase in the gabbro is completely recrystallized and forms the matrix, while cpx is observed as elongate crystals defining the foliation and as porphyroclasts that are altered to green amphibole. At the contact with the vein the grain size of the gabbro is further reduced and there is a zone of foliated green amphibole and oxides.

Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Plagioclase:	size: fine recrystallized shape: anhedral boundaries: curved to straight twinning: tapered undulose extinction: regular subgrains: curved to straight texture: fine recrystallized aggregates forming the matrix
Clinopyroxene:	size: medium shape: anhedral boundaries: straight to curved fractures: rare texture: foliated cpx, highly altered.
Oxide:	band/pond geometry: thin bands texture: the thin bands are weakly oriented parallel to the foliation, commonly associated with green amphibole.

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic

Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	coarse grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: coarse shape: subhedral to anhedral boundaries: straight to curved twinning: tapered (observed locally) undulose extinction: common and irregular subgrains: straight to curved texture: coarse grains partially altered and in contact with amphibole and minor oxides
Vein:	there is a felsic plagioclase vein in contact with the recrystallized gabbro. the vein is coarse grained and has a shape preferred orientation of elongate plagioclase grains.

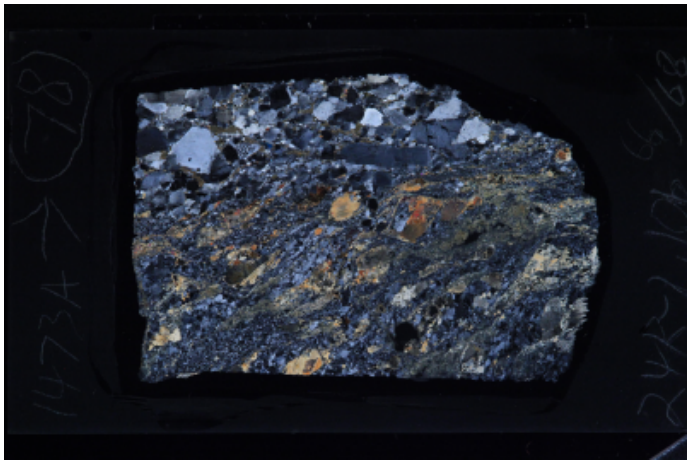
THIN SECTION LABEL ID: **360-U1473A-24R-1-W 66/68-TSB-TS_78** Piece no.: #10 TS no.: 78

Group	Summary
Igneous petrology:	A fine-grained gabbro intruded by a medium-grained diorite vein. Primary magmatic texture is not preserved and the diorite vein displays a granular texture.
Metamorphic petrology:	Brown and green hornblendes indicate amphibolite-facies alteration. Greenschist-facies assemblage of actinolite, epidote and secondary plagioclase occurs in the coarse-grained felsic rock.
Structure:	Stronly deformed, mylonitic gabbro cross-cut by felsic vein. Plagioclase in gabbro is completely recrystallized and defines the foliation, clinopyroxene is porphyroclastic partially recrystallized. In the felsic vein plagioclase is deformed and weakly recrystallized.

Plane-polarized

33013321

Cross-polarized



33013341

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: This domain is the fine-grained gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Plagioclase is completely recrystallized and clinopyroxene porphyroclasts are heavily altered.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		0.8	0.05	anhedral	subequant	undulose extinction
Clinopyroxene	40		3.6	0.8	anhedral	elongate	heavily altered and replaced by green amphibole

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is the medium-grained diorite with a granular texture, which is predominated by plagioclase. Clinopyroxene is interstitial between plagioclases and completely altered. Euhedral zircon is present in the diorite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		2.8	1.2	subhedral	subequant	
Clinopyroxene	10		0.8	0.1	anhedral	interstitial	completely altered

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 85 Observer(s): TN

Detailed description Clinopyoxene is pseudomorphically replaced by secondary clinopyroxene, and brown, green and colorless amphiboles. Plagioclase is mainly replaced by secondary plagioclase. Small amounts of epidote and actinolite occur interstitially in the coarse-grained rock.

Comment type	Comment
Mylonite comments:	Cpx, Pl, Amp (?) neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		90		80
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		20		5
Amphibole, green		20		
Clinopyroxene, sec.	n/a	10	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	5
Plagioclase, sec.	n/a	n/a	n/a	90
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic sense of shear is dextral reverse cross-cut by felsic vein Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Twinnings: rare tapered Undulose extinction: irregular Texture: completely recrystallized in relatively elongated very fine grained neoblasts that define the foliation
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: irregular Texture: porphyroclasts parallel to foliation, partially recrystallized. Neoblasts define foliation and may define recrystallization tails of porphyroclasts

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse to fine Grain shape: subhedral to anhedral Grain boundary: straight to curved Undulose extinction: irregular Texture: partially and locally recrystallized
Clinopyroxene:	anhedral and fine grained, low percentage
Vein:	straight contact with host gabbro

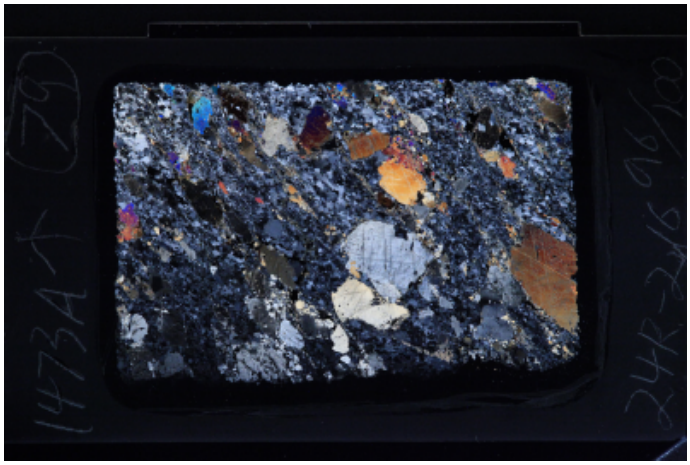
THIN SECTION LABEL ID: **360-U1473A-24R-2-W 96/100-TSB-TS_79** Piece no.: #16 TS no.: 79

Group	Summary
Igneous petrology:	A disseminated oxide gabbro. Primary magmatic texture is not preserved. It contains small amount of orthopyroxene. Plagioclase is strongly recrystallized and foliated. Clinopyroxene contains plagioclase inclusions and brown amphibole blebs. Opaque minerals are predominated by ilmenite.
Metamorphic petrology:	The alteration intensity of this thin section is moderate. Olivine totally altered. Clay minerals occurred in Ol, Cpx Opx and Pl more or less.
Structure:	coarse-grained foliated gabbro with a porphyroclastic texture. Foliation defined by oriented clasts of cpx, opx and thin bands of oxides. These grains are included in a matrix of recrystallized polygonal plagioclase aggregates, recrystallized cpx and fine-grained altered olivine.

Plane-polarized

33013381

Cross-polarized



33013401

IGNEOUS PETROLOGY

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A disseminated oxide gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. It contains small amount of orthopyroxenes, which are elongated along the foliation. Plagioclase is strongly recrystallized and foliated. Clinopyroxene is partly recrystallized and contains plagioclase inclusions and brown amphibole blebs. It is also rimmed by brown amphibole. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.2						completely altered and original shape is not preserved
Plagioclase	60		0.8	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	36		6	2	anhedral	subequant	with plagioclase inclusions
Orthopyroxene	2		3.2	2	anhedral	elongate	
Amphibole	0.6		0.2	0.1	anhedral	interstitial	
Opaques	1.2						
Ilmenite	1.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): QM

Detailed description Ol developed coronas with pale color amphibole and chlorite mixture filled in. Ol altered into pseudomorphic talc with some oxides. Tiny pale color amphibole occurred along the edge and cleavages of Opx. In addition, some clay minerals occurred in the cleavages of Opx. Cpx mainly altered into Pale color amphibole with some brown amphibole and clay. Pl were replaced by secondary plagioclase, pale color amphibole and clay.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro characteried by recrystallization of Cpx, Ol and Pl into aggregates. Ol neoblasts were totally replaced by talc and clay.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	20	20	35
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	15	85	70	5
Clay minerals	20	5	30	10
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc	40	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description coarse-grained foliated gabbro with a porphyroclastic texture. Foliation defined by oriented clasts of cpx, opx and thin bands of oxides. These grains are included in a matrix of recrystallized polygonal plagioclase aggregates, recrystallized cpx and fine-grained altered olivine.

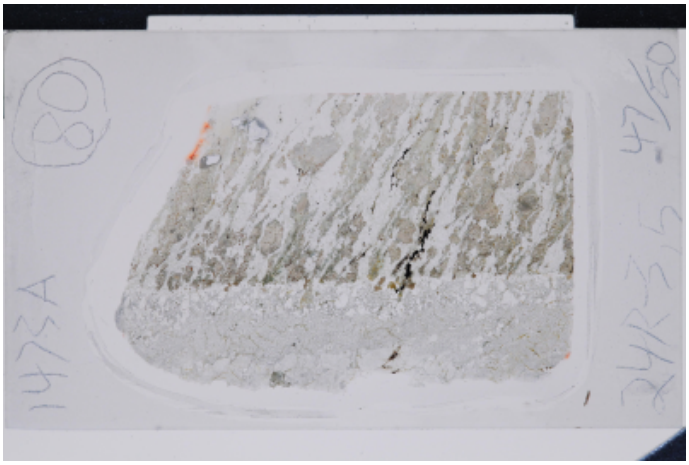
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine grained shape: anhedral boundaries: curved undulose extinction: not observed subgrains: not observed texture: completely altered and in contact with oxides and brown amphibole
Plagioclase:	size: fine recrystallized shape: anhedral boundaries: curved to straight twining: tapered undulose extinction: irregular subgrains: curved boundaries texture: recrystallized polygonal aggregates with straight boundaries forming the matrix of the rock.
Clinopyroxene:	size: medium to fine shape: anhedral boundaries: straight to curved fractures: common texture: mostly observed as medium grains partially altered to brown amphibole
Oxide:	band/pond geometry: observed as oriented bands parallel to the foliation

THIN SECTION LABEL ID: **360-U1473A-24R-3-W 47/50-TSB-TS_80** Piece no.: #05 TS no.: 80

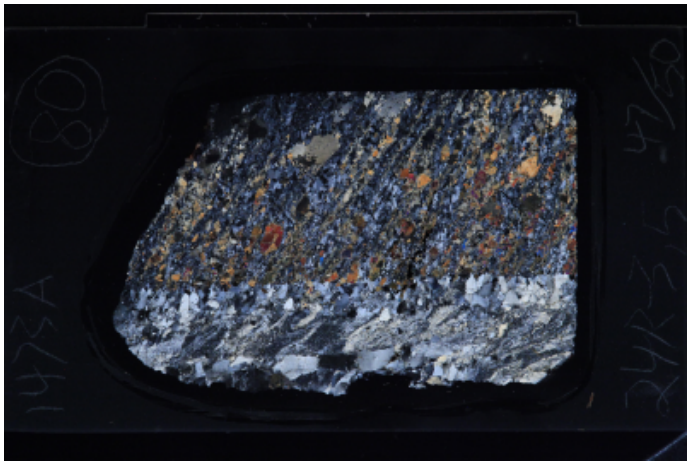
Group	Summary
Igneous petrology:	A gabbro intruded by a diorite vein. Primary magmatic texture of the gabbro is not preserved.
Metamorphic petrology:	The gabbro hosting the vein was first sheared at high temperatures and then moderately altered; felsic melt crystallized in a granophyric texture; potential quartz is completely replaced by secondary plagioclase which is dusty and porous; the "dirt" in the secondary plagioclase as well as an intergranular matrix between the larger plagioclase crystal consist of actinolite, clinozoisite, chlorite and titanite.
Structure:	foliated gabbro crosscut vein felsic sheared vein. The host rock is partially altered and the foliation is defined by cpx clasts, oxide bands and green amphibole.

Plane-polarized



33013441

Cross-polarized



33013461

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is a gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. The foliation is defined by the preferred orientation of elongated plagioclase and clinopyroxene. Clinopyroxene is pervasively replaced by green or brown amphibole. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		0.8	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	44		2.4	0.6	anhedral	elongate	moderately altered and replaced by green amphibole
Amphibole	0.8		0.4	0.2	anhedral	interstitial	
Opaques	0.2						

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: This domain is the diorite vein, which is almost completely composed of plagioclase. Zircons are present in the felsic vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	99		2.4	0.05	anhedral	elongate	
Amphibole	1						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: gabbro

Total rock alteration estimate (%): 15 Observer(s): JK

Detailed description The gabbro hosting the vein was first sheared at high temperatures and then moderately altered; felsic melt crystallized in a granophyric texture; potential quartz is completely replaced by secondary plagioclase which is dusty and porous; the "dirt" in the secondary plagioclase as well as an intergranular matrix between the larger plagioclase crystal consist of actinolite, clinozoisite, chlorite and titanite

Comment type	Comment
Alteration general comments:	The gabbro hosting the vein was first sheared at high temperatures and then moderately altered
Mylonite comments:	porphyroclasts and a granoplastic matrix are present
Vein 1 minerals:	chlorite
Vein 2 minerals:	amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		30		90
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		10		
Amphibole, green		20		5
Chlorite		40		15
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Subtotals replaced		100		100

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: leucodiorite

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	felsic melt crystallized in a granophyric texture; potential quartz is completely replaced by secondary plagioclase which is dusty and porous; the "dirt" consists of actinolite, clinozoisite, chlorite and titanite
Mylonite comments:	the leucodiorite ist partly affected by a strong crystal-plastic deformation revealing marked shearbands

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				50
Amphibole, colorless				10
Amphibole, green				10
Chlorite				10
Epidote/zoisite	n/a	n/a	n/a	10
Plagioclase, sec.	n/a	n/a	n/a	60
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

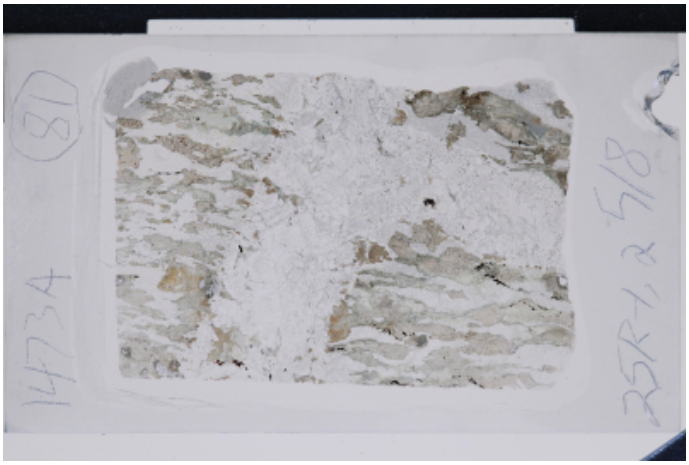
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	grain size: coarse (vein walls) and fine recrystallized grain shape: subhedral (vein wall) to anhedral (matrix) grain boundary: straight to curved twinning: mechanical (rarely observed) undulose extinction: irregular subgrains: rarely observed texture: defines the foliation alongside cpx and amphibole, and composes a felsic vein that crosccut the foliation
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: partially altered and recrystallized
Oxide:	geometry: thin bands parallel to the foliation
Vein:	there is a felsic vein crosscuting the foliation. The vein is mostly composed of plagioclase and minor alteration minerals, and is sheared with an apparent dextral shear sense. Grain size within the vein is fine, while the walls display coarse plagioclase crystals with their long axes normal to the vein elongation.

THIN SECTION LABEL ID: **360-U1473A-25R-1-W 5/8-TSB-TS_81** Piece no.: #02 TS no.: 81

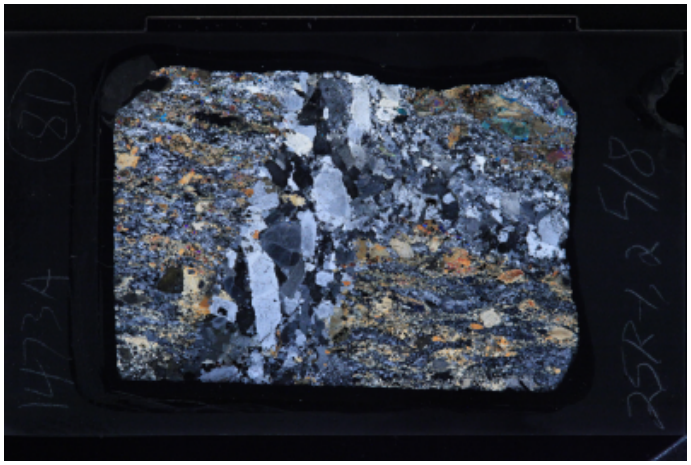
Group	Summary
Igneous petrology:	A gabbroic mylonite intruded by a leucodiorite vein. The primary magmatic texture of gabbro is not preserved. The leucodiorite shows a granular texture and plagioclase rarely displays oscillatory zoning.
Metamorphic petrology:	Sample consists of two domains: a host mylonitized gabbro and a felsic vein. Both are extensively altered, notably by greenschist assemblages.
Structure:	Strongly deformed with mylonitic foliation defined by completely recrystallized plagioclase in elongated neoblasts. The structure is cross-cut at high and low angle by two felsic vein.

Plane-polarized



33013481

Cross-polarized



33013501

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology domain 1

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: This domain is a mylonitic gabbro. The primary magmatic texture is not preserved.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		0.8	0.1	anhedral	elongate	undulose extinction
Clinopyroxene	39		3.6	2	anhedral	elongate	strongly altered
Opaques	1						
Ilmenite	1						

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **leucodiorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a leucodiorite with a granular texture, which is predominated by subhedral plagioclase, with minor amphibole. Plagioclase rarely displays an oscillatory zoning. Zircons are present in the vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	95		3.6	3.2	subhedral	subequant	undulose extinction
Amphibole	5		2	2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 2 Domain rel. abundance (%): Domain name:

Total rock alteration estimate (%): 80 Observer(s):

Detailed description

The felsic vein is extensively altered. Most conspicuous alteration is the occurrence of "dusty" minerals in the center of the plagioclase grain, surrounded by a relatively "clean" rim. The rim seems to be partially replaced by secondary plagioclase. The dusty minerals in the center are of high relief and low birefringence. They could be either epidote or hydrogrossular, or both. Pale green amphibole were observed to fill some fractures. Some grains are completely replaced by chlorite with minor epidote and a tremolite rim. Titanite was observed in close association with this assemblage. Amphibole in the vein are partially replaced by green amphibole. Overall, the vein seems to be particularly affected by greenschist alteration, and could be brought by the chlorite veins observed in the host rock. These chlorite veins seems to penetrate into the felsic vein as it cross cuts an amphibole grain located in the rims of the vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				80
Amphibole, colorless				0
Chlorite				20
Epidote/zoisite	n/a	n/a	n/a	20
Garnet	n/a	n/a	n/a	20
Plagioclase, sec.	n/a	n/a	n/a	40
Subtotals replaced				100

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name:

Total rock alteration estimate (%): 65 Observer(s): JL

Detailed description

The host rock is extensively altered. Cpx porphyroclasts and aggregates of recrystallized crystals are characterized by pale amphibole rims. Brown amphibole were observed within grains and at the grain edge. Brown amphibole is more pronounced at the contact with the felsic vein. Plagioclase is also substantially to extensively altered. Some grains are totally altered into chlorite and a tremolite rim. Aside from the felsic vein, chlorite veins were also observed. The chlorite vein seems to penetrate to the rims of the felsic vein, as it cuts through a brown amphibole crystal within the vein. Another evidence is that some plagioclase grains in the felsic vein are totally replaced by chlorite.

Comment type	Comment
Mylonite comments:	Sample is a mylonitic gabbro. Most plagioclase are recrystallized. Cpx grains are elongated and a few relic small fragments surrounding larger grains seems to be recrystallized.
Vein 1 minerals:	Sample was intruded by a felsic vein
Vein 2 minerals:	Thin chlorite veins were also observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		80		60
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		60		30
Chlorite				70
Clinopyroxene, sec.	n/a	10	n/a	n/a
Subtotals replaced		100		100

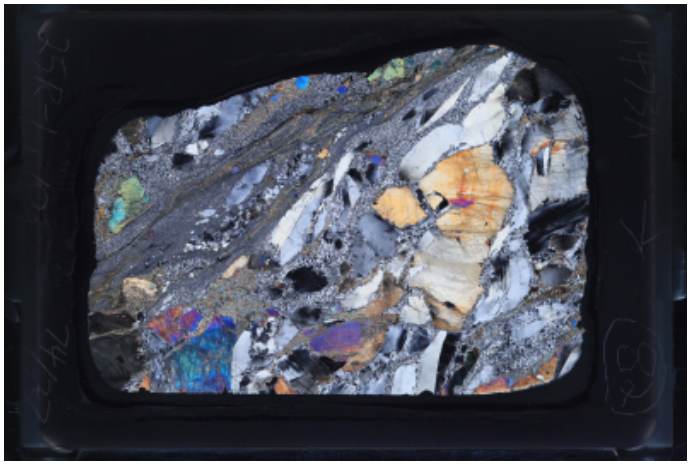
THIN SECTION LABEL ID: **360-U1473A-25R-1-W 74/77-TSB-TS_82** Piece no.: #10 TS no.: 82

Group	Summary
Igneous petrology:	An olivine-bearing gabbro crosscut by a mylonite. The primary magmatic texture of the gabbro is not preserved.
Metamorphic petrology:	This gabbro shows the recrystallization of Pl, Ol and Cpx. The thin section includes a fine-grained mylontic band characterized by the coexistence of Pl, brown Amp and, locally, oxide phases. The static background alteration is slight.
Structure:	Porphyroclastic shear zone cut by a normal-sense low angle ultramylonite with a weak brittle overprint.

Plane-polarized

33046021

Cross-polarized



33046101

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porhyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine-bearing gabbro with a porphyroclastic texture crosscut by a mylonite vein. Primary magmatic texture is not preserved. Olivine is elongated and partly altered. Plagioclase is strongly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized. Plagioclase is partly or fully enclosed within clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			6	anhedral	elongate	strongly altered
Plagioclase	60		7	0.1	anhedral	elongate	undulose extinction
Clinopyroxene	38		22	8	anhedral	elongate	contain plagioclase chadacryst

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): RT

Detailed description This gabbro shows the recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are typically associated with minor amounts of red-brown Amp. The thin section also shows a fine-grained mylontic band characterized by the coexistence of Pl, brown Amp and, locally, oxide phases. The static background alteration is slight.

Comment type	Comment
Alteration general comments:	The static background alteration is slight.
Mylonite comments:	This gabbro shows the recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are typically associated with minor amounts of red-brown Amp. The thin section also shows a fine-grained mylontic band characterized by the coexistence of Pl, brown Amp and, locally, oxide phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	10	50	
Amphibole, colorless			70	
Amphibole, green	30	100		
Chlorite	10		30	
Clay minerals	20			
Oxide	20			n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100	100	

MICROSTRUCTURES

Interval domain no: 2 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Porphyroclastic shear zone cut by an ultramylonite. The ultramylonite is mostly plagioclase with some pyroxene and amphibole. The ultramylonite is cored by porphyroclasts of plagioclase that are fractured. The ultramylonite has a normal sense of shear. There is a weak brittle overprint in the porphyroclastic shear zone with some plagioclase offset by fractures.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	1.5

Type	Comment
Olivine:	Grain size: porphyroclasts: ~6 mm. neoblasts: ~0.15 mm. Grain shape: elongate, anhedral. Grain boundary: irregular. Undulose extinction: developed in all grain sizes. complete and rectilinear in porphyroclasts. Texture: one example of a porphyroclast. the neoblasts are in aggregrates with neoblasts of pyroxene.
Plagioclase:	Grain size: porphyroclasts: ~6 mm. neoblasts: ~0.01 mm. Grain shape: elongate, kinked. Grain boundary: serrated Twinning: tapered in porphyroclasts and larger neoblasts. Undulose extinction: complete Subgrains: anhedral. Texture: Porphyroclasts surrounded by neoblasts. The porphyroblasts are very elongate in in many cases kinked.
Clinopyroxene:	Grain size: porphyroclasts: ~15 mm. neoblasts: ~0.1 mm. Grain shape: subhedral, kinked. Grain boundary: curved to straight, altered. Texture: kinked porphyroclasts with some zones of intense recrystallization.

Interval domain no: 1 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Porphyroclastic shear zone cut by an ultramylonite. The ultramylonite is mostly plagioclase with some pyroxene and amphibole. The ultramylonite is cored by porphyroclasts of plagioclase that are fractured. The ultramylonite has a normal sense of shear.

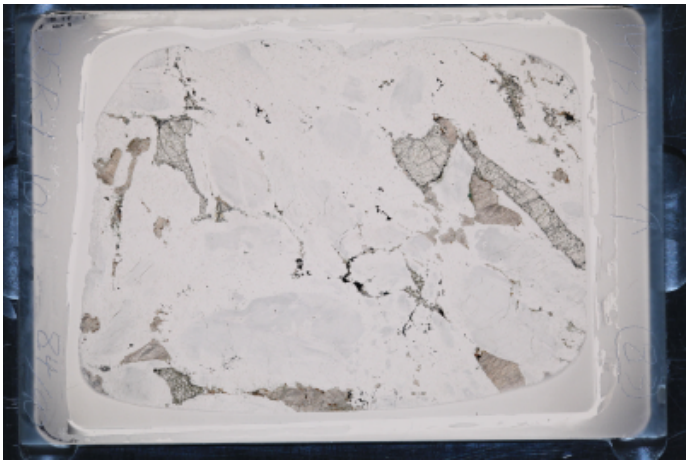
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	ultramylonitic [CPF_fabric]	5
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Not present, potentially altered.
Plagioclase:	Grain size: porphyroclasts: 0.3-6 mm neoblasts: ~0.0025 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered in porphyroclasts, absent in neoblasts. Undulose extinction: complete in all grain sizes. Subgrains: only in porphyroclasts, curved Texture: very fine grained neoblasts surrounding a series of broken porphyroclasts.
Clinopyroxene:	Grain size: porphyroclasts: ~3 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular, altered. Texture: porphyroclastic with thick bands of neoblasts forming tails.

THIN SECTION LABEL ID: **360-U1473A-25R-1-W 84/90-TSB-TS_83** Piece no.: #10 TS no.: 83

Group	Summary
Igneous petrology:	An olivine gabbro. Primary magmatic texture is not preserved. Olivine is elongated and partly altered. Plagioclase is strongly foliated and displays undulose zoning. Clinopyroxene is elongated along the foliation and completely replaced by amphibole. Small amount of ilmenite is present.
Metamorphic petrology:	Sample is moderately altered. Olivine is replaced by serpentine, oxide and green clay and surrounded by a talc-oxide or a tremolite rim. Cpx is replaced mostly by brown and green amphibole. Plagioclase grains are mostly recrystallized into smaller crystals and only exhibit minor static background replacement.
Structure:	Weakly foliated porphyroclastic shear zone with recrystallized plagioclase, olivine, and locally pyroxene.

Plane-polarized



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Cross-polarized

33045991

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is elongated and partly altered. Plagioclase is strongly foliated and displays undulose zoning. Clinopyroxene is elongated along the foliation. It has been completely replaced by amphibole. Small amount of ilmenite is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			0.8	anhedral	elongate	partly recrystallized
Plagioclase	85		15	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	6		8	5	anhedral	subequant	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description The sample is only slightly altered. Olivine is moderately altered into serpentine and oxide in mesh texture and rimmed by talc and oxide. Some grains are surrounded by a pale amphibole rim. Clay replacement after olivine represents late stage alteration event. Clinopyroxene is also moderately altered into mostly brown and green amphibole. Plagioclase is only slightly altered into mostly secondary plagioclase. Most of the plagioclase grains has been recrystallized into smaller crystals.

Comment type	Comment
Mylonite comments:	The sample exhibit a somehow weak mylonitic foliation. Porphyroclasts of plagioclase, clinopyroxene and olivine were observed. Many grains of the latter two exhibit elongated aggregates of large and small crystals parallel to the foliation. Most of the plagioclase occur as polygonal aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	30		10
Amphibole, brown	n/a	60	n/a	n/a
Amphibole, colorless				5
Amphibole, green	10	40		
Chlorite				20
Clay minerals	30			
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	75
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Porphyroclastic shear zone with recrystallized plagioclase, olivine, and locally pyroxene. The olivine forms sigma clasts and ribbons of monomineralic neoblasts. The plagioclase porphyroclasts have very irregular boundaries and do not define a strong preferred orientation.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: porphyroclasts: ~7.5 mm. neoblasts: ~0.15 mm. Grain shape: elongate, anhedral. Grain boundary: curved. Undulose extinction: complete in porphyroclasts and in larger neoblasts. Texture: porphyroclasts of olivine surrounded by neoblasts. One example is an elongate band of porphyroclasts and neoblasts of olivine.
Plagioclase:	Grain size: porphyroclasts: 4.5-15 mm neoblasts: 0.01-0.3 mm. Grain shape: elongate, anhedral. Grain boundary: very irregular, Twinning: carlsbad and tapered in porphyroclasts. tapered in larger neoblasts Subgrains: not well developed, anhedral. Undulose extinction: complete with patches. Texture: Porphyroclastic plagioclase with a weak preferred orientation. Bands of neoblasts define the foliation parallel to recrystallized bands of olivine. The ends and edges of porphyroclasts are very irregular.
Clinopyroxene:	Low abundance. one crystal is kinked (~6 mm), one is undeformed, one is recrystallized (porphyroclasts: ~2 mm; neoblasts: ~0.15 mm).
Oxide:	very little, usually rimming olivine or associated with alteration of olivine.

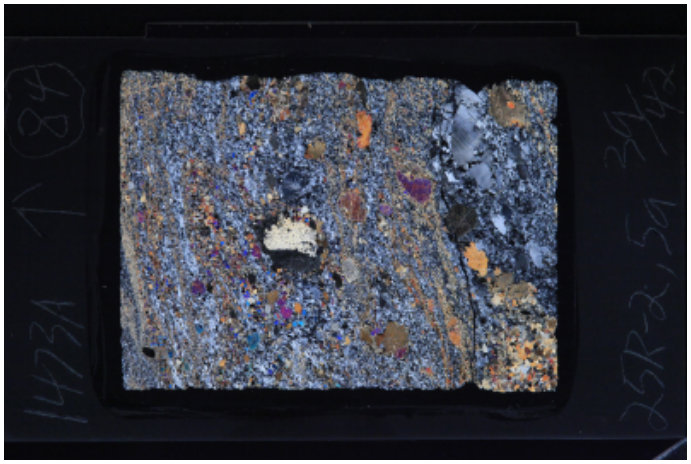
THIN SECTION LABEL ID: **360-U1473A-25R-2-W 39/42-TSB-TS_84** Piece no.: #05 TS no.: 84

Group	Summary
Igneous petrology:	A deformed gabbro. Primary magmatic texture is not preserved. Plagioclase is strongly recrystallized, and displays undulose extinction. Deformation twins can be seen in big grains. Clinopyroxene is strongly recrystallized and altered. Opaque minerals mainly consist of ilmenite, with minor sulfides.
Metamorphic petrology:	This alteration intensity of this thin section is extensive. Most of Cpx neoblasts altered into pale color amphibole and brown amphibole.
Structure:	mylonitic texture defined by cpx porphyroclasts and a matrix of recrystallized cpx and plagioclase. Cpx porhyroclasts are tipically altered to brown and pale amphibole.

Plane-polarized

33013521

Cross-polarized



33013541

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained [345]

Detailed description: A deformed gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. The foliation is defined by the preferred orientation of plagioclase and clinopyroxene. Plagioclase is strongly recrystallized, and displays undulose extinction. Deformation twins can be seen in big grains. Clinopyroxene is strongly recrystallized and altered. It contains brown amphibole blebs. Opaque minerals mainly consist of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.1						completely altered
Plagioclase	60		3.6	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	37		5	0.2	anhedral	elongate	strongly altered and replaced by green amphibole
Amphibole	2		0.4	0.1	anhedral	interstitial	parallel to the foliation
Opaques	0.9						
Ilmenite	0.8						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 70 Observer(s): QM

Detailed description This alteration intensity of this thin section is extensive. Cpx neoblasts mostly altered into pale color amphibole and brown amphibole to form amphibole neoblasts. Pl were mainly replaced by secondary plagioclase. Clay occurred in the boundary among the plagioclase.

Comment type	Comment
Mylonite comments:	Mylonitic gabbro characterized by recrystallization of Cpx and Pl into aggregates. The neoblasts consist of Cpx, Pl and pale color amphibole neoblasts. Brown amphibole occurred in the Cpx and pale color amphibole neoblasts.
Vein 1 minerals:	This vein consists of pale color amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		70		70
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		70		3
Clay minerals				7
Plagioclase, sec.	n/a	n/a	n/a	90
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Plagioclase:	grain size: fine recrystallized grain shape: anhedral grain boundaries: curved to straight twinning: mechanical undulose extinction: irregular subgrains: common texture: recrystallized matrix of equigranular plagioclase aggregates.
Clinopyroxene:	grain size: coarse (porphyroclast), medium (recrystallized) shape: subhedral (porphyroclast), anhedral (recrystallized) grain boundary: straight to curved fractures: common texture: altered to pale, brown and green amph

THIN SECTION LABEL ID: **360-U1473A-25R-2-W 53/55-TSB-TS_85** Piece no.: #05 TS no.: 85

Group	Summary
Igneous petrology:	The thin section consists of two domains, a coarse-grained subophitic gabbro and a fine-grained mylonitic gabbro. The coarse-grained gabbro displays a subophitic texture, in which tabular plagioclase is partly enclosed within clinopyroxene. The primary magmatic texture of the mylonitic gabbro is not preserved.
Metamorphic petrology:	Static alteration intensity is substantial. Secondary minerals indicate amphibolite facies and overprinting greenschist facies alteration.
Structure:	Undeformed gabbro cut by a mylonitic gabbro where plagioclase is completely recrystallized. Shear sense of mylonite is dextral reverse, and foliation is defined by both plagioclase and clinopyroxene.

Plane-polarized

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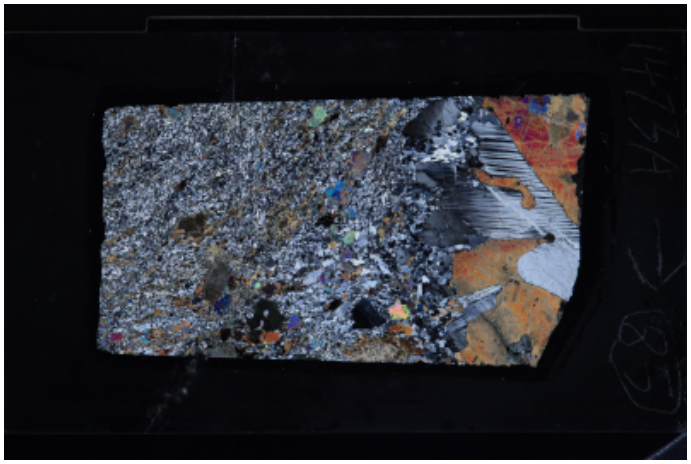
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology domain 1

Lithology: **gabbro** Observer: CL

Texture: mylonite Ave. grain size: fine grained [345]

Detailed description: This domain is a mylonitic gabbro. Primary magmatic texture is not preserved. Clinopyroxene is strongly altered and rimmed by brown amphibole. A big zircon is present in boundary.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		1	0.1	anhedral	elongate	undulose extinction
Clinopyroxene	27		2.8	2	anhedral	elongate	completely replaced by green and brown amphibole
Amphibole	2.6		2	0.4	anhedral	interstitial	
Opaques	0.4						
Ilmenite	0.4						

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: lithology domain 2

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: This domain is a coarse-grained gabbro with a subophitic texture. Tabular plagioclase is partly enclosed within clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		10	10	anhedral	tabular	
Clinopyroxene	45		8	6	anhedral	poikilitic	partly replaced by green amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Clinopyroxene is pseudomorphically or patchily replaced by dark/light-brown or colorless amphibole, which are rimmed by green amphibole. Orthopyroxene is replaced by pseudomorphic aggregates of actinolite, green hornblende and talc. Plagioclase is mainly replaced by secondary plagioclase with trace amounts of actinolite, epidote, titanite, clay and carbonate, and has fracture-filling chlorite.

Comment type	Comment
Mylonite comments:	Cpx and Pl porphyroclasts; Cpx, Opx and Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		60	70	50
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		20	35	10
Amphibole, green		30	30	
Chlorite				9
Clinopyroxene, sec.	n/a	5	n/a	n/a
Oxide		4	5	n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Sulfide		1		n/a
Talc		n/a	30	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: subhedral Grain boundary: straight Twinning: igneous and tapered
Clinopyroxene:	Grain size: coarse Grain shape: poikilitic Grain boundary: straight Texture: note deformed, one single crystal

Interval domain no: 2 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic contact with wall-rock is gradational with medium grained plagioclase neoblasts toward the wall-rock; shear sense dextral reverse. Top part of thin section shows change in orientation of mylonite from subhorizontal to inclined. Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Twinning: tapered Undulose extinction: irregular Texture: completely recrystallized, variation in grain size of neoblast are observed from the wall-rock to the mylonite from medium to very fine. Neoblasts are elongated and define the foliation.
Clinopyroxene:	Grain size: coarse porphyroclast and fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: partially altered porphyroclasts parallel to foliation, neoblasts form elongated tails of porphyroclasts and recrystallize within the matrix to define foliation

THIN SECTION LABEL ID: **360-U1473A-26R-2-W 101/104-TSB-TS_86** Piece no.: #12 TS no.: 86

Group	Summary
Igneous petrology:	An orthopyroxene-bearing disseminated oxide gabbro. Primary magmatic texture is not preserved. It contains 1% olivine and 3% orthopyroxene.
Metamorphic petrology:	Static background alteration intensity of the sample is moderate. Most of the alteration is associated with olivine replacement by clay and pyroxene replacement by amphibole. Plagioclase and oxides are generally fresh.
Structure:	Mylonitic foliation defined by the preferred orientation of fine recrystallized grains of olivine and pyroxene, commonly associated with oxide bands. porphyroclasts are mainly of Cpx and amphibole. Plagioclase forms monomineralic layers and is also present in cpx+ol mixture.

Plane-polarized

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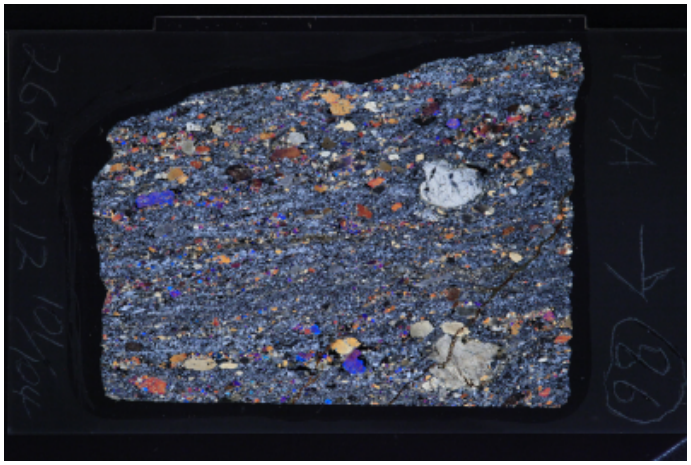
Cross-polarized



33013581

IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing gabbro** Observer: CL

Texture: mylonite Ave. grain size: fine grained [345]

Detailed description: An orthopyroxene-bearing disseminated oxide gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. It contains 1% olivine and 3% orthopyroxene. Olivine is completely altered and its original shape is not preserved. Plagioclase is completely recrystallized and strongly foliated. Clinopyroxene is partly recrystallized and contains plagioclase inclusions. Orthopyroxene with well-developed exsolution lamallae is strongly elongated along with the foliation. Opaque minerals mainly consist of ilmenite and magnetite, with minor sulfide. Intergrowth between ilmenite and magnetite is common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1						completely altered and original shape is not preserved
Plagioclase	55		0.6	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	39		3.6	1.6	anhedral	elongate	moderately recrystallized
Orthopyroxene	3		2.8	1.6	anhedral	elongate	
Opaques	2						
Magnetite	0.8						
Ilmenite	1						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description The sample is a mylonitic olivine oxide gabbro composed of porphyroclastic and neoblastic grains of clinopyroxene and olivine. Almost all of the plagioclase occur as monomineralic polygonal aggregates. Static background alteration is moderate. Olivine is substantially altered into mostly clay while clinoyproxene is characterized by the occurrence of brown amphibole along cleavage planes and for some grains, a rimming pale-green amphibole. Plagioclase and oxides are generally only slightly altered.

Comment type	Comment
Mylonite comments:	The sample consists of large grains of clinopyroxene and olivine mostly surrounded by neoblasts of similar mineralogy. Most plagioclase occurs as monomineralic polygonal aggregates and large porphyroclastic grains are rare. Deformed primary oxides are also common in the sample.
Vein 1 minerals:	The vein is likely a hematite-clay vein cross cutting the mylonite foliation. Half of the vein is made up of an oxide with a deep red color under PPL and was identified as hematite. The other half of the vein is composed of deep green clay.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	20		5
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	10	40		
Chlorite				10
Clay minerals	60			
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Olivine:	grain size: fine recrystallized grain shape: anhedral grain boundaries: straight to curved undulose extinction: not observed subgrains: not observed texture: recrystallized grains associated with trails of oxides and partially altered
Plagioclase:	grain size: fine recrystallized grain shape: anhedral grain boundary: straight to curved twinning: mechanical (rarely observed) undulose extinction: irregular subgrains: rare texture: fine-grained recrystallized aggregates mixed with cpx+ol+oxides
Clinopyroxene:	size: coarse (porphyroclasts) to fine (recrystallized) shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: mostly recrystallized, porphyroclasts altered to amphibole.
Oxide:	band/pond geometry: aligned in bands parallel to the foliation texture: thin parallel bands associated with cpx and olivine

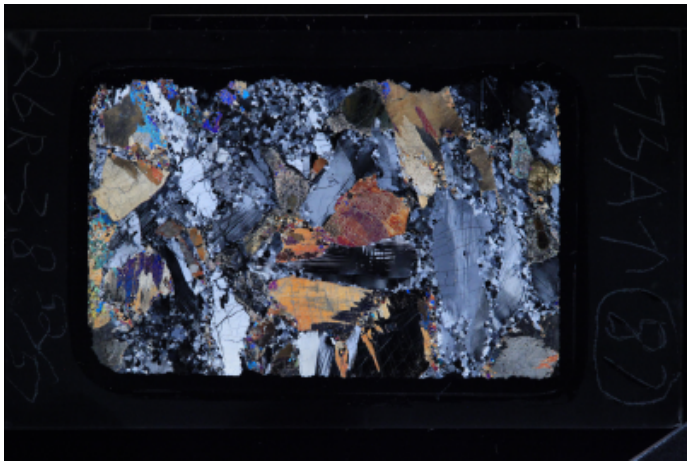
THIN SECTION LABEL ID: **360-U1473A-26R-3-W 52/57-TSB-TS_87** Piece no.: #08 TS no.: 87

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a granular texture. Olivine is moderately altered. Plagioclase is in a tabular shape and partly recrystallized. Clinopyroxene commonly displays a onsertal intergrowth texture. Opaque minerals are equally composed of ilmenite and sulfides.
Metamorphic petrology:	The alteration intensity of this thin section is substantial. Chlorite occurred along the boundary between plagioclase and olivine.
Structure:	coarse grained gabbro with an isotropic fabric. porphyroclasts of olivine, cpx and plagioclase are immersed in a matrix of fine-grained recrystallized plagioclase aggregates. Recrystallized plagioclase develops core-mantle structures and is also observed as polygonal aggregates in contact with cpx. Oxides are present as thin pods associated with olivine.

Plane-polarized

33027941

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a granular texture. Olivine is moderately altered. Plagioclase is in a tabular shape and partly recrystallized. Clinopyroxene is partly recrystallized and contains plagioclase inclusions. Consertal intergrowth texture is common in clinopyroxene porphyroclasts. Brown amphibole commonly associates with clinopyroxene neoblasts. Opaque minerals are equally composed of ilmenite and sulfides, showing an intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			1.6	anhedral	subequant	heavily altered
Plagioclase	60		9	4	anhedral	tabular	undulose extinction
Clinopyroxene	33		8	5.6	anhedral	subequant	partly recrystallized
Amphibole	0.1		0.2	0.1	anhedral	interstitial	
Opaques	0.1						
Ilmenite	0.05						
Sulfide	0.05						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Olivine altered into talc, serpentine and oxides mixture, sometimes with some needle shape actinolite in the assemblage. Clinopyroxene mainly altered into pale color amphibole. Plagioclase mainly altered into secondary plagioclase. Chlorite occurred in the cleavages of Pl and along the boundary between plagioclase and olivine.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	25		20
Amphibole, brown	n/a	17	n/a	n/a
Amphibole, colorless	15	80		
Chlorite				30
Clay minerals	2	3		5
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	65
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description coarse grained gabbro with an isotropic fabric. porphyroclasts of olivine, cpx and plagioclase are immersed in a matrix of fine-grained recrystallized plagioclase aggregates. Recrystallized plagioclase develops core-mantle structures and is also observed as polygonal aggregates in contact with cpx. Oxides are present as thin pods associated with olivine.

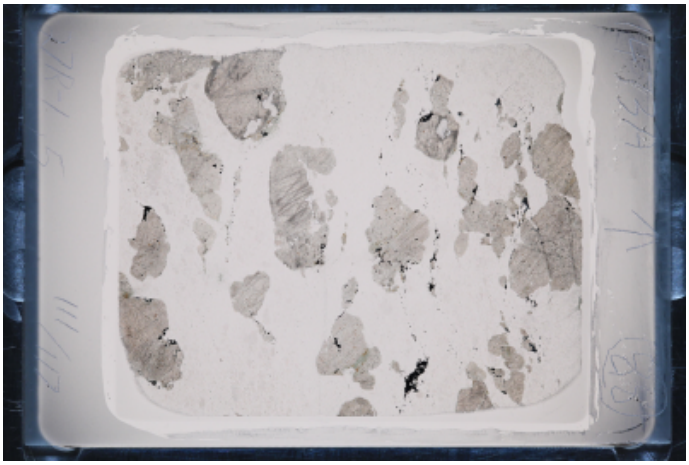
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to medium grained shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: observed as porphyroclasts and as redcrystallized grains at the rims of clasts, partially altered
Plagioclase:	size: coarse (clasts) to fine (recrystallized) shape: subhedral to anhedral boundaries: straight twinning: tapered undulose extinction: irregular subgrains: common, observed mainly in the porphyroclasts texture: completely recrystallized fine grained aggregates
Clinopyroxene:	size: coarse to fine shape: subhedral to anhedral boundaries: straight fractures: common texture: coarse grains as porphyroclasts and fine recrystallized aggregates observed at the boundaries with plagioclase.
Oxide:	band/pond geometry: thin pods commonly associated with olivine.

THIN SECTION LABEL ID: **360-U1473A-27R-1-W 111/117-TSB-TS_88** Piece no.: #05 TS no.: 88

Group	Summary
Igneous petrology:	Primary magmatic texture is not preserved. Plagioclase is completely recrystallized and foliated. Clinopyroxene is partly recrystallized. Opaque minerals are mainly composed of ilmenite, with minor sulfides.
Metamorphic petrology:	The alteration intensity of this thin section is substantial. Cpx altered into pale color amphibole, brown amphibole, chlorite and clay. Pl were mostly replaced by secondary plagioclase, some part of the Pl altered into chlorite. Tiny pale color amphibole occurred in the cleavages of Pl.
Structure:	Sub-horizontal porphyroclastic shear zone with almost completely recrystallized plagioclase and weakly recrystallized pyroxene

Plane-polarized



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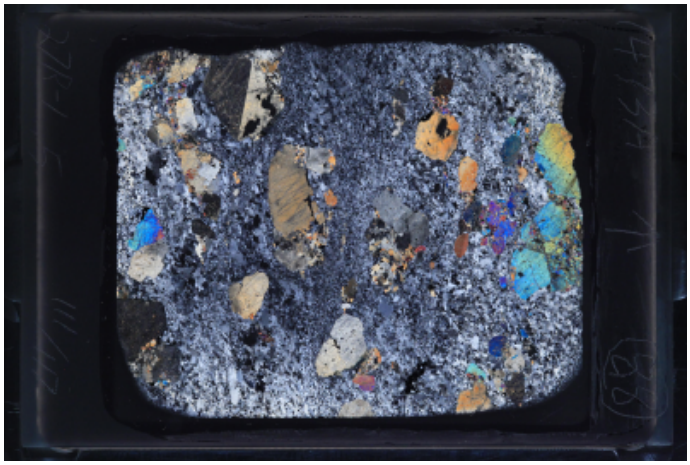
Cross-polarized



33045951

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porporphyroclastic Ave. grain size: medium grained [345]

Detailed description: An gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is completely recrystallized and foliated. Clinopyroxene is partly recrystallized. Opaque minerals are mainly composed of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		2	0.1	anhedral	subequant	undulose extinction
Clinopyroxene	30		10	8	anhedral	subequant	partly recrystallized
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Cpx altered into pale color amphibole, brown amphibole, chlorite and clay. Pl were mostly replaced by secondary plagioclase, some part of the Pl altered into chlorite. Tiny pale color amphibole occurred in the cleavages of Pl.

Comment type	Comment
Mylonite comments:	Mylontic gabbro charaterized by recrystallization of Cpx and Pl into polygonal aggregates. Cpx were associated with minor amount of brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		15		65
Amphibole, brown	n/a	12	n/a	n/a
Amphibole, colorless		75		5
Chlorite		5		5
Clay minerals		8		
Plagioclase, sec.	n/a	n/a	n/a	90
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Sub-horizontal porphyroclastic shear zone with almost completely recrystallized plagioclase and weakly recrystallized pyroxene. Some aggregates of plagioclase are polygonal, others are elongate parallel to the foliation.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Plagioclase:	Grain size: porphyroclasts: 1-2 mm. neoblasts: ~0.03 mm. Grain shape: elongate, anhedral. some aggregates of neoblasts are polygonal. Grain boundary: porphyroclasts: serrate. neoblasts: curved to polygonal. Subgrains: curved. Twinning: tapered in porphyroclasts and larger neoblasts. Texture: strongly recrystallized with small porphyroclasts defining a fabric.
Clinopyroxene:	Grain size: porphyroclasts: 2- 7.5 mm. neoblasts: 0.3 mm. Grain shape: subhedral, porphyroclasts are elongate. Grain boundary: straight to curved. Texture: Porphyroclasts surrounded by neoblasts.
Oxide:	There are oxide bands that are subparallel to the foliation. Some oxide bands completely surround neoblasts of plagioclase.

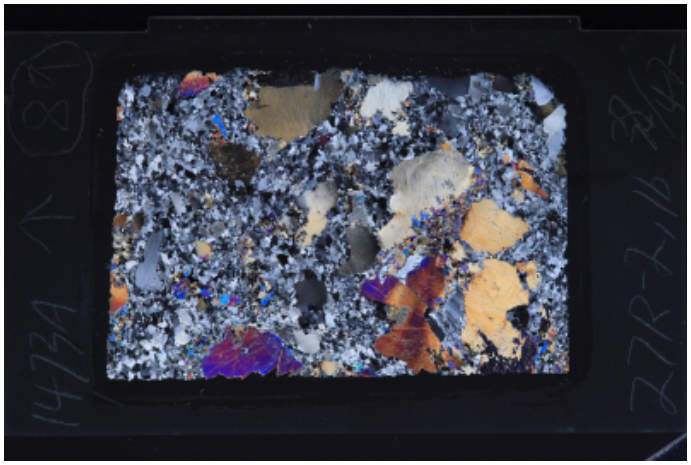
THIN SECTION LABEL ID: **360-U1473A-27R-2-W 38/42-TSB-TS_89** Piece no.: #01 TS no.: 89

Group	Summary
Igneous petrology:	A medium-grained gabbro. Primary magmatic texture is not preserved.
Metamorphic petrology:	Static alteration intensity is slight. Dominant alteration minerals are brown amphibole and secondary clinopyroxene replacing primary clinopyroxene.
Structure:	Deformed gabbro with porphyroclastic foliation. Porphyroclasts are clinopyroxene and minor plagioclase which is mainly recrystallized.

Plane-polarized

33013601

Cross-polarized



33013621

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is commonly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and the neoblasts are associated with brown amphibole. It occasionally displays a consertal intergrowth texture and contains plagioclase inclusions. Opaque minerals are composed of ilmenite and sulfide, occasionally showing an intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		4	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	29		8	5	anhedral	subequant	
Amphibole	0.7		0.4	0.1	anhedral	interstitial	commonly associates with clinopyroxene neoblasts
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Small amounts of olivine and orthopyroxene are replaced mainly by talc. Clinopyroxene is mainly replaced by brown amohibole and secondary clinopyroxene. Plagioclase is relatively fresh.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	20	10	3
Amphibole, brown	n/a	45	n/a	n/a
Amphibole, colorless	5		30	30
Amphibole, green		10		
Chlorite				10
Clay minerals	15			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	4	3		n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Sulfide	1	2		n/a
Talc	70	n/a	70	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Porphyroclastic gabbro with clinopyroxene and rare porphyroclasts. Observer: CF

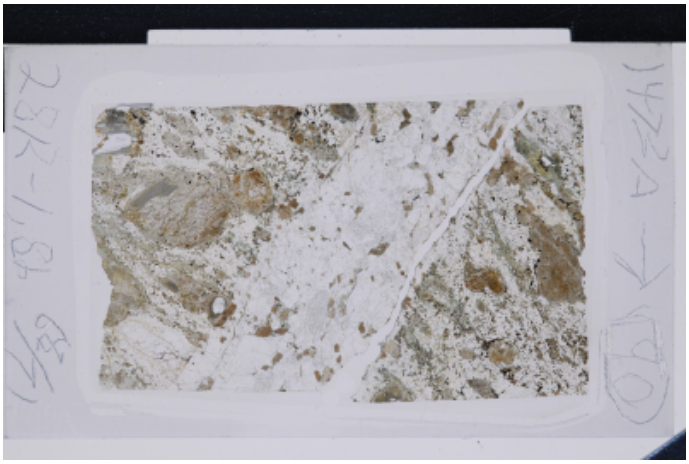
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	absent	n/a

Type	Comment
Plagioclase:	Grain size: coarse porphyroclast and medium to fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Twinning: tapered Undulose extinction: regular to irregular in neoblasts Texture: mostly recrystallized, deformed porphyroclasts
Clinopyroxene:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: straight to curved Undulose extinction: regular Texture: deformed porphyroclasts may include plagioclase chadacryst, neoblasts are observed between porphyroclasts and at grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-28R-1-W 68/71-TSB-TS_90** Piece no.: #08 TS no.: 90

Group	Summary
Igneous petrology:	A gabbro intruded by a diorite vein. Primary magmatic texture of the gabbro is not preserved. The diorite displays a granular texture.
Metamorphic petrology:	The gabbro hosting the vein was first sheared at high temperatures resulting in porphyroclasts and neoblastic domains and then moderately altered; most common is brown-green amphibole overgrowth and secondary plagioclase formation; the contact to the felsic vein is sutured; plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material, defects; mortar texture due to slight cataclasis; alteration phases in the felsic vein: green amphibole, sec. plagioclase, titanite, clay
Structure:	This gabbro is intruded by a coarse grained plagioclase vein. Cpx is observed as porphyroclasts mostly altered to green amphibole. Plagioclase in the gabbro is completely recrystallized to fine-grained aggregates. In the vein, plagioclase exhibits undulose extinction and subgrains.

Plane-polarized



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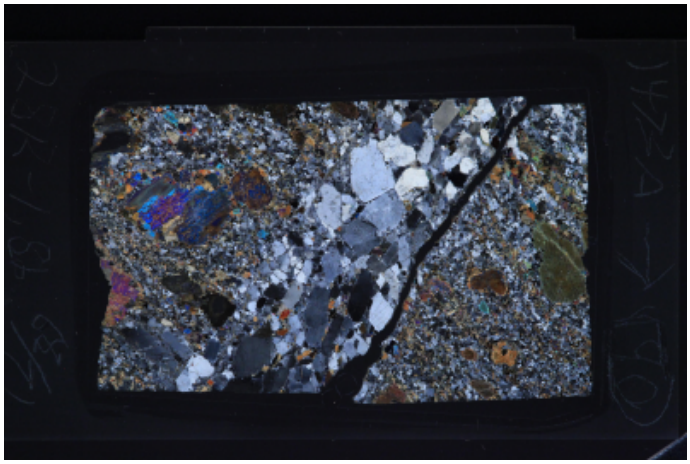
Cross-polarized



33027921

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 65 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: This domain is a gabbro displays a prophyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is highly recrystallized and displays undulose extinction. Clinopyroxene is pervasively replaced by green amphibole. Opaque oxides are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	45		1	0.4	anhedral	equant	undulose extinction
Clinopyroxene	53		5.6	0.2	anhedral	subequant	with consertal intergrowth texture
Opaques	2						
Ilmenite	2						

Interval domain no: **2** Domain rel. abundance (%): 35 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a medium-grained diorite vein with a granular texture. Both zircon and titanite are present. Titanite commonly associates with ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		3.6	2.4	subhedral	elongate	
Amphibole	10		1.2	0.8	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: gabbro

Total rock alteration estimate (%): 20 Observer(s): JK

Detailed description The gabbro hosting the vein was first sheared at high temperatures resulting in porphyroclasts and neoblastic domains and then moderately altered; most common is brown-green amphibole overgrowth and secondary plagioclase formation; the contact to the felsic vein is sutured; plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material, defects; mortar texture due to slight cataclasis; alteration phases: green amphibole, sec. plagioclase, titanite, clay

Comment type	Comment
Alteration general comments:	The gabbro hosting the vein was first sheared at high temperatures resulting in porphyroclasts and neoblastic domains and then moderately altered; most common is brown-green amphibole overgrowth and secondary plagioclase formation
Mylonite comments:	porphyroclasts and a granoplastic matrix are present
Vein 1 minerals:	clay
Vein 2 minerals:	oxide/hydroxide
Vein 3 minerals:	green amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50		30
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, green		50		30
Chlorite		5		10
Clay minerals		20		10
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide		5		n/a
Plagioclase, sec.	n/a	n/a	n/a	45
Subtotals replaced		100		100

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: leucodiortie

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material, defects; mortar texture due to slight cataclasis; alteration phases: green amphibole, sec. plagioclase, titanite, clay
Cataclasite comments:	slightly cataclastic: mortar texture
Vein 1 minerals:	green amphibole
Vein 2 minerals:	titanite (mixed with green amphibole)
Vein 3 minerals:	clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				40
Amphibole, green				20
Chlorite				10
Clay minerals				20
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description This gabbro is intruded by a coarse grained plagioclase vein. Cpx is observed as porphyroclasts mostly altered to green amphibole. Plagioclase in the gabbro is completely recrystallized to fine-grained aggregates. In the vein, plagioclase exhibits undulose extinction and subgrains.

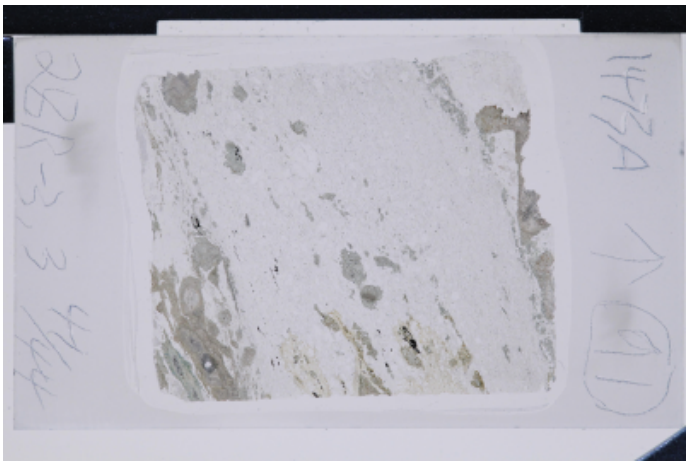
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: coarse (vein), fine recrystallized (gabbro) shape: subhedral to anhedral boundaries: curved to straight twinning: tapered (mostly observed in the gabbro) undulose extinction: irregular subgrains: curved boundaries (mostly in the vein) texture: fine-grained recrystallized aggregates in the gabbro; altered. Coarse elongate grains in the vein.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral grain boundaries: straight to curved fractures: common texture: porphyroclasts commonly altered to green amphibole
Oxide:	band/pod geometry: fine pods mainly parallel to the foliation in the gabbro\
Vein:	coarse plagioclase vein crosscutting the foliation. Close to the contact with the host rock, plagioclase grains are recrystallized to fine grained aggregates which may also mantle the coarse clasts.

THIN SECTION LABEL ID: **360-U1473A-28R-3-W 41/44-TSB-TS_91** Piece no.: #03, #CTSE No.: 91

Group	Summary
Igneous petrology:	A medium-grained gabbro intruded by a felsic vein. The primary magmtic texture of the gabbro is not preserved. The felsic vein shows a granular texture.
Metamorphic petrology:	The sample mostly consists of a felsic vein recording ductile deformation. The host gabbro shows a mylonitic foliation concordant with that of the felsic vein. The foliation of the gabbro is characterized by the dynamic crystallization of brown Amp at the expense of Cpx. In the mylonitized felsic vein, there are a few small gabbro pieces, locally oxide-bearing. These gabbro pieces show the recrystallization of primary Cpx into neoblastic Cpx aggregates. The background static alteration of this sample is overall moderate and mostly restricted to mafic minerals.
Structure:	The felsic vein shows extensive crystal plastic deformation with grain size reduction with increased deformation towards the margins of the vein. The vein contains stretched xenoliths of the gabbro country rock. Plagioclase shows undulose extinction and grainsize reduction, but no deformation twins. Reverse dextral sense of shear on boundary between domains 1 and 3. Both margins are sheared although there was shearing between domains 1 and 3 compared to 1 and 2.

Plane-polarized



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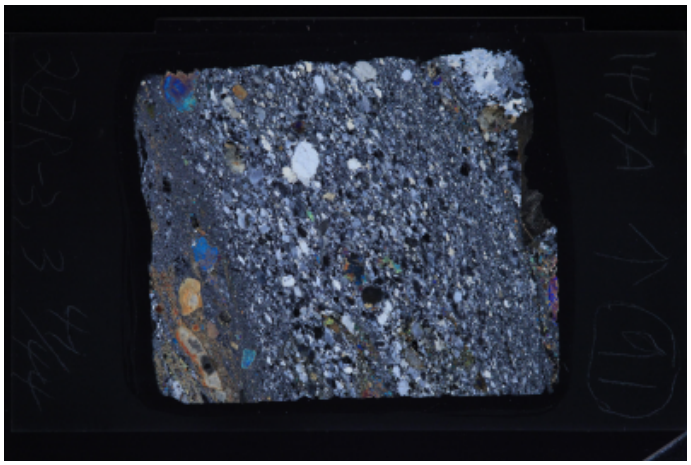
Cross-polarized



33027881

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 95 Domain name: vein

Lithology: **felsic vein** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is the felsic vein, which is predominated by plagioclase. Plagioclase displays undulose extinction. No quartz is found in the vein and abundant zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	95		4	0.8	anhedral	subequant	
Clinopyroxene	5		1.6	0.2			

Interval domain no: **2** Domain rel. abundance (%): 5 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: deformed Ave. grain size: medium grained [345]

Detailed description: This domain is a deformed gabbro. The primary magmatic texture is not preserved. Plagioclase displays undulose extinction and clinopyroxene is pervasively replaced by amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		2	0.6		subequant	
Clinopyroxene	45		8	8	anhedral	elongate	completely replaced by amphiboble

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): RT

Detailed description The sample mostly consists of a felsic vein recording ductile deformation. On one side, the host gabbro shows a mylonitic foliation concordant with that of the felsic vein. The foliation of the gabbro is characterized by the dynamic crystallization of brown Amp at the expense of Cpx. Pl from the host gabbro is mostly recrystallized into fine-grained aggregates. In the mylonitized felsic vein, there are a few small gabbro pieces, locally oxide-bearing. These gabbro pieces show the recrystallization of primary Cpx into neoblastic Cpx aggregates. The background static alteration of this sample is overall moderate and mostly restricted to mafic minerals. Conversely, Pl is typically fresh. Within the mylonitized felsic vein, there are areas where clay minerals are relatively abundant along the grain buondaries among the Pl neoblasts. In addition, Pl is altered in places into epidote and/or pale-green Amp.

Comment type	Comment
Alteration general comments:	The background static alteration of this sample is overall moderate and mostly restricted to mafic minerals.
Mylonite comments:	The sample mostly consists of a felsic vein recording ductile deformation. On one side, the host gabbro shows a mylonitic foliation concordant with that of the felsic vein. The foliation of the gabbro is characterized by the dynamic crystallization of brown Amp at the expense of Cpx. Pl from the host gabbro is mostly recrystallized into fine-grained aggregates. In the mylonitized felsic vein, there are a few small gabbro pieces, locally oxide-bearing. These gabbro pieces show the recrystallization of primary Cpx into neoblastic Cpx aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	20		5
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, colorless				30
Amphibole, green	70	10		
Clay minerals		10		30
Epidote/zoisite	n/a	n/a	n/a	40
Oxide	15			n/a
Talc	15	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 80 Domain name: Felsic vein

Microstructure: crystal-plastic Dynamically recrystallised felsic vein containing stretched xenoliths of the gabbro country rock. Both margins of the vein are more sheared/recrystallised than centre of the vein. Plagioclase shows undulose extinction and grainsize reduction, but no deformation twins. Reverse dextral sense of shear on boundary between domains 1 and 3. Observer: MJC

Detailed description This rock comes from a felsic pocket in the core section. It is an undeformed diorite with coarse plagioclase and amphibole grains. Alteration is observed in both phases, associated with oxides.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Olivine:	small isolated, equant, olivine subgrains (0.1mm diameter) are present in the margin of the dike and associated with the gabbro xenoliths.
Plagioclase:	Recrystallised plagioclase with variable grain size. Grainsize is more coarse in centre of vein and reduces towards margin of the vein, varying from a maximum of 3mm in the centre of the vein to 5 microns at the margin of the vein. Plagioclase grains are elongate with serriate boundaries in the centre of the vein and show undulose extinction and incipient subgrain development, but no deformation twins. crystals in the finer grained areas are more equant.
Clinopyroxene:	Gabbro xenoliths within the dike contain cpx and show subgrain (0.3-0.1 mm diameter) development.
Oxide:	small oxide pocket associated with relict cpx from gabbro

Interval domain no: 2 Domain rel. abundance (%): 10 Domain name: less sheared gabbroic margin

Microstructure: submagmatic subgrained deformation twinned plagioclase and pyroxene in relatively sharp contact with the very fine grained margin of the dike. Margin of the dike contains stretched out, recrystallized, patches of cliopyroxene and olivine from the host olivine gabbro. Observer: MJC

Detailed description porphyroclastic rock composed of fine-grained recrystallized plag aggregates and clasts of olivine, cpx and plag. Olivine is partially recrystallized and altered. Cpx is fractured and plagioclase clasts have bent twins.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	Equant olivine relicts (o.1-0.4 mm) in the margin of the gabbro
Plagioclase:	Plagioclase shows a reduction in grainsize towards the contact from 1mm to 0.2mm and less. Grains tend towards being equant, and anhedral tending to polygonal for the smaller grains. The larger grains show kinking, deformation twinning and undulose extinction and incipient sub-grain development.
Clinopyroxene:	Large relict cpx's show subgrain (0.1mm diameter) development. Large cpx shows undulose extinction near to the sheared dike margin

Interval domain no: 3 Domain rel. abundance (%): 10 Domain name: Sheared gabbroic margin

Microstructure: crystal-plastic Observer: MJC

Detailed description Extremely fine grained, with large amphibole (after cpx) porphyroclasts showing extensive recrystallisation and neoblast development. Smaller lenses of recrystallised plagioclase. Long tails of recrystalised olivine and clinpopyroxene within recrystallied fine plagioclase indicate remanants of the gabbro caught with the margins of the dike. Rotating porphyroclasts.

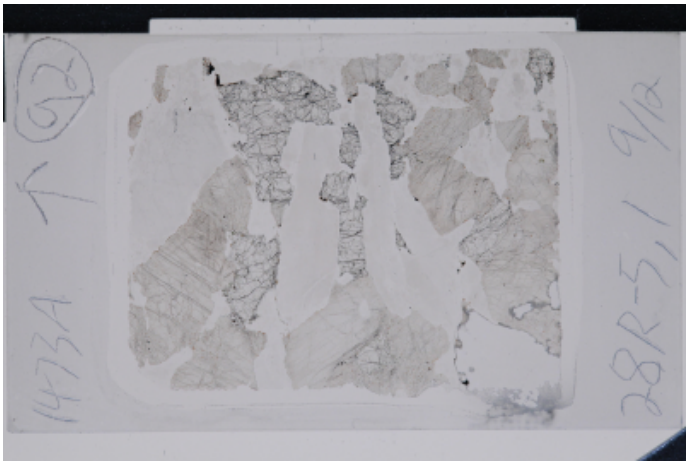
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4

Type	Comment
Olivine:	none observed in the less deformed country rock, but present in the sheared margin, immediately next to the country rock. The olivine is equant and 0.3mm in diameter.
Plagioclase:	Relict, elongate 2mm dia fractured porphyroclasts show deformation twins and undulose extinction. Some grains are elongate and develop subgrains. These sit in zones of totally recrystallised fine grained, 5 micron, diameter plagioclase
Clinopyroxene:	Some relict cpx (up to 2mm dia) porphyroclasts remain. They show tail and subgrain development and fracturing. Many are replaced by amphibole with extensive subgrain (30 microns) development and long tails. The tails provide a reverse dextral sense of shear. Cpx is preserved within the mylonitic foliation at the margin of the dike. Amphibole dramatically replaces the cpx away from the margin.

THIN SECTION LABEL ID: **360-U1473A-28R-5-W 9/12-TSB-TS_92** Piece no.: #01 TS no.: 92

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction and is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture. Opaque minerals are equally composed of ilmenite and sulfides.
Metamorphic petrology:	Overall, the sample is moderately altered. Olivine is partially replaced by serpentine and oxide in a mesh texture, and is usually rimmed by a talc, amphibole and oxide assemblage. Pyroxene is rimmed by brown and green amphibole. Plagioclase is partially replaced by secondary plagioclase and chlorite.
Structure:	Sample has a weak crystal plastic overprint defined by narrow zones of recrystallization and neoblast development along crystal boundaries. Large plagiolase crystals show undulose extinction and deformation twinning and plagioclase neoblasts show a range of grain sizes and also deformation twins. Olivine shows extensive undulose extinction, subgrains and lesser neoblast development. Cpx, shows undulose extinction and less common neoblast development.

Plane-polarized



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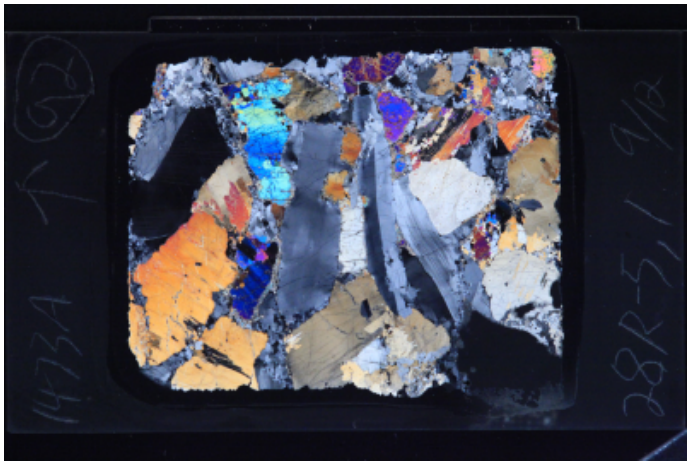
Cross-polarized



33013661

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is partly altered and rimmed by orthopyroxene. The subhedral plagioclase is in a tabular shape and partly recrystallized. It commonly displays undulose extinction. Plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture and is replaced by neoblasts and brown amphiboles. Opaque minerals are equally composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			3.6	anhedral	subequant	moderately altered; overgrowth by orthopyroxene
Plagioclase	40		14	12	subhedral	tabular	undulose extinction
Clinopyroxene	45		18	8	anhedral	subequant	with a consertal intergrowth texture
Amphibole	0.5		0.2	0.05	anhedral	interstitial	associates with clinopyroxene neoblasts or distribute along with exsolution lamallae of clinopyroxene
Opaques	0.1						
Ilmenite	0.05						
Sulfide	0.05						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description The sample is moderately altered with olivine the most altered primary mineral and plagioclase the least. Olivine has the usual mesh type texture associated with serpentine and oxide. Relict olivine is then surrounded by an oxide-rich mixture of talc and colorless amphibole. Some olivine grains are totally altered into this assemblage. Brown and green amphibole were observed in clinopyroxene grains while orthopyroxene, occurring within clinopyroxene grains, are totally altered into pale amphibole. Plagioclase is only slightly altered into secondary plagioclase and chlorite.

Comment type	Comment
Mylonite comments:	Sample is weakly mylonitized. Recrystallized olivine is hard to discern due to the alteration degree. Recrystallized plagioclase and clinopyroxene, however, were observed to form as polygonal aggregates surrounding or in contact with larger grain of similar mineralogy.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	15	100	10
Amphibole, brown	n/a	60	n/a	n/a
Amphibole, colorless	30	40	100	
Chlorite				30
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	50	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: submagmatic Observer: MJC

Detailed description Minor (10%) recrystallization of all phases around margins, due to weak crystal plastic deformation

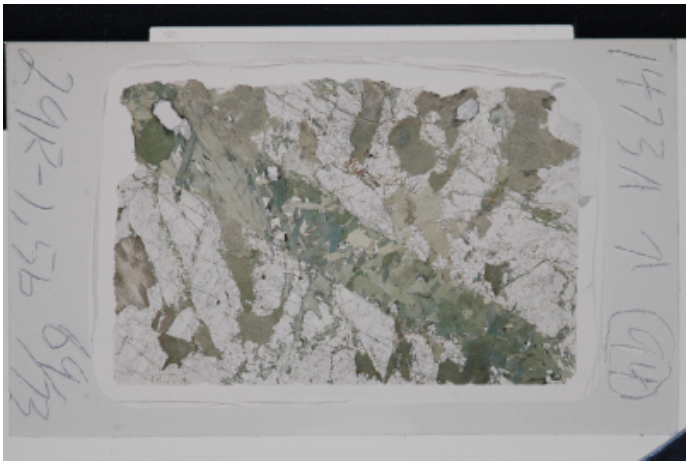
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	absent	n/a
Fault rock intensity:	undeformed	0

Type	Comment
Olivine:	Large olivines all sub-grained and or show undulose extinction, Some with polygonal neoblasts (100 microns and less) at crystal endz. Neoblasts are anhedral, and equant, with smooth/polygonal grain boundaries.
Plagioclase:	Large porphyoclasts show deformation twins and undulose extinction with clear evidence for bending and shearing of the crystals. Neoblasts developed locally, and in narrow, discrete zones along grain boundaries. Neoblasts show deformation twins and varying grainsizes to <20 microns. Grain boundaries of larger neoblasts are serriate; smaller neoblasts are polygonal. some larger plagioclase subgrains are fractured.
Clinopyroxene:	Large cpx's show weak undulose extinction, some neoblast development in narrow shear bands, with grainsizes of <20 microns. Neoblasts are anhedral and equant with straight grain boundaries. Larger neoblasts have more complicated grain boundaries.
Oxide:	two small pools

THIN SECTION LABEL ID: **360-U1473A-29R-1-W 32/36-TSB-TS_93** Piece no.: #03 TS no.: 93

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing gabbro with an ophitic texture. Tabular plagioclase is partly enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture. Opaque minerals consist of ilmenite and sulfides.
Metamorphic petrology:	Moderately altered rock. Dominant alteration minerals are talc after olivine, brown amphibole after clinopyroxene, and fracture-filling chlorite in plagioclase grains.
Structure:	Weakly deformed, isotropic olivine gabbro with partly recrystallized porphyroclasts

Plane-polarized



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Cross-polarized

33059131

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: ophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine-bearing gabbro with an ophitic texture. Olivine is moderately altered. Tabular plagioclase commonly shows undulose extinction and is partly enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture, and contains brown amphibole blebs and plagioclase inclusions. It is also rimmed by brown amphibole. Opaque minerals consist of ilmenite and sulfides, with an intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			4	anhedral	subequant	partly altered
Plagioclase	45		10	5	anhedral	tabular	undulose extinction
Clinopyroxene	52		10	6	anhedral	subequant	with a consertal intergrowth texture
Amphibole	0.3		0.2	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Olivine is replaced by talc at rims and by talc, serpentine or clay minerals along fractures. Clinopyroxene has patches of secondary clinopyroxene, and fringes and blebs of brown amphibole. Plagioclase fractures filled with chlorite and a minor amount of actinolite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	15		5
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless	5	5		10
Amphibole, green		10		
Chlorite				40
Clay minerals	15			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	3	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Sulfide	2	1		n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

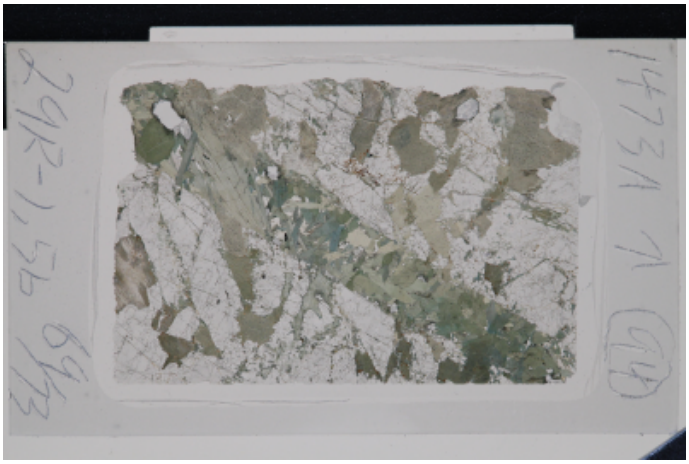
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts, fine neoblasts Grain shape: anhedral Grain boundary: altered Undulose extinction: regular Texture: porphyroclasts locally recrystallized at grain boundaries together with cpx forming aggregates
Plagioclase:	Grain size: coarse to fine; neoblasts recrystallized Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinning: tapered Undulose extinction: regular Texture: porphyroclasts with local neoblasts; sometimes including cpx
Clinopyroxene:	Grain size: coarse porphyroclasts to fine neoblasts Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: rare Texture: porphyroclasts include plagioclase and olivine; grain boundaries with aggregates of neoblasts
Oxide:	interstitial with recrystallized cpx and olivine

THIN SECTION LABEL ID: **360-U1473A-29R-1-W 69/73-TSB-TS_94** Piece no.: #05 TS no.: 94

Group	Summary
Igneous petrology:	A medium-grained gabbro crosscut by an amphibole vein. The gabbro displays a subophitic texture. Plagioclase is in a tabular shape and displays undulose extinction. Clinopyroxene is completely replaced by green amphibole. The amphibole vein mainly consists of subhedral amphibole.
Metamorphic petrology:	The thin section is entirely crosscut by a major vein that mostly consists of green Hbl and minor Pl. Cpx from the host gabbro is almost completely replaced by green Amp. The rock overall shows substantial alteration.
Structure:	This rock consists of an undeformed gabbro crosscut by an amphibole vein. The vein is mostly composed of hornblende and minor plagioclase. In the host rock, deformation microstructures are limited to tapered twins and fractures in plagioclase. Minor ecrystallization of plagioclase may be observed in the contacts of the vein with the host rock

Plane-polarized



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Cross-polarized

33059131

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: This domain is the gabbro with a subophitic texture. Plagioclase is in a tabular shape and partly recrystallized. It displays undulose extinction. Clinopyroxene is completely replaced by green amphibole and occasionally contains brown amphibole blebs.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	75		6	4	anhedral	tabular	undulose extinction
Clinopyroxene	25		7	4	anhedral	subequant	completely replaced by green amphibole and occasionally by brown amphibole

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **amphibole vein** Observer: CL

Texture: granular Ave. grain size:

Detailed description: The amphibole vein mainly consists of tabular amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Amphibole	100		9.6	3	anhedral	tabular	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): RT

Detailed description The thin section is entirely crosscut by a major vein that mostly consists of green Hbl and minor Pl. The latter is extensively replaced by Chl and minor pale-green Amp. Cpx from the host gabbro is almost completely replaced by green Amp. Primary Pl is substantially altered into green Amp, secondary Pl and chlorite, mostly along micro-fractures. Pl also includes micro-veins filled with clay minerals. The rock overall shows substantial alteration.

Comment type	Comment
Alteration general comments:	The rock shows a substantial alteration.
Vein 1 minerals:	The section is crosscut by a major vein that mostly consists of green Hbl and minor Pl. The latter is extensively replaced by Chl and minor pale-green Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		90		30
Amphibole, green		100		45
Chlorite				15
Clay minerals				10
Plagioclase, sec.	n/a	n/a	n/a	30
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description This rock consists of an undeformed gabbro crosscut by an amphibole vein. The vein is mostly composed of hornblende and minor plagioclase. In the host rock, deformation microstructures are limited to tapered twins and fractures in plagioclase. Minor ecrystallization of plagioclase may be observed in the contacts of the vein with the host rock

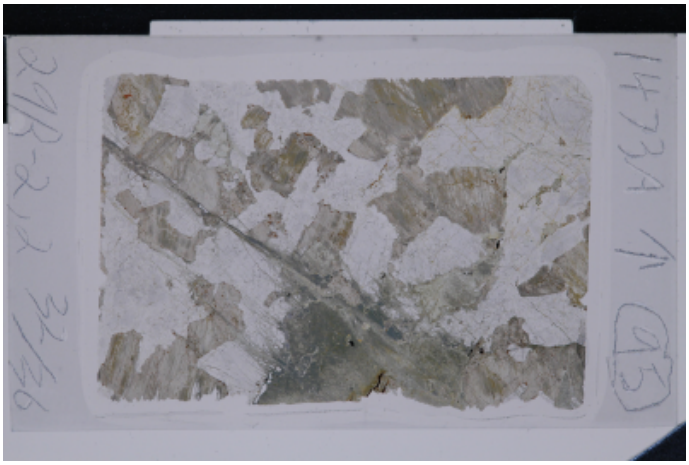
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight boundaries texture: coarse grains with bent twins and crosscut by fractures.
Clinopyroxene:	size: medium to fine grained shape: anhedral boundaries: curved fractures: rarely observed texture: mostly recrystallized to amphibole
Oxide:	band/pod geometry: local in occurrence, observed as thin bands associated with green amphibole
Vein:	a coarse grained green amphibole (hornblende) vein crosscut the rock. The vein is mostly formed by large subhedral crystals of hornblende and fine-grained plagioclase.

THIN SECTION LABEL ID: **360-U1473A-29R-2-W 32/36-TSB-TS_95** Piece no.: #02 TS no.: 95

Group	Summary
Igneous petrology:	A medium-grained gabbro with a subophitic texture. Plagioclase is partly enclosed within clinopyroxene. Clinopyroxene is heavily altered and displays a consertal intergrowth texture. Small amount of ilmenite are present.
Metamorphic petrology:	The sample is substantially altered, especially those mineral grains close to a dominantly chlorite vein. Some plagioclase grains are completely altered into chlorite, pale green amphibole and clay.
Structure:	Partly recrystallized plagioclase along grain boundaries and metamorphic vein cross-cutting thin section.

Plane-polarized



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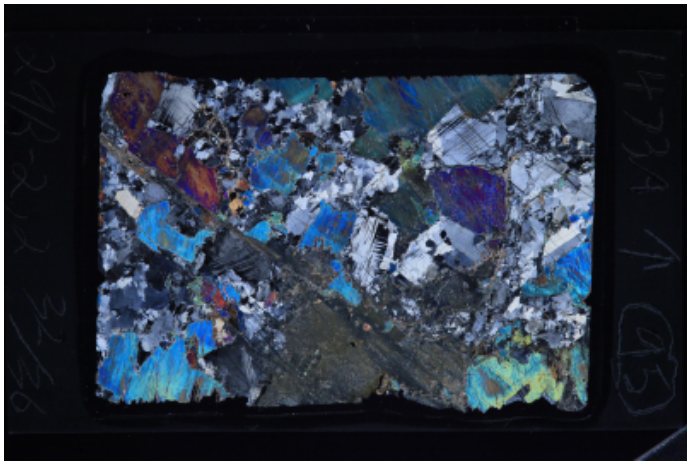
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a subophitic texture. Plagioclase is in a subequant shape and partly recrystallized. It is partly enclosed within clinopyroxene. Clinopyroxene is heavily altered and displays a consertal intergrowth texture. It contains brown amphibole blebs and also rimmed by brown amphibole. Small amount of ilmenite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		4.4	4	anhedral	subequant	undulose extinction
Clinopyroxene	45		8	4	anhedral	subequant	heavily recrystallized
Amphibole	0.4		0.6	0.1	anhedral	interstitial	occurs at the rim of clinopyroxene or as blebs in clinopyroxene
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): JL

Detailed description The sample consist of a chlorite-tremolite vein and an altered host gabbro. Minerals surrounding the vein are heavily altered. Some plagioclase grains are totally altered into a mixture of chlorite and tremolite and a tremolite rim.

Comment type	Comment
Vein 1 minerals:	Vein is originally composed of tremolite and chlorite. Chlorite exhibit subparallel fibrous habit in smaller vein and chondrule-like fibrous habit (akin to polyhedral serpentine in serpentinites) in larger veins. This vein is later overprinted by clays.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		30		50
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		40		20
Chlorite				50
Clay minerals		10		30
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: metamorphic Observer: OP

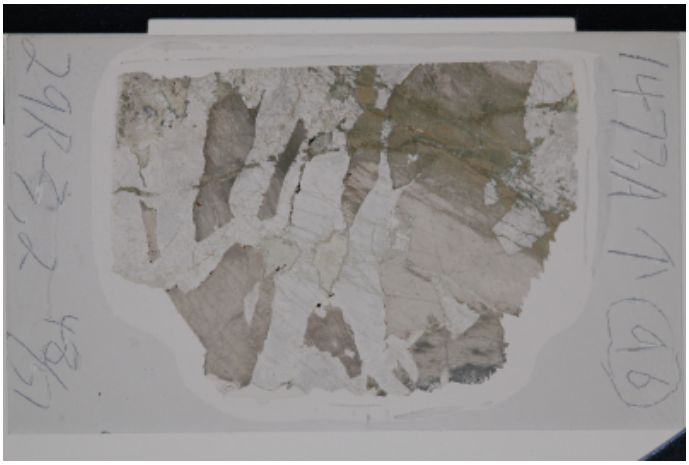
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	partial	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size porphyroclast: medium Grain size neoblasts: medium to fine Grain shape porphyroclast: subhedral Grain shape neoblasts: anhedral Grain boundary porphyroclast: curved to straight Grain boundary neoblasts: straight Twinning porphyroclast: tapered Twinning neoblasts: tappered Undulose extinction porphyroclast: regular and common; irregular to patchy extinction Undulose extinction neoblasts: regular and common Texture: porphyroclasts with neoblasts along grain boundaries and fractures; plagioclase grains are commonly fractured with alteration products along them
Clinopyroxene:	Grain size: coarse porphyroclastic Grain shape: subhedral to anhedral Grain boundary: curved to irregular Undulose extinction: common Texture : porphyroclasts partially to fully altered; alteration progresses along cleavage planes and fractures; some grains show undulose extinction with signs of crystal bending.
Oxide:	Present, but minor. Near mafic phases.
Vein:	Metamorphic vein: planar, branched into small veins, polycrystalline, clear cut with wall rock

THIN SECTION LABEL ID: **360-U1473A-29R-3-W 48/51-TSB-TS_96** Piece no.: #02 TS no.: 96

Group	Summary
Igneous petrology:	A coarse-grained gabbro with a subophitic texture. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture. Small amount of opaque minerals are present.
Metamorphic petrology:	The section is crosscut by some amphibole veins mostly consisting of brown to green Amp. When the Amp vein crosscuts the Pl, the vein is also locally filled with secondary Pl. The sample overall shows a substantial static alteration. Cpx is extensively altered into brown to green Amp near the amphibole veins. Pl is moderately altered, mostly along micro-veins consisting of Chl and minor pale-green Amp.
Structure:	Weakly deformed coarse grained, cpx poikilitic gabbro. Original plagioclase crystals are completely recrystallised in some areas of the thin section and elsewhere recystallisation occurs along the margins of grains. Both large (original primacrysts) and smaller grains show undulose extinction, kinking and deformation twiining. Even chadocrysts within the cpx show deformation twinning. Neoblast and subgrain development is common. Large Cpx crystals locally show neoblast development and kinking. Both plagoioclase and cpx shows fracturing, with observable offsets.. Cpx is partly replaced by amphibole concurrently with fracturing.

Plane-polarized



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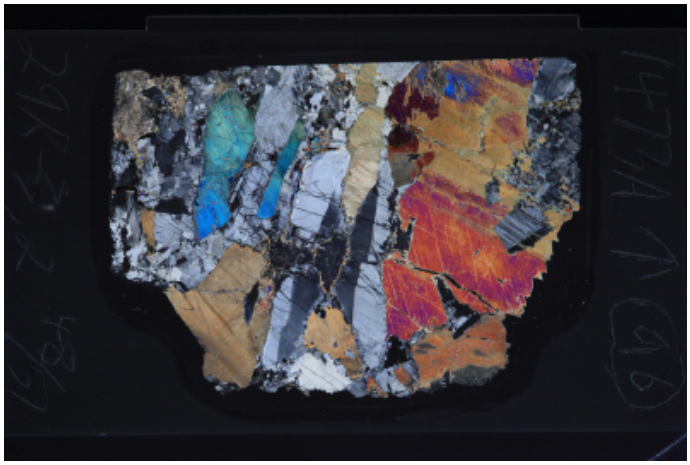
Cross-polarized



33035641

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained gabbro with a subophitic texture. Plagioclase is partly recrystallized and shows undulose extinction. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture. It is partly recrystallized and the neoblasts associate with brown amphibole. Small amount of opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		12	7	subhedral	tabular	undulose extinction
Clinopyroxene	45		18	10	anhedral	subequant	moderately altered
Amphibole	0.1		0.2	0.1	anhedral	interstitial	associates with clinopyroxene neoblasts
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): RT

Detailed description The section is crosscut by some amphibole veins mostly consisting of brown to green Amp; brown Amp is locally rimmed by green Amp. When the Amp vein crosscuts the Pl, the vein is also locally filled with secondary Pl. The sample overall shows a substantial static alteration. Cpx is extensively altered into brown to green Amp near the amphibole veins. Far from the Amp veins, Cpx is only slightly altered into green Amp; this alteration typically occurs along Cpx rims. Pl is moderately altered, mostly along micro-veins consisting of Chl and minor pale-green Amp.

Comment type	Comment
Alteration general comments:	The sample overall shows a substantial static alteration.
Mylonite comments:	Primary Pl and Cpx are locally recrystallized.
Vein 1 minerals:	The section is crosscut by some amphibole veins mostly consisting of brown to green Amp; brown Amp is locally rimmed by green Amp. When the Amp vein crosscuts the Pl, the vein is also locally filled with secondary Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50		25
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, colorless				15
Amphibole, green		20		
Chlorite				70
Plagioclase, sec.	n/a	n/a	n/a	15
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: MJC

Detailed description The rock is a weakly deformed coarse grained, cpx poikilitic gabbro. Original plagioclase crystals seem to be completely recrystallised in some areas of the thin section and recystallisation also occurs along the margins of grains. Both large (original primacrysts) and smaller grains show undulose extinction, kinking and deformation twiining. Even chadacrysts within the cpx show deformation twinning. Subgrain development is common. Large Cpx crystals locally show neoblast development and kinking. Both plagoioclase and cpx shows fracturing, with observable offsets.. Cpx is partly replaced by amphibole concurrently with fracturing.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	inequigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a
Fault rock intensity:	minor fracturing	1

Type	Comment
Plagioclase:	Plagioclase shows a wide range of grain sizes (down to 10 microns) and shapes, depending on the location and extent of recrystallisation. Large to smaller grains show kinking, undulose extinction and twinning. Large grains show subgrain development. The smallest grains are equant and tend towards being polygonal. Late, mostly dextral-reverse fractures, cut the large plagioclase crystals.
Clinopyroxene:	Large poikilitic cpx's show slight kinking and and undulose extinction. Minor neoblast development occurs at grain margins (grain size approximately 80 microns).

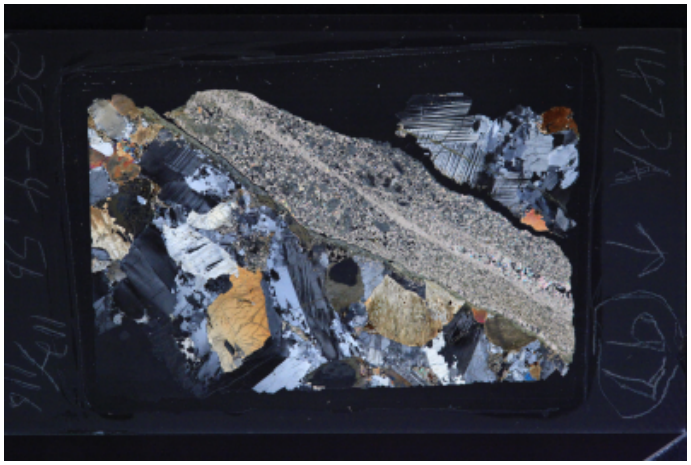
THIN SECTION LABEL ID: **360-U1473A-29R-4-W 112/116-TSB-TS_97** Piece no.: #05 TS no.: 97

Group	Summary
Igneous petrology:	A medium-grained gabbro with a subophitic texture crosscut by a carbonate vein. Plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture. A few brown amphibole and opaque minerals are present.
Metamorphic petrology:	Altered olivine gabbro intruded by a carbonate vein. Olivine is completely replaced by talc and clay. The center of the vein is made up mostly of carbonates, the intermediate and bulk part of aggregates of clay-chlorite mixture surrounded by carbonates and edged by the same clay-chlorite mixture with a subparallel fibrous habit.
Structure:	Cataclastic carbonate fault vein with rounded chlorite agglomerates in gabbro.

Plane-polarized

33035561

Cross-polarized



33035581

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro crosscut by a carbonate vein. The gabbro displays a subophitic texture. Plagioclase is partly or fully enclosed within clinopyroxene. It commonly shows undulose extinction. Clinopyroxene is heavily altered and occasionally displays a consertal intergrowth texture. A few brown amphibole and opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		8	4	anhedral	tabular	undulose extinction
Clinopyroxene	40		4.4	3.6	anhedral	subequant	with plagioclase inclusions

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): JL

Detailed description The host rock is substantially altered with olivine being completely replaced by clay and talc. Clinopyroxene and plagioclase are only moderately altered, The sample also consist of a 1 cm wide carbonate vein with circular enclosure of clay-chlorite mixtures. The edge of the carbonate vein is also made up of this clay-chlorite mixture in a subparallel fibrous habit.

Comment type	Comment
Vein 1 minerals:	A relatively large vein (~1 cm) composed of mostly carbonates and round aggregates of clay and/or chlorite. Towards the center, the vein is composed of purely carbonate crystals, some are relatively large grains of carbonates. The round aggregates are likely clays as observed by its yellowish tinge in PPL. The individual crystals seems to have a fibrous habit that resembles that of chlorite. This materials could be a clay-chlorite mixture. The vein contains mineral grains (mostly altered clinopyroxene) that probably came from the wallrock. At the edge of the carbonate vein is a yellowish vein made up of low birefringence mineral with a fibrous habit that could be composed of the same clay-chlorite mixture that make up the round aggregates in the larger carbonate vein.
Vein 2 minerals:	A smaller vein was observed cross cutting mineral grains subparallel to the larger carbonate vein. This vein is also made up of the same yellowish, fibrous mineral observed at the edge of the larger carbonate vein (chlorite-clay mixture). At the center of this vein are reddish clays. This vein is likely a branch of the larger vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	30		20
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		30		
Chlorite				20
Clay minerals	55	60		10
Clinopyroxene, sec.	n/a	5	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Sulfide	5			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: porphyroclasts: coarse. neoblasts: medium to fine. Grain shape: porphyroclasts: subhedral to anhedral. neoblasts: anhedral Grain boundary: porphyroclasts: curved to irregular. neoblasts: straight to irregular. Twinning: tapered, mostly in porphyroclasts. Undulose extinction: straight to irregular in porhyroclasts Texture: coarse grained, subhedral to anhedral, partly elongated porphyroclasts with tapered twinning.
Clinopyroxene:	Grain size: coarse Grain shape: subhedral Grain boundary: straight to irregular Subgrains: rare with irregular to curved boundaries Texture: alteration along grain boundaries and fractures, porhyroclasts include plagioclase grains.

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

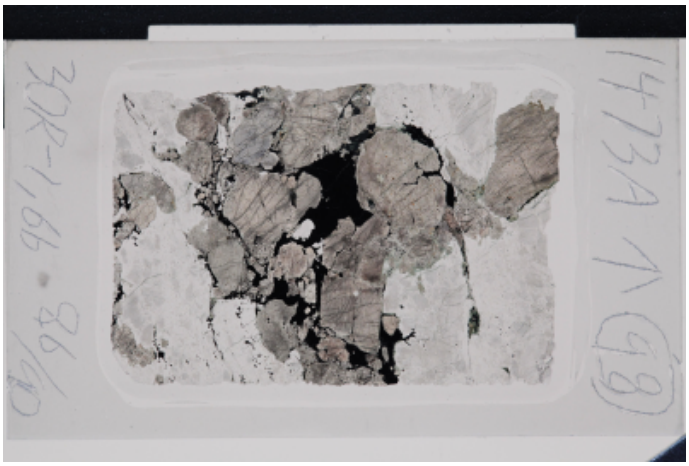
Microstructure: fault rock Observer: OP

Type	Comment
Vein:	cataclastic carbonate fault vein with rounded chlorite agglomerates and fine-grained central zone; clear cut boundaries with wall rock; in some cases irregular alteration fronts penetrate the wall rock plagioclase;

THIN SECTION LABEL ID: **360-U1473A-30R-1-W 86/90-TSB-TS_98** Piece no.: #06 TS no.: 98

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved.
Metamorphic petrology:	The alteration intensity of this thin section is substantial. Clay minerals occurred in all the primary minerals.
Structure:	Oxide-rich pyroxene ban bounded by ultramylonites in contact with porphyroclastic crystal plastic fabrics.

Plane-polarized



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Cross-polarized

33035541

IGNEOUS PETROLOGY

Lithology: **oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is partly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and altered. Opaque minerals are commonly interstitial among clinopyroxene. Brown amphibole commonly occurs as blebs in clinopyroxene. Opaque minerals are predominated by ilmenite, with minor sulfides. Intergrowth between ilmenite and sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	50		8	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	45		8	4.5	anhedral	subequant	partly recrystallized
Amphibole	0.1		0.2	0.1	anhedral	interstitial	
Opaques	5						
Ilmenite	4.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Cpx mainly altered into pale color amphibole with some brown amphibole. Opx were mostly replaced by talc. Pl were the most heavily altered primary minerals and alomst relaced by secondary plagioclase. Clay minerals occured in all the primary minerals.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		25	20	50
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		75	10	
Chlorite			5	15
Clay minerals		15	10	5
Plagioclase, sec.	n/a	n/a	n/a	80
Talc		n/a	75	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Oxide-rich pyroxene ban bounded by ultramylonites in contact with porphyroclastic crystal plastic fabrics. The ultramylonites are defined by very fine grained recrystallized plagioclase that has a reverse sense of shear. The oxide and pyroxene-rich band has limited recrystallization with neoblasts of pyroxene surrounded by oxides.

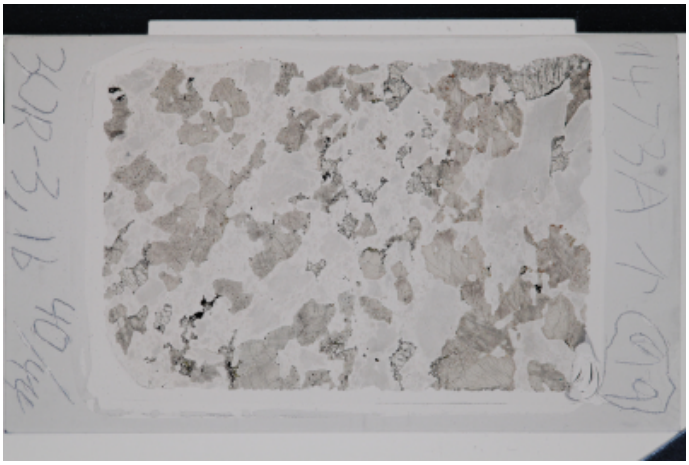
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fault sense of shear:	reverse-dextral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: 0.5-2 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: straight. Undulose extinction: complete. Texture: Equigranular porphyroclasts with limited recrystallization.
Plagioclase:	Grain size: porphyroclasts: 1-6 mm. neoblasts: 0.0025-0.15 mm. Grain shape: anhedral to equigranular. Grain boundary: polygonal to serrate. Twinning: albite and tapered. Undulose extinction: complete. limited in smaller neoblasts. Texture: Very fine grained zones in contact with pyroxene-rich zone. Some larger porphyroclasts present near pyroxene. Some plagioclase aggregates are polygonal. Asymmetric porphyroclasts define shear sense.
Clinopyroxene:	Grain size: porphyroclasts: 1.5-6 mm. neoblasts: 0.025-0.2 mm. Grain shape: subhedral. Grain boundary: curved to straight. Texture: porphyroclastic with limited recrystallization. There is a band that is pryoxene-rich surrounded by oxides.
Oxide:	Oxide pods surround pyroxene porphyroclasts and some neoblasts. The oxide bands do not define the foliation.

THIN SECTION LABEL ID: **360-U1473A-30R-3-W 40/44-TSB-TS_99** Piece no.: #01 TS no.: 99

Group	Summary
Igneous petrology:	A medium-grained olivine. Primary magmatic texture is not preserved. Olivine is partly altered and rimmed by orthopyroxene. Plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfides.
Metamorphic petrology:	Static alteration intensity is moderate. Dominat alteration phases are talc after olivine and amphibole after clinopyroxene.
Structure:	moderately deformed olivine gabbro with porphyroclasts and local recrystallization

Plane-polarized



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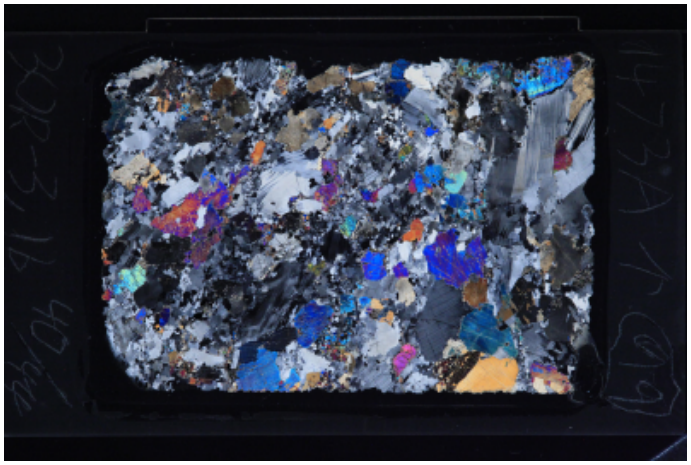
Cross-polarized



33035461

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a granular to porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is partly altered and rimmed by orthopyroxene. Plagioclase is partly recrystallized and displays undulose extinction. It is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture. It is partly recrystallized and the neoblasts commonly associate with brown amphibole. Opaque minerals are composed of ilmenite and sulfides. Intergrowth between ilmenite and sulfides can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2.5	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	70		6.4	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	25		5	4	anhedral	poikilitic	with consertal intergrowth texture
Amphibole	0.1		0.1	0.05	anhedral	interstitial	associates with clinopyroxene neoblasts
Opaques	0.4						
Ilmenite	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): TN

Detailed description Olivine is replaced by talc at rims, and talc and clay in fractures; clinopyroxene by secondary clinopyroxene patches, brown amphibole blebs, and green/pale amphibole rims. A trace amount of orthopyroxene is replaced by talc and clay. Plagioclase fractures are filled with chlorite and a minor amount of actinolite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	30	10	10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		5		18
Amphibole, green		10		2
Clay minerals	35	2	50	
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	4	2		n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Sulfide	1	1		n/a
Talc	60	n/a	50	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

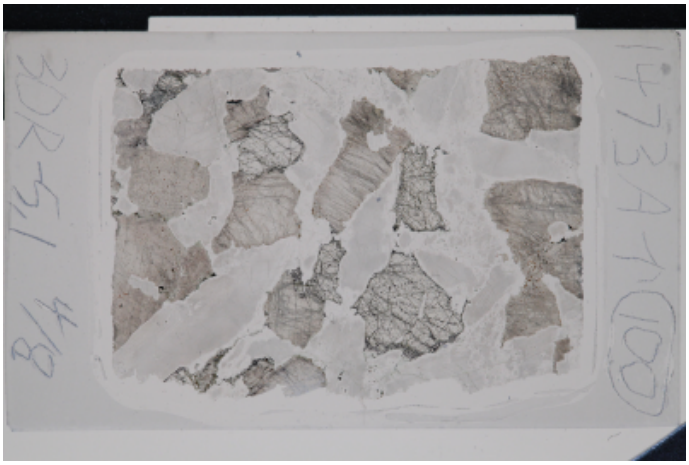
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts; medium neoblasts Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: fractured; partly altered; rarely recrystallized
Plagioclase:	Grain size: coarse porphyroclasts and medium to fine neoblasts Grain shape: subhedral porphyroclasts and anhedral neoblasts Grain boundary: straight to curved Twinning: tapered Undulose extinction: irregular Texture: porphyroclasts with neoblasts
Clinopyroxene:	Grain size: coarse porphyroclasts and medium neoblasts Grain shape: anhedral Grain boundary: straight to curved Texture: porphyroclasts with neoblasts; neoblasts form aggregates with olivine at porphyroclast grain boundaries
Oxide:	rare, interstitial

THIN SECTION LABEL ID: **360-U1473A-30R-5-W 4/8-TSB-TS_100** Piece no.: #01 TS no.: 100

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is partly recrystallized and also partly or fully enclosed within clinopyroxene. Opaque minerals consist of ilmenite and sulfides.
Metamorphic petrology:	The background static alteration is slight and confined to Ol and Cpx.
Structure:	Coarse grained olivine gabbro with porphyroclasts with recrystallized neoblasts.

Plane-polarized



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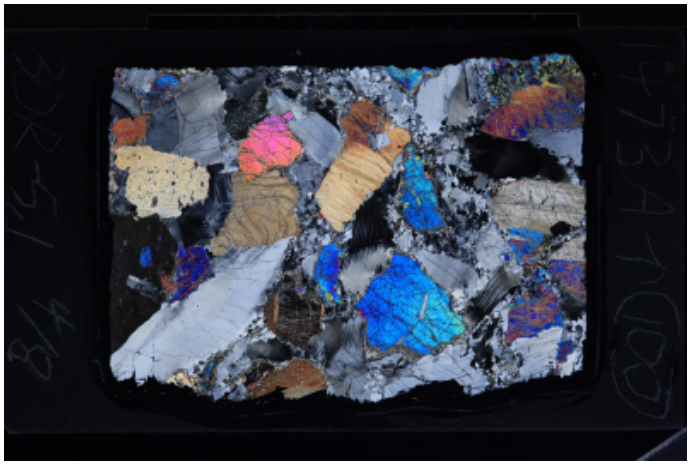
Cross-polarized



33035421

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is partly altered and rimmed by orthopyroxene. Plagioclase is in a tabular to subequant shape. It is partly recrystallized and the porphyroclasts shows undulose extinction. It is also partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and the neoblasts commonly associate with brown amphibole. Opaque minerals consist of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		16	5	anhedral	tabular	undulose extinction
Clinopyroxene	30		10	8	anhedral	subequant	with consertal intergrowth texture
Amphibole	0.1		0.1	0.05	anhedral	interstitial	
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description The background static alteration is slight and confined to Ol and Cpx. Ol is locally partially replaced by aggregates made up of talc and oxides. At the contact with Pl, these pseudomorphs are in places rimmed by a thin rim of chlorite. The outer portions of the Cpx are in places altered into secondary Cpx including parallel Pl lamellae and red-brown Amp blebs. At the contact with Pl, Cpx is in places rimmed by a thin corona made up of pale-green Amp and oxide phase towards and Cpx, and by Chl towards the Pl. The rock also locally shows a dynamic recrystallization of Pl and Cpx; the Cpx neoblasts are typically associated with minor amounts of red-brown Amp.

Comment type	Comment
Alteration general comments:	The background static alteration is slight and confined to Ol and Cpx.
Mylonite comments:	The rock shows a partial recrystallization of Pl and Cpx. The Cpx neoblasts are associated with minor amounts of red-brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	10		
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		30		
Chlorite	10	15		
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	30	5		n/a
Talc	60	n/a		n/a
Other		5		
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Olivine:	Grain size: porphyroclast coarse and rare fine neoblast; Grain shape: anhedral; Grain boundary: staright to curved and altered; Undulose extinction: complete; Subgrains: straight; Texture: porphyroclast with neoblast at grain boundaries
Plagioclase:	Grain size: porphyroclast coarse and fine to medium neoblast; Grain shape: anhedral; Grain boundary: staright to irregular; Undulose extinction: irregular; Twinning: tapered; Texture: porphyroclastic with recrystallized neoblast including olivine
Clinopyroxene:	Grain size: porphyroclast coarse and rare fine neoblast; Grain shape: subhedral to anhedral; Grain boundary: staright to curved; Undulose extinction: irregular; Texture: fractured, porphyroclast with neoblast at grain boundaries.
Oxide:	rare interstitial

THIN SECTION LABEL ID: **360-U1473A-30R-5-W 27/31-TSB-TS_101** Piece no.: #02 TS no.: 101

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro with a granular texture. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction. Clinopyroxene displays a conerstal intergrowth texture and contains plagioclase inclusions.
Metamorphic petrology:	Sample is a moderately altered olivine gabbro where olivine is highly altered into a talc-tremolite-oxide assemblage. Small chlorite veins cross cut several grains.
Structure:	Olivine gabbro with strongly recrystallized plagioclase and partly recrystallized clinopyroxene.

Plane-polarized

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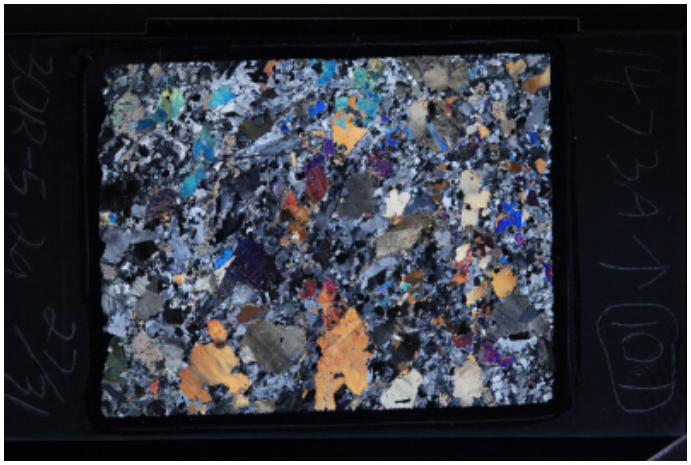
Cross-polarized



33035381

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine-bearing gabbro with a granular texture. Olivine is partly altered and rimmed by orthopyroxene. Plagioclase is commonly recrystallized and occasionally elongated. It displays undulose extinction. Clinopyroxene displays a conerstal intergrowth texture and contains plagioclase inclusions. It has been partly recrystallized and the neoblasts associate with brown amphibole. Small amount of opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			2.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		2.8	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	38		6.4	2	anhedral	subequant	with a consertal intergrowth texture
Amphibole	0.5		0.3	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): JL

Detailed description Sample is a moderately altered olivine gabbro. Olivine is mostly altered into tremolite, talc and oxides. Clinopyroxene and plagioclase were replaced by mosty 2nd clinopyroxene and 2nd plagioclase, respectively. Chlorite veins were detected.

Comment type	Comment
Vein 1 minerals:	Several chlorite vein were observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	30		15
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	30	30		
Chlorite	20			30
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	45	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: fault rock Observer: OP

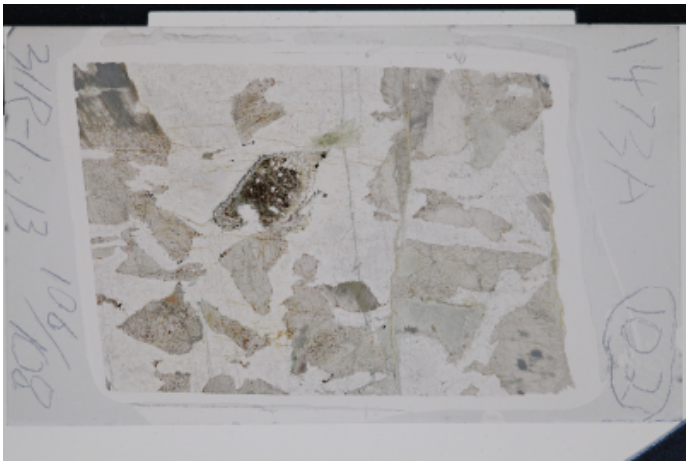
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: porphyroclast medium to coarse and rare fine neoblast; Grain shape: anhedral; Grain boundary: staright to curved and altered; Undulose extinction: straight; Subgrains: straight; Texture: porphyroclast with rare neoblast forming aggregates with clinopyroxene
Plagioclase:	Grain size: porphyroclast coarse and medium to fine neoblast; Grain shape: anhedral; Grain boundary: staright to curved; Undulose extinction: irregular; Twinning: tapered; Texture: mainly recrystallized neoblast
Clinopyroxene:	Grain size: porphyroclast coarse and medium neoblast; Grain shape: anhedral; Grain boundary: staright to curved; Undulose extinction: irregular; Texture: fractured porphyroclasts locally recrystallized
Oxide:	related to alteration of olivine

THIN SECTION LABEL ID: **360-U1473A-31R-1-W 106/108-TSB-TS_102** Piece no.: #13 TS no.: 102

Group	Summary
Igneous petrology:	An olivine-bearing gabbro. Primary magmatic texture is not preserved. Olivine is completely altered. Plagioclase displays undulose extinction. Clinopyroxene is moderately recrystallized and the neoblasts commonly associate with brown amphibole. It occasionally displays a consertal intergrowth texture. Small amount of opaque minerals are present.
Metamorphic petrology:	The alteration intensity of this thin section is extensive. Carbonate developed as pseudomorph of olivine and plagioclase.
Structure:	Deformed olivine gabbro with recrystallized plagioclase and strongly deformed clinopyroxene as well as highly altered olivine.

Plane-polarized



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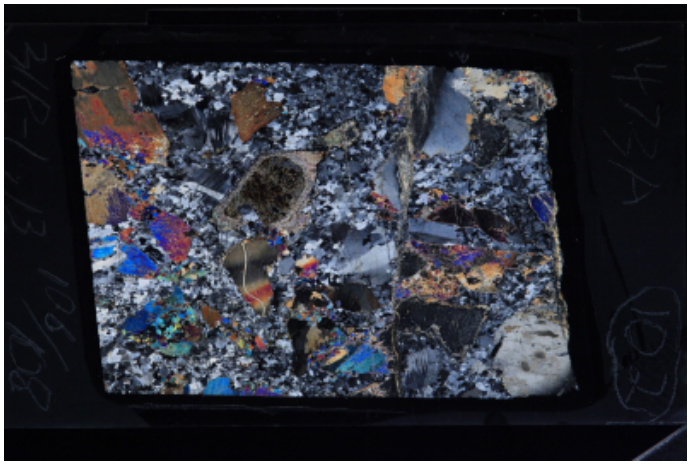
Cross-polarized



33035341

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine-bearing gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is completely altered. Plagioclase is strongly recrystallized and displays undulose extinction. Clinopyroxene is moderately recrystallized and the neoblasts commonly associate with brown amphibole. It occasionally displays a consertal intergrowth texture. A fold texture can be seen in some clinopyroxene porphyroclasts. Small amount of opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			6	anhedral	subequant	completely altered
Plagioclase	60		4.4	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	37		6	4	anhedral	subequant	with a consertal intergrowth texture
Amphibole	0.4		0.3	0.1	anhedral	interstitial	occurs at the rim of clinopyroxene or associates with clinopyroxene neoblasts
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 65 Observer(s): QM

Detailed description The alteration intensity of this thin section is extensive. Ol alteration included several stages. It developed typical mesh texture. The mesh rim probably consisted of serpentine, talc and green clay. The mesh core were replaced by pseudomorphic serpentine, dark red clay and carbonate. It also developed corona with talc, oxide clay and pale color amphibole mixture. Cpx altered into pale color amphibole, brown amphibole, chlorite and secondary clinopyroxene. Pl mainly altered into secondary plagioclase. Pseudomorphic chlorite and calcite with tremolite occurring along the rim and in the center.

Comment type	Comment
Vein 1 minerals:	The vein was composed of pale color amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	30		80
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless	5	70		
Carbonate	5	n/a	n/a	n/a
Chlorite		10		25
Clay minerals	35			7
Clinopyroxene, sec.	n/a	5	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	65
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: porphyroclast coarse and medium to fine neoblast; Grain shape: subhedral porphyroclast and anhedral neoblast; Grain boundary: straight to curved and altered; Texture: altered with rather fresh neoblast
Plagioclase:	Grain size: porphyroclast coarse and medium to fine neoblast; Grain shape: anhedral; Grain boundary: curved; Undulose extinction: irregular; Twinning: tapered; Texture: rare porphyroclast with neoblasts
Clinopyroxene:	Grain size: porphyroclast coarse and medium to fine neoblast; Grain shape: anhedral; Grain boundary: serrated; Undulose extinction: regular; Texture: partially altered deformed with local neoblast
Oxide:	interstitial between neoblast aggregates
Vein:	straight single policrystalline vein cross-cutting thin section.

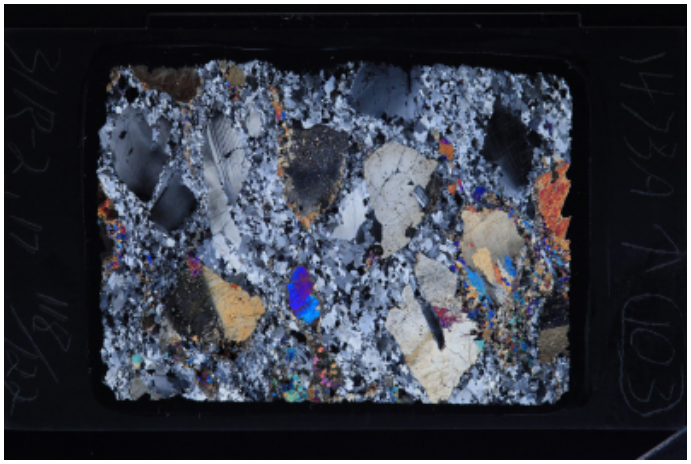
THIN SECTION LABEL ID: **360-U1473A-31R-2-W 118/122-TSB-TS_103** Piece no.: #17 TS no.: 103

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro. Primary magmatic texture is not preserved, but it could be subophitic or ophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Total static alteration intensity is moderate. Dominant alteration minerals are talc after olivine, amphiboles after clinopyroxene and chlorite filling fractures of plagioclase.
Structure:	this is a coarse grained rock with strong recrystallization of plagioclase into fine-grained aggregates. Cpx and olivine are observed as porphyroclasts immersed in the matrix. The degree of alteration in the Fe-Mg silicates is partial.

Plane-polarized

33035281

Cross-polarized



33035301

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine-bearing gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved, but it could be subophitic or ophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene. Olivine is partly altered and rimmed by orthopyroxene. Plagioclase is partly recrystallized and commonly displays undulose extinction. Deformation twins can be seen in big plagioclase grains. Clinopyroxene is moderately altered and rimmed by brown amphibole. It is partly recrystallized and the porphyroclast occasionally displays a consertal intergrowth texture. Opaque minerals consist of ilmenite and sulfides, with an intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	70		5	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	27		8	5	anhedral	subequant	partly recrystallized
Amphibole	0.5		0.4	0.1	anhedral	interstitial	occurs at the rim of clinopyroxene or as blebs in clinopyroxene
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Olivine is replaced by talc and clay at rims and along fractures. Clinopyroxene is replaced by patches of secondary clinopyroxene, by patches and blebs of brown amphibole, by fringes of green amphibole, and by brown clay along cleavage surfaces. Plagioclase ha fractures filled with chlorite and a small amount of actinolite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	20		10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		10		10
Amphibole, green		20		
Carbonate	5	n/a	n/a	n/a
Chlorite				50
Clay minerals	40	5		
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	40
Sulfide	1	1		n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description this is a coarse grained rock with strong recrystallization of plagioclase into fine-grained aggregates. Cpx and olivine are observed as porphyroclasts immersed in the matrix. The degree of alteration in the Fe-Mg silicates is partial.

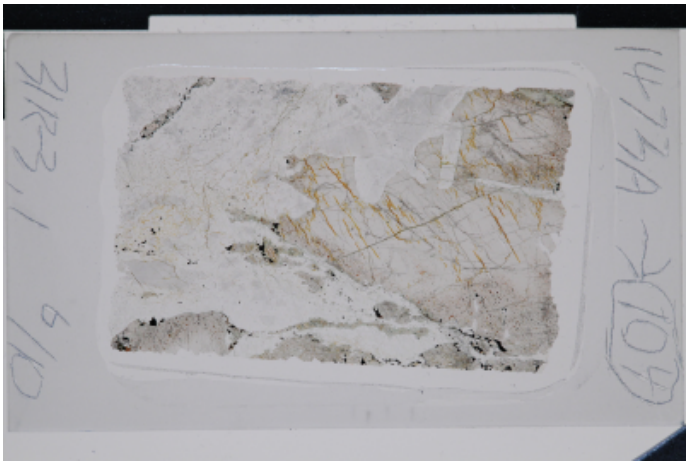
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries (locally observed) texture: porphyroclasts partially altered and recrystallized.
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: curved to straight twinning: tapered undulose extinction: irregular subgrains: curved to straight texture: fine grained recrystallized aggregates and coarse porphyroclasts.
Clinopyroxene:	size:coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: partially altered clasts showing bent of the cleavage.
Oxide:	band/pod geometry: thin bands commonly associated with alteration of olivine and locally cpx.

THIN SECTION LABEL ID: **360-U1473A-31R-3-W 6/10-TSB-TS_104** Piece no.: #01 TS no.: 104

Group	Summary
Igneous petrology:	A disseminated oxide gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved, but it could be subophitic, as tabular plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	The sample shows to have been involved in a ductile deformation event. Pl is extensively recrystallized and Cpx is locally ricrystallized into an aggregate made up of neoblastic Cpx and minor red-brown Amp. The background static alteration is moderate.
Structure:	Strongly deformed with porphyroclastic foliation defined by elongated plagioclase neoblasts and aggregates of clinopyroxene recrystallized. Porphyroclasts are clinopyroxene and rare plagioclase. The porphyroclastic structure is cutted by a gently dipping mylonite.

Plane-polarized



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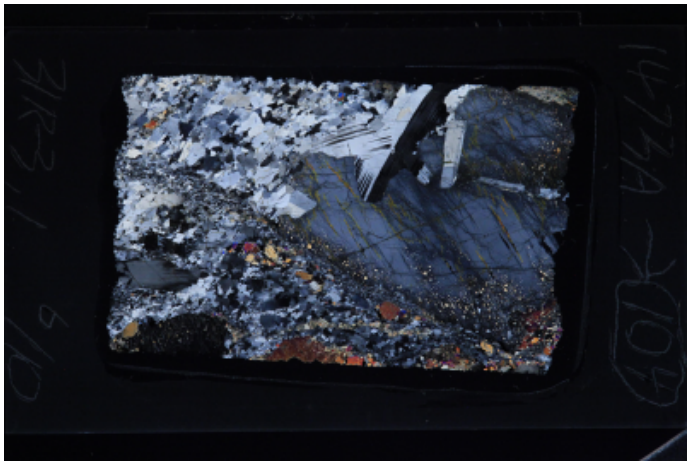
Cross-polarized



33035261

IGNEOUS PETROLOGY

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A disseminated oxide gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved, but it could be subophitic, as tabular plagioclase is partly enclosed within clinopyroxene. Plagioclase is recrystallized and displays undulose extinction. Deformation twins can be seen in big plagioclase grains. Several brown amphibole veinlets occur in the big clinopyroxene grain. Opaque minerals mainly consist of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		10	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	39		20	1	anhedral	subequant	
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	1						
Ilmenite	0.9						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): RT

Detailed description The sample shows to have been involved in a ductile deformation event. Pl is extensively recrystallized and Cpx is locally ricrystallized into an aggregate made up of neoblastic Cpx and minor red-brown Amp. The rock also includes thin shear bands characterized by fine-grained Pl neoblasts. The Cpx porphyroclasts involved in these shear bands show extensive Opx exsolution associated with formation of red-brown Amp blebs. The sample shows a moderate static alteration. Cpx is locally rimmed by pale-green Amp and include micro-veins filled with clay. Opx is substantially altered into pale-green amhibole and, towards the contacts with Pl, chlorite. Pl is only slightly altered, along micro-veins filled with chlorite or clay.

Comment type	Comment
Alteration general comments:	The sample shows a moderate alteration.
Mylonite comments:	The sample shows to have been involved in a ductile deformation event. Pl is extensively recrystallized and Cpx is locally ricrystallized into an aggregate made up of neoblastic Cpx and minor red-brown Amp. The rock also includes thin shear bands characterized by fine-grained Pl neoblasts. The Cpx porphyroclasts involved in these shear bands show extensive Opx exsolution associated with formation of red-brown Amp blebs.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		10	50	5
Amphibole, colorless		50	90	
Chlorite			10	
Clay minerals		50		
Subtotals replaced		100	100	

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: euhedral Grain boundary: straight Twinning: tapered Undulose extinction: weak Texture: coarse chadacrysts included in cpx weakly deformed
Clinopyroxene:	Grain size: coarse Grain shape: poikilitic Grain boundary: straight Texture: coarse poikilitic single grain including plg

Interval domain no: 2 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: anhedral Grain boundary: curved to straight Twinning: tapered Undulose extinction: irregular Texture: rare porphyroclasts mainly recrystallized. Recrystallization occur as medium to coarse neoblasts in the bottom part of the section, and as medium to fine in the upper part, the two are separated by mylonitic shear zone
Clinopyroxene:	Grain size: coarse porphyroclast and medium to fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: porphyroclastic partially recrystallized at grain boundary and in aggregates
Oxide:	interstitial between neoblasts

Interval domain no: 3 Domain rel. abundance (%): 10 Domain name: microfabric

Microstructure: crystal-plastic gently depping shear zone cut the porphyroclastic gabbro Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	unknown	n/a

Type	Comment
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: irregular Texture: very fine completely recrystallized

THIN SECTION LABEL ID: **360-U1473A-32R-2-W 85/89-TSB-TS_105** Piece no.: #03 TS no.: 105

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro. Primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture. Very few opaque minerals are present.
Metamorphic petrology:	Sample is moderately altered. Olivine is mostly altered into rimming talc, oxide and pale amphibole. Cpx is partially replaced by mostly 2nd Cpx. Plagioclase is only slightly altered into mostly 2nd plagioclase.
Structure:	Spectacular recrystallisation and semi-brittle deformation in an olivine gabbro. Plagioclase and olivine are extensively recrystallised (40% of the thin section) and show subgrain development, kink bands, deformation twins and undulose extinction. Localized, discrete shear band runs through the thin section. Clinopyroxene shows some subgrain development and minor kinking.

Plane-polarized

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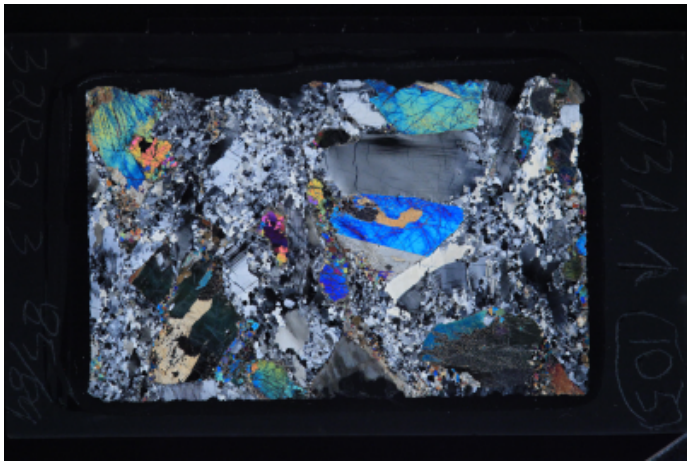
Cross-polarized



33035221

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine-bearing gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene and commonly altered. Plagioclase is recrystallized and displays undulose extinction. Deformation twins can be seen in big plagioclase grains. Clinopyroxene is partly recrystallized and commonly displays a consertal intergrowth texture. It contains plagioclase inclusions. Brown amphibole commonly associates with clinopyroxene neoblasts. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			2.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	70		11	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	27		8.4	6.4	anhedral	subequant	with consertal intergrowth texture
Amphibole	0.2		0.2	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Overall, the sample is only moderately altered. Olivine has the most pronounced alteration, often totally altered into talc + tremolite in many grains surrounded by plagioclase, Most of the olivine grains are rimmed by a talc + oxide mixture, often occurring whenever olivine is bounded by plagioclase. Cpx is moderately altered into mostly secondary Cpx while plagioclase is slightly replaced by 2nd plagioclase. The grains are deformed with the formation of several polygonal aggregates of olivine, Cpx, brown amphibole (in close association with Cpx porphyroclasts) and plagioclase.

Comment type	Comment
Mylonite comments:	Deformed, but does not have a clear mylonitic foliation. Neoblastic grains of olivine, plagioclase, Cpx and brown amphibole were observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	15		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	30	10		
Chlorite				30
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: MJC

Detailed description Spectacular recrystallisation and semi-brittle deformation in an olivine gabbro. Plagioclase and olivine are extensively recrystallised (40% of the thin section) and shows subgrain development, kink bands, deformation twins and undulose extinction. Localized, discrete shear band runs through the thin section. Clinopyroxene shows some subgrain development.

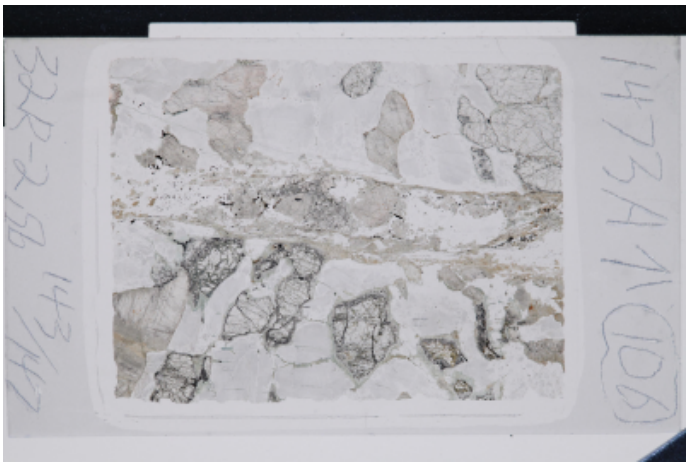
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Olivine has recrystallized and developed neoblasts (0.5mm to 20 microns) especially where it is streched out within the discrete shear zone (remains fresh). Elsewhere the olivine shows subgrains. Neoblasts are equant, and polygonal to anhedral in shape.
Plagioclase:	Extensive recrystallisation of plagioclase especially along a 1-2 mm wide shear band that crosses the section. Relict, large, plagioclase primocrysts show kink band development, undulose extinction, deformation twins and subgrains. Neoblasts are mostly equant (down to 50 microns diameter), polygonal; even the smallest grains show some deformation twining. Some medium sized neoblasts (0.3 mm) show extensive deformation twinning. No significant fracturing.
Clinopyroxene:	Large cpx's show some gentle bending and undulose extinction and neoblast development near to the shear zone and at grain ends (grain size 60 micron). Neoblasts are equant and sub-polygonal. Limited fracturing.
Oxide:	no oxides

THIN SECTION LABEL ID: **360-U1473A-32R-2-W 143/147-TSB-TS_106** Piece no.: #05 TS no.: 106

Group	Summary
Igneous petrology:	There are two domains. Domain 1 is an olivine gabbro with a granular texture. Domain 2 is a mylonitic disseminated oxide gabbro. Its primary magmatic texture is not preserved.
Metamorphic petrology:	The alteration intensity of this thin section is moderate. Ol developed typical corona texture. Clay minerals more or less presented in all the primary minerals.
Structure:	Two sub-parallel mylonite zones with recrystallized matrix block in between.

Plane-polarized



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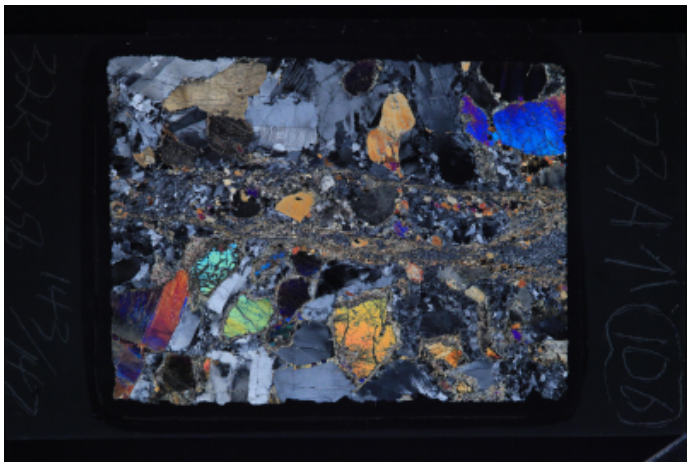
Cross-polarized



33035181

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 80 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is an olivine gabbro with a granular texture. Olivine is commonly rimmed by amphibole and opaque minerals. Plagioclase displays undulose extinction and is weakly recrystallized. Clinopyroxene is strongly replaced by green or brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	25			2.4	anhedral	subequant	moderately altered
Plagioclase	55		8	4	anhedral	elongate	undulose extinction
Clinopyroxene	20		7	4	anhedral	subequant	heavily altered

Interval domain no: **2** Domain rel. abundance (%): 20 Domain name: lithology domain 2 minor

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: This domain is a mylonitic disseminated oxide gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is completely recrystallized and foliated. Clinopyroxene is partly recrystallized and elongated along the foliation. Opaque minerals are mainly consist of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		0.5	0.05	anhedral	equant	undulose extinction
Clinopyroxene	39		0.6	0.05	anhedral	elongate	completely replaced by green amphibole
Opaques	1						
Ilmenite	0.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol developed typical corona texture. The corona mainly consist of green amphibole and pale color amphibole. The relative fresh Ol core developed classical mesh texture which consist of serpentine, clay and oxides. Cpx mainly altered into pale color amphibole with some brown amphibole. Pl were mostly replaced by secondary plagioclase with minor chlorite occurring in the cleavage. Clay minerals more or less presented in all the primary minerals.

Comment type	Comment
Mylonite comments:	Mylonitic band characterized by recrystallization of Cpx and Pl into polygonal aggregates in the center. Along the boundary of mylonitic band, there are pale color amphibole neoblasts occurring. The Cpx neoblasts were associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	20		25
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	10	70		
Amphibole, green	30			
Chlorite				7
Clay minerals	5	10		3
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium to coarse grained; Grain shape: subhedral; Grain boundary: curved and in some cases serrated; Undulose extinction: straight; Texture: partly altered along fractures
Plagioclase:	Grain size: coarse; Grain shape: subhedral to anhedral; Grain boundary: irregular to curved; Undulose extinction: irregular; Twinning: tapered twinning; Texture: coarse-grained porphyroclasts with some medium-grained neoblasts encompassing the porhyroclasts
Clinopyroxene:	Grain size: coarse grained; Grain shape: subhedral; Grain boundary: straight to curved; Fractures: fracture network throughout grains; Texture: fully altered
Oxide:	oxides along olivine grain boundaries

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: microfabric

Microstructure: crystal-plastic

two sub-parallel mylonite zones with fine grained plagioclase; block in between the two mylonite zone consists of medium-grained, recrystallized plagioclase and three coarser grained orthopyroxene grains

Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	dextral	n/a

Type	Comment
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: irregular to curved Undulose extinction: common, irregular
Oxide:	oxides follow amphibole layer within shear zone

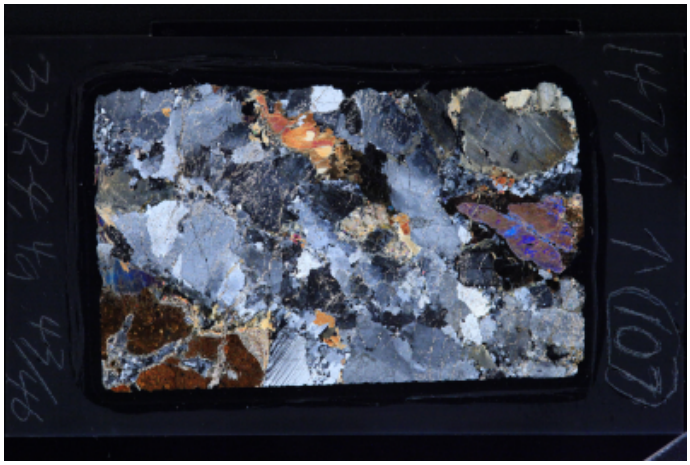
THIN SECTION LABEL ID: **360-U1473A-32R-4-W 43/46-TSB-TS_107** Piece no.: #04 TS no.: 107

Group	Summary
Igneous petrology:	Therefore are two domains. Domain 1 is a highly altered olivine gabbro with a granular texture. Domains 2 is a diorite vein with a granular texture.
Metamorphic petrology:	The thin section shows an about 1 cm thick felsic vein within an Ol-gabbro. The felisc vein mostly consists of plagioclase locally showing ehedral to subhedral morphology. At the contact with the felsic vein, Cpx from the host Ol-gabbro is rimmed by brown Amp, locally associated with zircon. The rock shows a substantial alteration. Olivine is mostly altered into clay minerals. In rare cases, Ol is rimmed by aggregates made up of pale-green Amp and minor biotite. Pl alteration frequently includes the development of calcite.
Structure:	Thin section contains an 1cm wide felsic vein which is part of a 5cm wide vein in the core that includes xenoliths of the surrounding coarse grained olivine gabbro. The olivine gabbro has narrow zones of extensively recrystallized plagioclase surrounding large, clinopyroxenes and iddingsitized olivines. The felsic/anorthositic vein is weakly deformed with the large felspars showing undulose extinction and subgrain formation. Some neoblasts are developed at grain margins. One xenolith contains a large cpx crystal which has now been replaced by amphibole and subsequently deformed to produce amphibole neoblasts (not an amphibole vein).

Plane-polarized

33059071

Cross-polarized



33059091

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: This is domains is a highly altered olivine gabbro with a granular texture. Olivine is completely altered. Plagioclase is partly recrystallized and displays undulose extinction. Clinopyroxene close to the vein is pervasively replaced by brown amphibole. Exsolution lamallae are still preserved in clinopyroxene away from the vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			4			completely altered and original shape is not preserved
Plagioclase	60		8	5	anhedral	subequant	partly recrystallized
Clinopyroxene	30		10	8	anhedral	subequant	completely replaced by amphibole

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: vein

Lithology: **diorite** Observer:

Texture: Ave. grain size:

Detailed description: This domain is a diorite vein displays a granular texture. It is predominated by subequant plagioclase, with minor amphibole. Plagioclase occasionally shows a oscillatory zoning and undulose extinction. Several zircons are present with amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		6	5			undulose extinction
Amphibole	10		1.2	0.2	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 55 Observer(s): RT

Detailed description The thin section shows an about 1 cm thick felsic vein within an Ol-gabbro. The felisc vein mostly consists of plagioclase locally showing ehedral to subhedral morphology. At the contact with the felsic vein, Cpx from the host Ol-gabbro is rimmed by brown Amp, locally associated with zircon. The rock shows a substantial alteration. Olivine is mostly altered into clay minerals. Other olivine alteration products are: (i) talc and oxide phase, and (ii) pale-green Amp and Chl, with Chl localized towards primary Pl. In rare cases, Ol is rimmed by aggregates made up of pale-green Amp and minor biotite. Pl alteration frequently includes the development of calcite. The thin section includes many micro-veins made up of pale-green Amp or calcite. In particular, the calcite veins locally crosscut the clay olivine pseudomorphs.

Comment type	Comment
Alteration general comments:	The rock shows a substantial alteration.
Vein 1 minerals:	The thin section shows an about 1 cm thick felsic vein within an Ol-gabbro. The felisc vein mostly consists of plagioclase locally showing ehedral to subhedral morphoogy. At the contact with the felsic vein, Cpx from the host Ol-gabbro is rimmed by brown Amp, locally associated with zircon.
Vein 2 minerals:	The thin section includes many micro-veins made up of pale-green Amp or calcite. In particular, the calcite veins locally crosscut the clay olivine pseudomorphs.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	30		50
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	10			30
Amphibole, green		20		
Chlorite	5			
Clay minerals	70	30		20
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Talc	10	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 40 Domain name: Olivine Gabbro

Microstructure: submagmatic Observer: MJC

Detailed description Thin section records an ~ 1cm wide felsic vein which is part of a 5cm wide vein in the core with xenoliths of the surrounding coarse grained olivine gabbro. The olivine gabbro has narrow zones of extensively recrystallized plagioclase surrounding large, iddingsitized olivines and clinopyroxene. The felsic/anorthositic vein is weakly deformed with the large felspars showing undulose extinction and subgrain formation. Some neoblasts are developed at grain margins. One xenolith contains a large cpx crystal which has now been replaced by amphibole and subsequently deformed to produce amphibole neoblasts. The margin of the vein is marked by a thin (1mm wide) zone of recrystalized plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a
Fault rock intensity:	minor fracturing	1

Type	Comment
Olivine:	Large highly iddingsitized olives, but apparently with very little deformation.
Plagioclase:	Apart from one large (5mm) plagioclase which shows deformation twins and late fracturing, most plagioclase occurs in re creastallized seams between the olivine and pyroxene. Plagioclase in the deformation seams, shows undulose extinction, some deformation twins, and incipient subgrain development. Neoblasts are equant with irregular grain boundaries. Grain size is 100 microns and less.
Clinopyroxene:	Only a little deformation. One grain shows slight bending and others show weak undulose extiinction. Pyroxenes are altered/overgrown to/by amphibole around the vein margin, and pyroxene in xenolith in the centre of this part of the vein is partially replaced by amphibole and shows subgrain development (subgrain grain size dia. >60 microns)

Interval domain no: 2 Domain rel. abundance (%): 60 Domain name: Felsic Vein

Microstructure: magmatic Observer: MJC

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	inequigranular	n/a
Intensity of dynamic recrystallization:	partial	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	absent	n/a

Type	Comment
Plagioclase:	Large (>5mm dia) plagioclase, show undulose extinction and incipient sub-grain development and very little deformation twinning (albite?). The vein contains areas of grain size reduction, producing clusters/patchs of smaller grains ranging from the mm scale in diameter to the 50 micron scale. Zones of late fracturing associated with local sharp bending of the plagioclase are also present. Neoblasts tend towards being equant and polygonal.

THIN SECTION LABEL ID: **360-U1473A-32R-5-W 131/136-TSB-TS_108** Piece no.: #11 TS no.: 108

Group	Summary
Igneous petrology:	A foliated olivine gabbro. Primary magmatic texture is not preserved. The foliation is defined by the preferred orientation of both plagioclase and clinopyroxene.
Metamorphic petrology:	Static background alteration intensity is substantial. Dominant alteration minerals are amphiboles, talc and brown clay. Near the felsic vein, biotite occurs coexisting with a lot of small (<0.05 mm) equant grains of an unidentified phase.
Structure:	Mylonitic shear zone with a discorant, weakly deformed plagioclase-rich patch.

Plane-polarized

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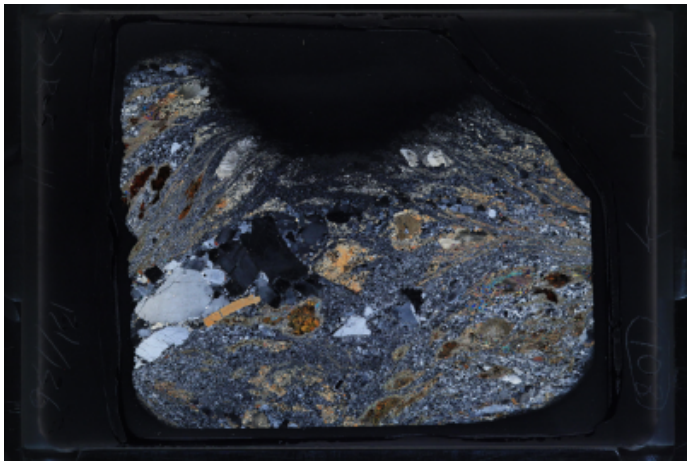
Cross-polarized



33045881

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: A foliated olivine gabbro. Primary magmatic texture is not preserved. The foliation is defined by the preferred orientation of both plagioclase and clinopyroxene. Olivine is completely altered. Plagioclase is strongly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and completely replaced by green amphibole. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5						completely altered and original shape is not preserved
Plagioclase	55		6	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	40		6	2.8	anhedral	elongate	partly recrystallized

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Olivine is completely replaced by pseudomophic aggregates of actinolie, talc, reddish brown clay and/or carbonate. Many grains of clinopyroxene is pseudomorphically by amphiboles. Plagioclase is replaced by secondary plagioclase and has fractures filled with chlorite and amphibole. Near the felsic vein, there are biotite and an unidentified mineral, which has an equant shape with a diameter <0.05 mm, and coexists with biotite; low birefringence and high relief looks like orthopyroxene.

Comment type	Comment
Vein 1 minerals:	Pl+Qz+Amp+Bt

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		50
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	15	30		
Amphibole, green	10	40		
Carbonate	2	n/a	n/a	n/a
Chlorite				10
Clay minerals	40			
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	2			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Sulfide	1			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 95 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Mylonitic shear zone with a weakly deformed plagioclase-rich patch. The olivine is in elongate recrystallized aggregates parallel to the foliation. The plagioclase is almost completely recrystallized. The foliation is irregular and could be folded. The plagioclase-rich patch is discordant with the foliation.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4

Type	Comment
Olivine:	Grain size: porphyroclasts: ~1.5 mm. neoblasts: ~0.15 mm. Grain shape: elongate, anhedral. Grain boundary: curved, altered. Undulose extinction: irregular, altered. Texture: aggregrates of olivine that form elongate bands parallel to the foliation. altered.
Plagioclase:	Grain size: porphyroclasts: ~2 mm. neoblasts: 0.01-0.3 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered. Undulose extinction: irregular in all grain sizes. Texture: Strongly to completely recrystallized in elongate bands that are parallel to the foliation. Folded.
Clinopyroxene:	Grain size: porphyroclasts: ~3.6 mm. neoblasts: ~0.15 mm Grain shape: subhorizontal. Grain boundary: curved. Texture: porphyroclasts with tails of recrystallized grains parallel to the foliation.

Interval domain no: 2 Domain rel. abundance (%): 5 Domain name: microfabric

Microstructure: submagmatic Observer: JD

Detailed description Mylonitic shear zone with a weakly deformed plagioclase-rich patch. The olivine is in elongate recrystallized aggregates parallel to the foliation. The plagioclase is almost completely recrystallized. The foliation is irregular and could be folded. The plagioclase-rich patch is discordant with the foliation.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Plagioclase:	Grain size: porphyroclasts: 1.5-10 mm. neoblasts: ~0.075. Grain shape: subhedral. Grain boundary: straight to irregular. Twinning: tapered. Undulose extinction: patchy. Texture: Weakly deformed zone of plagioclase with very few neoblasts.

THIN SECTION LABEL ID: **360-U1473A-32R-6-W 38/43-TSB-TS_109** Piece no.: #03 TS no.: 109

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro intruded by a dike. The olivine gabbro displays a subophitic texture and the amphibolite dike shows a granoblastic texture.
Metamorphic petrology:	The gabbro intruded by the basalt is slightly altered. Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene and oxide. Rims of relictic plag phenocrysts were integrated into the granoblastic matrix.
Structure:	This is a contact between coarse grained gabbro and a fine grained diabase. The gabbro is weakly deformed, with recrystallized polygonal plagioclase aggregates and fractures being the main deformation microstructures. The fine-grained diabase is mainly composed of recrystallized plagioclase and both brown and green amphibole.

Plane-polarized

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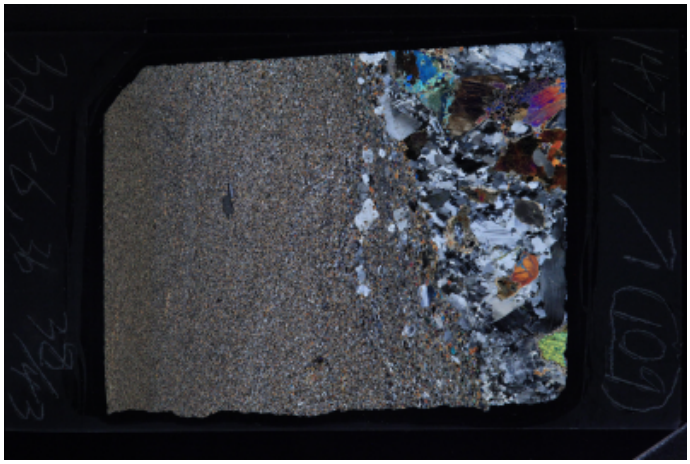
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 30 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: This domain is an olivine gabbro with a subophitic texture. Olivine is partly altered and clinopyroxene is partly recrystallized. Plagioclase at the boundary is recrystallized. It displays undulose extinction and partly enclosed within clinopyroxene. Clinopyroxene is partly recystallized and the porphyroclasts show a consertal intergrowth texture. Brown amphibole commonly associates with the clinopyroxene neoblasts. Small amount of ilmenite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			2.8	anhedral	subequant	partly altered
Plagioclase	70		5.6	2.4	anhedral	subequant	
Clinopyroxene	20		4.8	2.4	anhedral	subequant	partly recrystallized

Interval domain no: **2** Domain rel. abundance (%): 70 Domain name: vein

Lithology: **granoblastic amphibolite** Observer: CL

Texture: granoblastic Ave. grain size: fine grained [345]

Detailed description: This domain is the amphibolite dike with a granoblastic texture. The dike is composed of plagioclase and amphibole, which are well equilibrated. In the boundary, the dike is mylonitized and contain abundant zircons.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		0.4	0.1			
Amphibole	45		0.2	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 35 Domain name: olivine gabbro

Total rock alteration estimate (%): 15 Observer(s): JK

Detailed description The gabbro intruded by the basalt is slightly altered. Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene and oxide. Rims of relictic plag phenocrysts were integrated into the granoblastic matrix.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the basalt is slightly altered
Mylonite comments:	the contact is characterized by an evolved composition and was sheared at high temperatures producing augenlike plagioclases
Cataclasite comments:	cataclastic effects after the high temperature shearing
Vein 1 minerals:	chlorite
Vein 2 minerals:	clay
Vein 3 minerals:	amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	30		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, green	20	30		
Carbonate	20	n/a	n/a	n/a
Chlorite	5			10
Clay minerals	20			10
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10	10		n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 65 Domain name: granoblastic basalt

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene and oxide. Rims of relictic plag phenocrysts were integrated into the granoblastic matrix.
Vein 1 minerals:	amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		100		95
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, green		10		
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name:

Microstructure: crystal-plastic Observer: GV

Detailed description

This is a contact between coarse grained gabbro and a fine grained diabase. The gabbro is weakly deformed, with recrystallized polygonal plagioclase aggregates and fractures being the main deformation microstructures. Cpx is altered to brown and green amphibole. Close to the contact, a fine-grained foliation is observed, characterized by a recrystallized zone of fine-grained plagioclase and green amphibole. Plagioclase medium grains have sigmoidal shapes and might be locally coarse grained forming porphyroclasts. The fine-grained diabase is mainly composed of recrystallized plagioclase and both brown and green amphibole. Close to the contact with the gabbro, brown amphibole dominates; further away from the boundary zone with the gabbro, green amphibole is the common phase alongside plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: partially altered, observed as porphyroclasts in contact with plagioclase.
Plagioclase:	size: coarse to medium (recrystallized) shape: anhedral boundaries: straight twinning: mostly tapered, magmatic locally preserved undulose extinction: irregular subgrains: curved boundaries texture: coarse grains with bent twins and medium grained aggregates in a polygonal texture.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: locally observed in clasts texture: coarse porphyroclasts altered to brown and green amphibole
Oxide:	band/pod geometry: minor pods as alteration products in cpx.

Interval domain no: 2 Domain rel. abundance (%): Domain name:

Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Plagioclase:	size: fine grained recrystallized shape: anhedral boundaries: curved to straight twinning: tapered, locally observed undulose extinction: irregular subgrains: curved boundaries texture: fine recrystallized grains defining a foliation

THIN SECTION LABEL ID: **360-U1473A-33R-1-W 3/7-TSB-TS_110** Piece no.: #01 TS no.: 110

Group	Summary
Igneous petrology:	A slightly deformed olivine-gabbro. Primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene and brown amphibole. Plagioclase is commonly recrystallized and the big grains show deformed twins. Clinopyroxene occasionally displays a consertal texture and contain brown amphibole belbs.
Metamorphic petrology:	Static alteration total intensity is moderate. Olivine is mainly replaced by talc and clay minerals; clinopyroxene by amphiboles; plagioclase by secondary plagioclase, chlorite and amphibole.
Structure:	Deformed olivine gabbro with coarse grained olivine, pyroxene, plagioclase porphyroclasts and recrystallized neoblasts.

Plane-polarized

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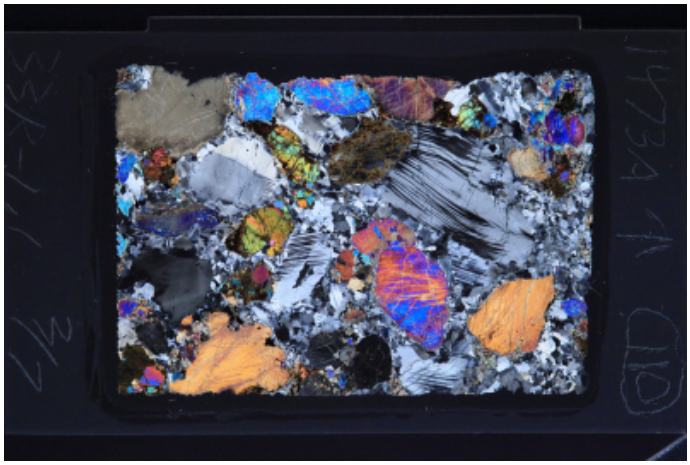
Cross-polarized



33045731

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: AS

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: A slightly deformed olivine-gabbro. Primary magmatic texture is not preserved. Olivine is partly altered and rimmed by orthopyroxene and brown amphibole. Plagioclase is commonly recrystallized and the big grains show deformed twins. Clinopyroxene occasionally displays a consertal texture and contain brown amphibole belbs. Oxides and sulfides are commonly associated with amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			5	subhedral	subequant	locally recrystallized
Plagioclase	60		12	8	subhedral	subequant	undulose extinction
Clinopyroxene	23		12	8	subhedral	equant	partly recrystallized
Orthopyroxene	1			0.8	subhedral	equant	deformed
Amphibole	0.2		0.08	0.05	anhedral	interstitial	rims around Cpx or blabes within Cpx. Commonly associated with Ox
Opaques	1						
Sulfide	0.2						
Oxide	0.8		0.8	0.2	subhedral	interstitial	included in Cpx or Ol. Textural equilibrium with neoblasts

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Olivine is replaced by talc at rims and along fractures, by reddish brown clay patchily and along fracture fillings. Clinopyroxene is replaced by secondary clinopyroxene patches, by brown amphibole patches and blebs, by green/colorless amphibole fringes, by brown clay along cleavage surfaces, and by talc at rims locally. Plagioclase has fractures filled with chlorite and green amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	10		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	5	20		
Amphibole, green		25		30
Chlorite				20
Clay minerals	60	5		
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Sulfide	1	1		n/a
Talc	30	n/a		n/a
Other		5		
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

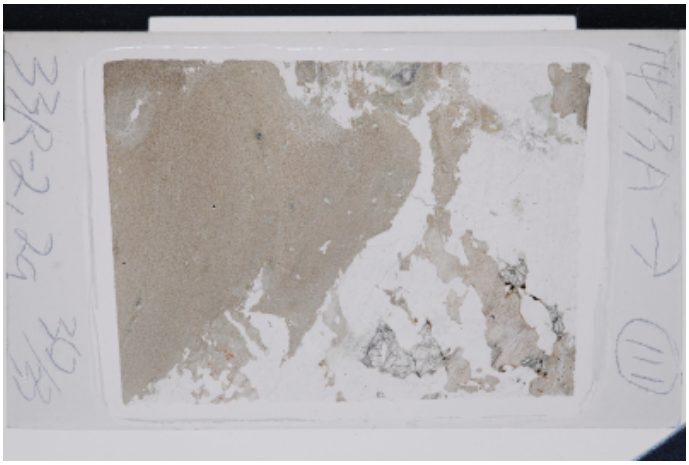
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse-porphyroclasts, rare medium-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to curved, altered; Undulose extinction: straight, regular; Texture: partly altered and fractured porphyroclasts with rare neoblasts at grain boundaries
Plagioclase:	Grain size: coarse-grained porphyroclasts, medium- to fine-grained neoblasts; Grain shape: anhedral porphyroclasts and neoblasts; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Texture: porphyroclasts with neoblasts around grain boundaries
Clinopyroxene:	Grain size: coarse-grained porphyroclasts, rare fine-grained neoblasts; Grain shape: anhedral; Grain boundary: curved; Texture: fractured porphyroclasts with rare neoblasts
Oxide:	oxides associated to olivine and pyroxene alteration

THIN SECTION LABEL ID: **360-U1473A-33R-2-W 30/33-TSB-TS_111** Piece no.: #02 TS no.: 111

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro intruded by a dike. The gabbro displays a granular texture, in which clinopyroxene is moderately replaced by brown amphibole. The dike has been metamorposed to amphibolite and displays a granoblastic texture.
Metamorphic petrology:	The gabbro intruded by the basalt is slightly altered. Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene and oxide. Rims of relictic plag phenocrysts were integrated into the granoblastic matrix.
Structure:	Weakly deformed host olivine gabbro intruded by amphibolite dike showing elongated plagioclase parallel to the contact with the host rock.

Plane-polarized



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Cross-polarized

33045591

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: vein

Lithology: **granoblastic amphibolite** Observer: CL

Texture: granoblastic Ave. grain size: fine grained [345]

Detailed description: The dike has been metamorposed to amphibolite and displays a granoblastic texture. A plagioclase-rich layer exists between the gabbro and amphibolite. Small zircons are present in the boundary.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	50		0.4	0.02	anhedral		
Amphibole	50		0.1	0.05	anhedral	subequant	

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a gabbro with a granular texture. Olivine is moderately altered. Plagioclase is recrystallized and displays undulose extinction. It has also been subjected to brittle deformation. Clinopyroxene is moderately replaced by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			4	anhedral	subequant	
Plagioclase	75		4	3.5	anhedral	tabular	
Clinopyroxene	20		5	4	anhedral	subequant	partly replaced by brown amphibole

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: olivine gabbro

Total rock alteration estimate (%): 15 Observer(s): JK

Detailed description The gabbro intruded by the basalt is slightly altered. Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene and oxide. Rims of relictic plag phenocrysts were integrated into the granoblastic matrix.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the basalt is slightly altered
Vein 1 minerals:	secondary plag
Vein 2 minerals:	chlorite
Vein 3 minerals:	amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	30		10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	10			
Amphibole, green	20	30		
Chlorite				30
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: granoblastic basalt

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene and oxide. Rims of relictic plag phenocrysts were integrated into the granoblastic matrix.
Vein 1 minerals:	amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	100		95
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, colorless	30			
Amphibole, green		10		
Carbonate	30	n/a	n/a	n/a
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	10	n/a		n/a
Other	10			
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name:

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: curved and altered Undulose extinction: regular Subgrain: rare straight Texture: fractured and partially altered
Plagioclase:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: subhedral to anhedral Grain boundary: curved Undulose extinction: regular Twinning: tapered Texture: porphyroclasts very fractured, especially close to contact with dike. Fractures are filled with plagioclase neobalsts. Recrystallization occur mainly along the contact with dike suggesting is related to water content and high temperature from the dike itself
Clinopyroxene:	Grain size: medium to coarse Grain shape: anhedral Grain boundary: straight Texture: altered and interstitial between very coarse plagioclase

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name:

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	fine grains weakly aligned parallel to the contact with host olivine gabbro

THIN SECTION LABEL ID: **360-U1473A-33R-3-W 33/38-TSB-TS_112** Piece no.: #02 TS no.: 112

Group	Summary
Igneous petrology:	A deformed olivine gabbro with a subophitic texture. Olivine is elongated. Plagioclase is strongly recrystallized and tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene porphyroclasts commonly display a consertal intergrowth texture.
Metamorphic petrology:	The rock shows the dynamic recrystallization of Pl, Ol and Cpx. The mylonitic foliation is crosscut by two veins made up of secondary Pl. At the contact with these veins, the Cpx is altered into brown Amp. The background static alteration is slight and confined to Ol and Cpx.
Structure:	Porphyroclastic olivine gabbro with plagioclase, clinpyroxene and olivine neoblasts as well as plagioclase veins cross-cutting coarse-grained clinopyroxene porphyroclasts.

Plane-polarized

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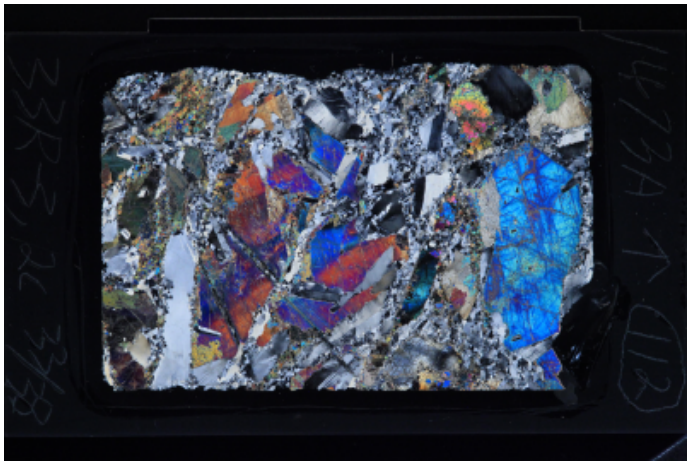
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: AS

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A deformed olivine gabbro with a subophitic texture. Olivine is partly recrystallized and elongated. Plagioclase is strongly recrystallized and displays undulose extinction. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and the porphyroclasts commonly display a consertal intergrowth texture. Amphibole is mostly present among the neoblastic clinopyroxene assemblage, Rare oxides are included in plagioclase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			8	subhedral	elongate	partly recrystallized
Plagioclase	49		18	10	subhedral	tabular	undulose extinction
Clinopyroxene	42		18	12	subhedral	poikilitic	partly recrystallized
Amphibole	0.5		0.1	0.03	anhedral	interstitial	commonly associates with clinopyroxene neoblasts
Opaques	0.5						
Oxide	0.5		0.5	0.03	anhedral	interstitial	associated with brown amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s):

Detailed description The rock shows the dynamic recrystallization of Pl, Ol and Cpx. Neoblastic Cpx is typically associated with minor amounts of red-brown Amp. The thin section (and the mylonite foliation) is crosscut by two veins made up of secondary Pl. At the contact with these veins, the Cpx is altered into brown Amp. The background static alteration is slight and confined to Ol and Cpx. Cpx is frequently altered into secondary Cpx and minor parallel lamellae of Pl, which are locally associated with red-brown Amp blebs. This alteration is commonly found at the rims of primary Cpx. The secondary Cpx is in places enclosed, with a porphyroclastic structure, within the Cpx neoblastic aggregates. Primary Cpx, neoblastic Cpx and red-brown Amp are locally rimmed by green to pale-green Amp.

Comment type	Comment
Alteration general comments:	The background static alteration is slight and confined to Ol and Cpx.
Mylonite comments:	The rocks show the dynamic recrystallization of Pl, Ol and Cpx. Neoblastic Cpx is typically associated with minor amounts of red-brown Amp.
Vein 1 minerals:	The thin section (and the mylonite foliation) is crosscut by two veins made up of secondary Pl. At the contact with these veins, the Cpx is altered into brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	15		
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		5		
Amphibole, green		5		
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	20			n/a
Talc	80	n/a		n/a
Other		10		
Subtotals replaced	100	100		

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Detailed description Olivine gabbro with partly recrystallized plagioclase, clinopyroxene and olivine porphyroclasts. Plagioclase veins cross-cut deformed clinopyroxene porphyroclasts. Plagioclase within the veins exhibits twinning and recrystallization, implying that deformation continued after veining.

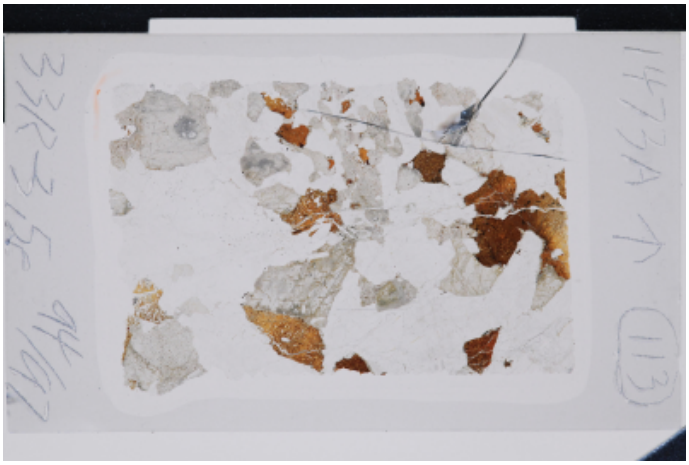
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: coarse-grained, elongated porphyroclasts, medium-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: regular; subgrains: straight; texture: porphyroclasts surrounded by neoblasts, in some areas olivine neoblasts form aggregates with clinopyroxene neoblasts.
Plagioclase:	Grain size: medium to coarse (porphyroclasts); medium to fine (neoblasts); Grain shape: subhedral to anhedral (porphyroclasts); anhedral to polygonal (neoblasts) Grain boundary: irregular (porphyroclasts); straight to curved (neoblasts); Twinning: tapered; Undulose extinction: irregular (porphyroclasts); rare (neoblasts); Texture; coarse-grained porphyroclasts encompassed by neoblasts; recrystallized, twinned plagioclase grains make up cross-cutting veins.
Clinopyroxene:	Grain size: coarse-grained porphyroclasts; medium-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Texture: locally recrystallized porphyroclasts with plagioclase inclusions. Some porphyroclasts are cross-cut by plagioclase veins.
Oxide:	Local interstitial oxide mainly associated to olivine alteration.
Vein:	cross-cutting melt veins filled via plagioclase; plagioclase has been deformed after solidification

THIN SECTION LABEL ID: **360-U1473A-33R-3-W 94/97-TSB-TS_113** Piece no.: #05 TS no.: 113

Group	Summary
Igneous petrology:	A weakly deformed olivine gabbros with a subophitic texture. Olivine is moderately altered and rimmed by orthopyroxene. Plagioclase commonly displays undulose extinction and is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and the neoblasts commonly associate with brown amphibole.
Metamorphic petrology:	Sample is substantially altered with olivine completely replaced by reddish clay minerals and rimmed by talc. Several carbonate veins were observed crosscutting mineral grains.
Structure:	Weakly deformed plagioclase and undeformed clinopyroxene. Plagioclase is weakly and locally recrystallized.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: AS

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A weakly deformed olivine gabbros with a subophitic texture. Olivine is moderately altered and rimmed by orthopyroxene. Plagioclase commonly displays undulose extinction and is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and the neoblasts commonly associate with brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			7	subhedral	subequant	completely altered
Plagioclase	65		18	7	subhedral	tabular	undulose extinction
Clinopyroxene	25		10	7	subhedral	poikilitic	with euhedral Pl chadacrysts
Opaques	0.1						
Oxide	0.1		0.3	0.02	subhedral	interstitial	commonly included in Pl, locally at rims of Cpx

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): JL

Detailed description Sample is substantially altered. Olivine is totally altered into mostly clay reddish clay minerals and rimmed by minor talc + oxide. Clinopyroxene is mostly altered into pale amphibole and some clay. Plagioclase is partially replaced by 2nd plagioclase. Veins of carbonate in a braided pattern was observed cross-cutting several grains.

Comment type	Comment
Vein 1 minerals:	There are several veins in the sample and all are composed by carbonates. The veins are less than a mm wide and occurs in a braided pattern. Most of the larger veins are made of crystalline calcite. Some of the smaller grains are made up of fine-grained carbonate materials.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	60		30
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		40		
Carbonate	5	n/a	n/a	n/a
Chlorite				5
Clay minerals	80	50		30
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	55
Talc	10	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic deformed plg and undeformed cpx Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Olivine:	completely altered
Plagioclase:	Grain size: coarse and medium recrystallized Grain shape: euhedral to subhedral and anhedral recrystallized Grain boundary: straight Twinning: igneous and tapered Undulose extinction: weak regular Texture: very weakly recrystallized and weakly deformed, sometimes included in coarse cpx
Clinopyroxene:	Grain size: coarse Grain shape: poikilitic oikoscryst Grain boundary: straight Undulose extinction: not observed Texture: coarse altered crystals, may include anhedral plagioclase
Vein:	fractures filled with alteration material

THIN SECTION LABEL ID: **360-U1473A-33R-4-W 11/15-TSB-TS_114** Piece no.: #01 TS no.: 114

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Olivine is commonly rimmed by orthopyroxene. Plagioclase commonly displays undulose extinction and is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture. Opaque minerals are predominated by sulfide, with very few tiny ilmenite.
Metamorphic petrology:	The alteration degree of this thin section is about 11%. Ol developed typical mesh texture with large amount of oxides in the mesh rims.
Structure:	Slightly deformed ophitic olivine gabbro. Weak zones of recrystallized plagioclase and recrystallized clinopyroxene at grain margins, together with kink banding in olivine indicates deformation.. Thin section illustrates that even the most undeformed looking olivine gabbros are deformed. One low temperature fracture passes through the entire thin section.

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is commonly rimmed by orthopyroxene and partly altered. Plagioclase is in a tabular shape and commonly displays undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly altered and occasionally displays a consertal intergrowth texture. It is rimmed by brown amphibole and also contains brown amphibole blebs. Opaque minerals are predominated by sulfide, with very few tiny ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			2.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		7.2	4	anhedral	tabular	undulose extinction
Clinopyroxene	37		8	4	anhedral	poikilitic	with a consertal intergrowth texture
Amphibole	0.4		0.2	0.1	anhedral	interstitial	occurs as blebs in clinopyroxene or at the rim of clinopyroxene
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 11 Observer(s): QM

Detailed description The alteration degree of this thin section is about 11%. Ol developed typical mesh texture with large amount of oxides in the mensh rims. There were also some talc and serpentine occuring in the alteration of Ol. Cpx mainly altered into pale color amphibole. Brown amphibole usually occurred at the boundary of Cpx. Pl mainly altered into secondary plagioclase with minor pale color amphibole occurring in the cleavages of Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	12		7
Amphibole, brown	n/a	18	n/a	n/a
Amphibole, colorless	5	80		3
Clay minerals	5	2		
Oxide	45			n/a
Plagioclase, sec.	n/a	n/a	n/a	97
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: MJC

Detailed description "Weakly deformed ophitic olivine gabbro. Poikilitic clinopyroxene ""protects"" the plagioclase from deformation. But weak zones of recrystallization of plagioclase and the margins of cpx, together with kink banding in olivine does occur in some areas. Thin section illustrates that even the most undeformed looking olivine gabbros are deformed to some degree. Large plagioclase crystals show brittle-plastic deformation. One low temperature fracture passes through the entire thin section."

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	inequigranular	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a
Fault rock intensity:	minor fracturing	1

Type	Comment
Olivine:	Olivine shows sub-grains and kink band development. Nearly all olivines show kink banding. Minor neoblast development in one area. Neoblast grainsize = 0.1mm.
Plagioclase:	On close inspection, most plagioclase crystals show some degree of deformation twinning and undulose extinction. Local areas of the thin section show more extensive crystallisation and neoblast formation (grainsize 30 microns) in~ 10% of the thin section. Neoblasts are sub equant.polygonal.
Clinopyroxene:	Smaller clinopyroxene oikocrysts show gentle undulose extinction. One crystal exhibits kinking associated with later stage fracturing. Minor equant, neoblast (grain size = 0.1mm) development at cpx grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-33R-5-W 55/58-TSB-TS_115** Piece no.: #02 TS no.: 115

Group	Summary
Igneous petrology:	A coarse-grained gabbro crosscut by diorite vein. The gabbro displays a subophitic texture and the diorite shows a granular texture.
Metamorphic petrology:	Ts documents the intrusion of a probably leucocratic quartz diorite into a gabbro with all stages of hybridization, i.e. the incorporation of xenocrysts into the melt which produces a wide spectrum of cpx overgrowth and formation of new brown green hornblende. The resulting rock is a quartz diorite which is moderately altered. At a very late alteration stage, the qz diorite was infiltrated by a CO2-rich fluid producing replacements of quartz, plagioclase, titanite, and hornblende by calcite.
Structure:	3mm wide dioritic felsic vein network intruding coarse grained olivine gabbro Host gabbro consists of large relict cpx's. overgrown by amphibole, large plagioclase crystals and fine grained plagioclase regions with streaked out amphibole define the pre-existing proto-mylonitic foliation. The vein network consists of a thin section long axis parallel vein with lateral offshoots in to the host gabbro approximately at right angles to the main vein. The vein postdates the mylonitic deformation and itself is only slightly deformed/recrystallised. The absence of sharp margins, together with evidence for semi-brittle intrusion related deformation, suggests the vein was intruded at high temperatures

Plane-polarized

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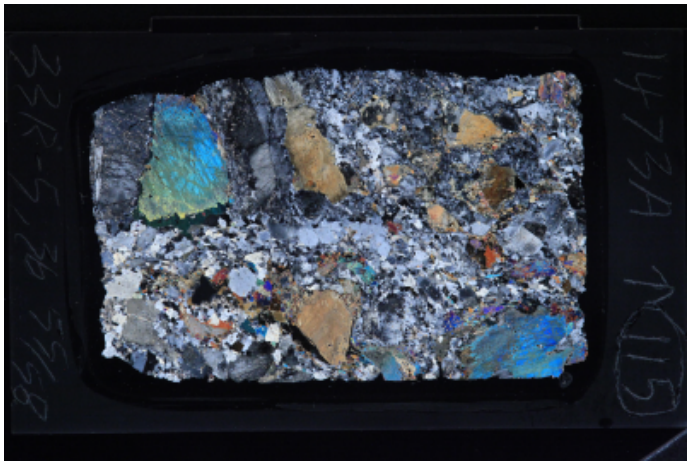
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: This domain is a coarse-grained gabbro with a subophitic texture. Plagioclase displays undulose extinction and is partly recrystallized. It is partly enclosed within clinopyroxene. Clinopyroxene is replaced by green amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		8	7	anhedral	subequant	undulose extinction
Clinopyroxene	40		8	8	anhedral	subequant	replaced by green amphibole

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: The diorite veins display a granular texture. Plagioclase is subhedral and rarely displays a oscillatory zoning. Both zircon and titanite are present in the diorite vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		2	1	subhedral	subequant	undulose extinction
Amphibole	10		0.4	0.3	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JK

Detailed description Ts documents the intrusion of a probably leucocratic quartz diorite into a gabbro with all stages of hybridization, i.e. the incorporation of xenocrysts into the melt which produces a wide spectrum of cpx overgrowth and formation of new brown green hornblende. The resulting rock is a quartz diorite which is moderately altered. At a very late alteration stage, the qz diorite was infiltrated by a CO2-rich fluid producing replacements of quartz, plagioclase, titanite, and hornblende by calcite.

Comment type	Comment
Alteration general comments:	The rock is moderately altered. Cpx xenocrysts of the quartz diorite show symplectitic intergrowth with brown hornblende and overgrowth of new brown green hornblende at their rims as a consequence of felsic melt - rock interaction. At much lower temperature, the qz diorite was infiltrated by a CO2-rich fluid producing replacements of quartz, plagioclase, and hornblende by calcite.
Vein 1 minerals:	green amphibole
Vein 2 minerals:	clay
Vein 3 minerals:	calcite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50		20
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, green		45		20
Clay minerals				30
Clinopyroxene, sec.	n/a	20	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced		95		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: Olivine Gabbro

Microstructure: submagmatic Observer: MJC

Detailed description 3mm wide dioritic felsic vein network intruding coarse grained olivine gabbro (although, only one olivine crystal is present in the thin section (olivine is visible in core photo). Host gabbro consists of large relict cpx's. overgrown by amphibole, large plagioclase crystals and fine grained plagioclase regions with streaked out amphibole which defines the pre-existing proto-mylonitic foliation. The vein network consists of a thin section long axis parallel vein with elongate plagioclase crystals defining a foliation parallel to the vein margins. The vein has lateral offshoots in to the host gabbro approximately at right angles to the main vein. The vein postdates the mylonitic deformation and itself is only slightly deformed/recrystallised. The absence of sharp margins suggests the vein was intruded at high temperatures Semi brittle offset of pre-existing amphibole foliation related to vein intrusion suggests normal sinistral movement. Similar semi brittle kinking, sub-grain development and fracturing seen in the large plagioclase crystals of the host gabbro. Deformation likely related to the intrusion of the diorite veins.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a
Fault rock intensity:	minor fracturing	1
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Olivine clearly seen in core photo. One example of fragmented re-crystallised olivine found in the thin section. Neoblasts 0.1mm in diameter.
Plagioclase:	Relict plagioclases are large (0.8cm) and relatively little deformed. Deformation twinning is rare and only associated with one large kinked plagioclase crystal. The kinking of this crystal has led to recrystallisation along the kink axis. The diorite intrusion likely caused semi-brittle deformation in the host gabbro. Zones of very fined grained (20 microns) recrystallised plagioclase approximately perpendicular to the main vein preserves the original plagioclase fabric in the host rock. The smallest neoblasats are approximately polygonal. Larger neoblasts (0.5mm dia).are more irregular, show undulose extinction and deformation twinning. Overall, the rock suggests semi-brittle deformation at high temps during the intrusion of the diorite veins.
Clinopyroxene:	Large relict Cpx overgrown by amphibole. Examples of kinking and weak undulose extinction. Subgrains and neoblasts only preserved in one or two places; in other cases, likely overprinted by amphibiole. Relict foliation is preserved by amphibole "fish" with subgrained tails. Fish offset by shear associated with the vein suggests normal sinistral displacement.

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: Diorite

Microstructure: magmatic Observer: MJC

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Plagioclase:	The diorite veins dominantly consist of plagioclase, which occurs as bother larger rectangular crystals and as more rounded, anhedral. 0.5mm diameter, sometimes chemically zoned crystals (often the slightly larger rectangular crystals). The smaller plagioclase crystals are mostly equant, have irregular boundaries, show undulose extinction and sub-grain development. The elongate crystals define a magmatic fabric parallel to the vein margins.

THIN SECTION LABEL ID: **360-U1473A-34R-5-W 88/91-TSB-TS_116** Piece no.: #09 TS no.: 116

Group	Summary
Igneous petrology:	A fine-grained olivine gabbro. Primary magmatic texture is not preserved.
Metamorphic petrology:	The alteration intensity of this thin section is moderate(~12%).
Structure:	this rock consists of a fine-grained recrystallized polyphase matrix containing plagioclase, cpx, olivine and minor oxides. Finer recrystallized plagioclase grains are observed in zones where olivine is recrystallized and partially altered.

Plane-polarized

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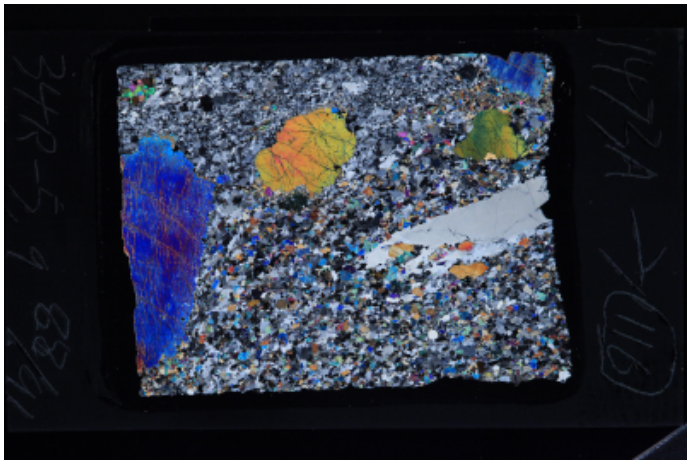
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained [345]

Detailed description: A fine-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Both olivine and clinopyroxene porphyrocalsts are rimmed by orthopyroxene. The weak foliation is defined by the preferred orientation of both plagioclase and clinopyroxene. Opaque minerals mainly consist of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			0.2	anhedral	subequant	two big olivine prophyroclasts are present, with overgrowth of orthopyroxene
Plagioclase	60		8	0.5	anhedral	subequant	undulose extinction
Clinopyroxene	24		16	0.8	anhedral	subequant	commonly recrystallized but two big porphyroclasts are present
Amphibole	0.5		0.4	0.1	anhedral	interstitial	associates with neoblasts or occurs as blebs in clinopyroxene.
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 12 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate(~12%). Ol developed typical mesh texture. The mesh core were fresh olivine and the mesh rim consisted of a mixture of talc, caly, serpentine and minor oxide. Cpx altered into pale color amphibole, brown amphibole, clay minerals and minor chlorite which usually occurred in the cleavages of Cpx. Pl were mostly replaced by secondary Pl with minor pale color amphibole, clay and chlorite occurring in the cleavages of Pl.

Comment type	Comment
Mylonite comments:	Fine-grained mylonitic gabbro characterized by recrystallization of Cpx, Pl and Ol into polygonal aggregates. Cpx neoblasts were associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	12	3	15
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		60		5
Chlorite		5		2
Clay minerals	35	14	10	3
Oxide	5	1		n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	40	n/a	90	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description this rock consists of a fine-grained recrystallized polyphase matrix containing plagioclase, cpx, olivine and minor oxides. Finer recrystallized plagioclase grains are observed in zones where olivine is recrystallized and partially altered. Cpx, olivine and plagioclase porphyroclasts are observed in the matrix. Core-mantle structures can be seen at plag porhyroclast's margins.

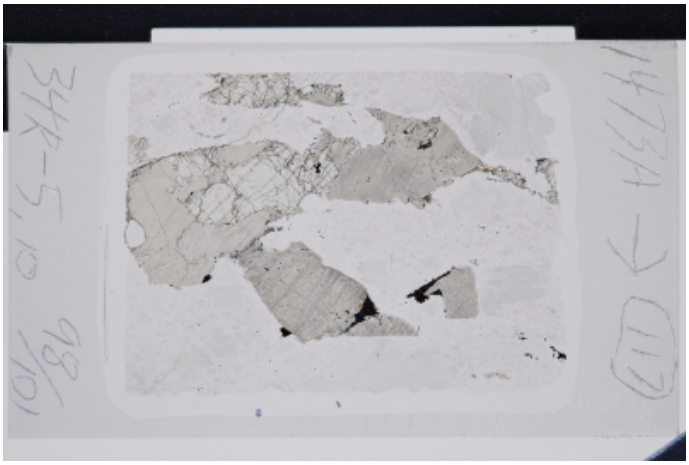
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: coarse porphyroclasts and fine recrystallized grains. shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: observed as fractured and partially altered porphyroclasts and as minor recrystallized grains.
Plagioclase:	size: coarse porphyroclasts and fine recrystallized grains shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: irregular texture: coarse elongated porphyroclasts and fine grained recrystallized aggregates.
Clinopyroxene:	size: coarse porphyroclasts and fine recrysytallized grains shape: subhedral to anhedral boundaries: straight to curved fractures: mainly observed on clasts. texture: partially altered
Oxide:	band/pod geometry: fine pods disseminated in the matrix.

THIN SECTION LABEL ID: **360-U1473A-34R-5-W 98/101-TSB-TS_117** Piece no.: #10 TS no.: 117

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Primary magmatic texture is not preserved. Olivine is locally rimmed by orthopyroxene. Plagioclase displays undulose extinction. Clinopyroxene porphyroclasts shows a consertal intergrowth texture. Opaque minerals mainly consists of sulfides, with minor ilmenite.
Metamorphic petrology:	The sample is only slightly altered with serpentine, secondary oxides and talc after olivine grains the most common replacement minerals.
Structure:	Porphyroclastic gabbro or protomylonite, with the foliation defined by extensively recrystallised plagioclase swirling around relatively undeformed plagioclase and clinopyroxene porphyroclasts. Olivine shows kink banding and minor development of neoblasts. Clinopyroxene shows some slight kinking, undulose extinction and neoblast formation.

Plane-polarized



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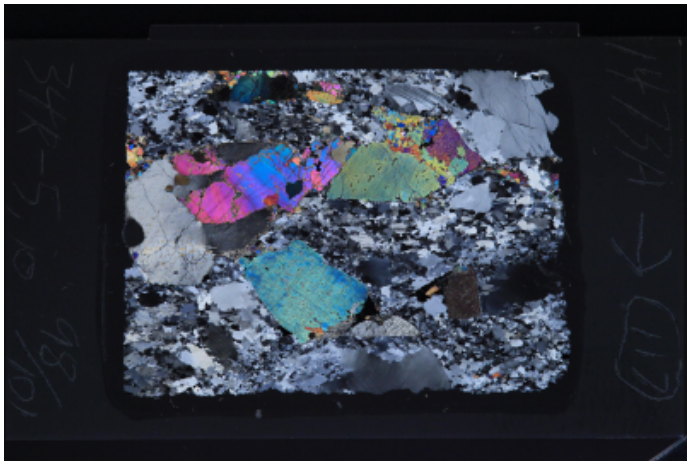
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is locally rimmed by orthopyroxene. Plagioclase is strongly recrystallized and foliated. It displays undulose extinction. It is partly or fully enclosed within clinopyroxene, which is partly recrystallized. Clinopyroxene porphyroclasts shows a consertal intergrowth texture, and contain abundant brown amphibole blebs. Opaque minerals mainly consists of sulfides, with minor ilmenite. Intergrowth between ilmenite and sulfides can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			7	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	70		5.6	1.2	anhedral	subequant	undulose extinction
Clinopyroxene	20		8	8	anhedral	subequant	with plagioclase inclusions and brown amphibole blebs
Amphibole	0.1		0.4	0.1	anhedral	interstitial	commonly occurs at the rim of porphyroclasts
Opaques	0.4						
Ilmenite	0.1						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Sample is only slightly altered. Olivine is moderately replaced by serpentine and oxide in a mesh texture with a thin talc rim. Plagioclase and clinopyroxene are less affected by static background alteration. The rock has a mylonitic foliation with neoblastic aggregates of mostly plagioclase. Large Cpx grains are surrounded by neoblastic Cpx grain, brown amphibole and oxides.

Comment type	Comment
Mylonite comments:	Plagioclase neoblasts were observed as polygonal aggregates. Cpx neoblasts, brown amphibole neoblasts and oxides surrounds porphyroclastic Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	5	0	3
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		50		
Clay minerals				10
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic

Sample is a porphyroclastic gabbro or protomylonite. The foliation is defined by extensively recrystallised plagioclase swirling around relatively undeformed plagioclase and clinopyroxene porphyroclasts. Olivine shows kink banding and minor development of neoblasts. One example of a stretched out olivine crystal parallel to the foliation is present.

Observer: MJC

Detailed description This rock consists of a fine-grained plagioclase matrix in which porphyroclasts of plag and cpx are contained. the matrix is recrystallized to polygonal aggregates of equant grain size. When in association with oxides and alteration products, plag grain size becomes finer.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Magmatic fabric intensity:	Obscured	
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	absent	n/a
Fault rock intensity:	undeformed	0

Type	Comment
Olivine:	Large olivine shows kink banding and rare subgrains. In one example, olivine is stretched out parallel to the foliation. In a few places equant neoblasts are present (0.1mm diameter).
Plagioclase:	Plagioclase is extensively deformed and extreme grain size reduction facilitates development of a clear foliation (Cpf = 3) around the large porphyroclasts. Large relict plagioclase crystals, display bending and deformation twins and incipient sub-grain development/undulose extinction, Recrystallised plagioclase is stretched out and defines the foliation. Grainsize of the neoblasts in the finer grained zones is 30 microns. Neoblasts approach being polygonal. Deformation twins are present in the larger neoblasts.
Clinopyroxene:	Large clinopyroxenes show weak undulose extinction and minor kinking. Regions of moderately well developed neoblasts (grain size = 0.1 mm)are present at the edges of the pyroxenes nearest the most deformed plagioclase shear zones. Neoblasts are sub-equant and anhedral.
Oxide:	some oxide is present

THIN SECTION LABEL ID: **360-U1473A-35R-1-W 55/58-TSB-TS_118** Piece no.: #06 TS no.: 118

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Primary magmatic texture is not preserved. It could be subophitic to ophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Protomylonite with clinopyroxene porphyroclasts and plagioclase neoblasts merging into more strongly foliated protomylonitic zone with elongated olivine-clinopyroxene aggregates.

Plane-polarized

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Cross-polarized

33058831

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. It could be subophitic to ophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. Plagioclase is strongly recrystallized and displays undulose extinction. A weak foliation is shown by the preferred orientation of plagioclase and the recrystallized clinpyroxene. Olivine is elongated along the foliation. Clinpyroxene porphyroclasts show consertal intergrowth texture. Small amount of brown amphibole and opaque minerals are present. Intergrowth between ilmenite and sulfides can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.4	anhedral	elongate	strongly recrystallized and elongated
Plagioclase	65		2.4	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	30		9	1	anhedral	elongate	partly recrystallized
Amphibole	0.1		0.4	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 13 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Olivine developed classical mesh texture which mainly consisted of clay, serpentine and oxides. Cpx were slightly replaced by pale color amphibole, brown amphibole and clay. Pl mostly altered into secondary plagioclase with minor pale color amphibole occurring in the cleavages of Pl.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro charaterized by recrystallization of Ol, Cpx and Pl into polygonal aggregates. Cpx neoblasts were associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	8		20
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless		60		3
Clay minerals	60	5		
Oxide	25			n/a
Plagioclase, sec.	n/a	n/a	n/a	97
Talc	5	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: medium-grained neoblasts; Grain shape: anhedral; Grain boundary: curved; Undulose extinction: complete, straight; Subgrains: straight; Texture: elongated aggregates of medium-grained neoblasts sub-parallel to foliation; aggregates together with clinopyroxene
Plagioclase:	Grain size: medium- to fine-grained neoblasts; Grain shape: anhedral; Grain boundary: curved to polygonal; Undulose extinction: irregular; Twinning: tapered; Texture: elongated plagioclase neoblasts
Clinopyroxene:	Grain size: coarse-grained porphyroclasts; medium-grained neoblasts; Grain shape: subhedral to anhedral porphyroclasts; anhedral neoblasts; Grain boundary: curved to irregular; Undulose extinction: irregular; Texture: cpx porphyroclasts partly altered along fractures and cleavage; porphyroclasts show plagioclase inclusions
Oxide:	oxides associated to clinopyroxene grain boundaries

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: Observer: OP

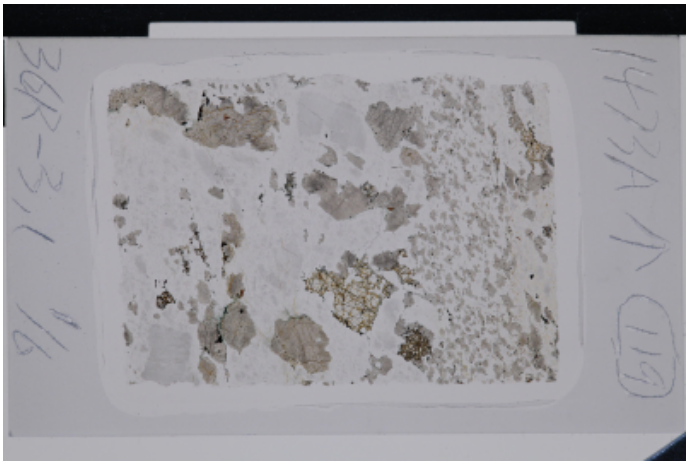
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	normal-dextral	n/a

Type	Comment
Olivine:	Grain size: medium-grained neoblasts; Grain shape: anhedral; Grain boundary: curved; Undulose extinction: complete, straight; Subgrains: straight; Texture: elongated aggregates of medium-grained neoblasts together with clinopyroxene parallel to foliation
Plagioclase:	Grain size: medium- to fine-grained neoblasts; Grain shape: anhedral; Grain boundary: curved to polygonal; Undulose extinction: irregular; Twinning: tapered; Texture: elongated plagioclase neoblasts
Clinopyroxene:	Grain size: elongated medium-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Texture: medium-grained clinopyroxene-olivine aggregates; one clinopyroxene porphyroclast encompassed in clinopyroxene-olivine neoblasts
Oxide:	locally interstitial, elongated oxides

THIN SECTION LABEL ID: **360-U1473A-36R-3-W 1/6-TSB-TS_119** Piece no.: #01 TS no.: 119

Group	Summary
Igneous petrology:	This thin section contains two domains, i.e., a deformed olivine gabbro and a slightly deformed fine-grained olivine gabbro. The deformed olivine gabbro preserves a subophitic texture. The slightly deformed fine grained olivine gabbro displays a granular texture.
Metamorphic petrology:	The alteration intensity of this thin section is substantial. Ol develop typical mesh texture. Clay minerals occurred in all the primary minerals.
Structure:	Fine grained, thin (~1cm), likely intrusive layer (disseminated oxide microgabbro) into porphyroclastic olivine gabbro. Both margins are visible. The lower one is irregular, sharp and the upper one is equally sharp, but more planar. The porphyroclastic olivine gabbro on either side of the layer shows a gently dipping foliation, consistent with that seen in hand sample. The microgabbro is weakly recystallised. Elongate cpx in the microgabbro records a relic magmatic foliation parallel to the intrusion margins. The host gabbro has zones of high recrystallisation of plagioclase with lesser recrystalilsation of olivine and clinopyroxene on grain boundaries.

Plane-polarized



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Cross-polarized

33044501

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology domain 1 major

Lithology: **disseminated oxide olivine gabbro** Observer: AS

Texture: subophitic Ave. grain size: medium grained [345]

Texture comment: deformed

Detailed description: This domain is an deformed olivine gabbro, which preserves a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is commonly recrystallized and sometimes partly enclosed within clinopyroxene. Clinopyroxene is commonly not recrystallized and occasionally contain plagioclase chadacrysts. Amphibole presents as interstitial grain associated with oxides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			7	subhedral	subequant	locally altered, recrystallized
Plagioclase	65		8	4	subhedral	elongate	undulose extinction
Clinopyroxene	22		6	4	subhedral	equant	euhedral Pl chadacrysts
Amphibole	0.3			0.3	anhedral	interstitial	mostly occurrs blebs into Cpx. Locally associated to Ox at rims of Cpx.
Opaques	1.2						
Sulfide	0.2						
Oxide	1		1	0.5	subhedral	interstitial	comomnly included in Cpx

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: lithology domain 2 minor

Lithology: **disseminated oxide gabbro** Observer: AS

Texture: granular Ave. grain size: fine grained [345]

Texture comment: deformed

Detailed description: This domain is a deformed fine grained olivine gabbro, with a granular texture. Both plagioclase and clinopyroxene are recrystallized and foliated. Olivine is elongated along the foliation.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1	subhedral	equant	recrystallized
Plagioclase	58		5	0.8	subhedral	subequant	undulose extinction
Clinopyroxene	35		3	1	subhedral	equant	locally deformed
Amphibole	0.1			0.1	anhedral	interstitial	associated with Ox
Opaques	1.5						
Sulfide	0.2						
Oxide	1.3		0.5	0.3	anhedral	equant	associated with neoblastic Cpx

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Ol develop typical mesh texture. There were two low temperature alteration of Ol. One type with dark red clay and minor oxide occurring in the mesh rims was observed. The other one was with light yellow /red clay and large amount of oxides occurring in the mesh rims. Cpx altered into green, brown and pale color amphibole. Pl were mostly replaced by secondary plagioclase with minor chlorite and pale color amphibole. Clay minerals occurred in all the primary minerals.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	8		50
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		1
Amphibole, green		30		
Chlorite				7
Clay minerals	55	10		2
Oxide	25			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	5	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 82 Domain name: microfabric

Microstructure: submagmatic Observer: MJC

Detailed description Fine grained, thin (~1cm), likely intrusive layer (disseminated oxide microgabbro) into porphyroclastic olivine gabbro. Both margins are visible. The lower one is irregular, sharp and the upper one is equally sharp, but more planar. The porphyroclastic olivine gabbro on either side of the layer shows a gently dipping foliation, consistent with that seen in hand sample. The microgabbro is weakly recystallised, and plagioclase shows kinking, undulose extinction and incipient subgrain development. Elongate cpx in the microgabbro records a relic magmatic foliation parallel to the intrusion margins. The host gabbro exhibits zones of high recrystallisation of plagioclase with lesser recrystalilsation of olivine and clinopyroxene on grain boundaries.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	The few, large, olivine porphyroclasts show kink banding, subgrains and neoblasts developing on grain boundaries. Above the upper contact, the recrystallised olivine is beginning to be streaked out in a tail. Olivine neoblasts may be as small as 30 microns.
Plagioclase:	Plagioclase essentially defines the porphyroclastic fabric, whicjh is inclined (~30 degrees) relative to the horizontal intrusive margins. Large plagioclase crystals are bent and kinked and show deformation twins and subgrain development. Zones of recrystallised plagioclase anastomose through the domain. Smaller grains show deformation twins and some undulose extinction. Grain size can be 30 microns and the smaller grains tend to be polygonal in habit.
Clinopyroxene:	Large clinopyroxenes are mostly undeformed except for one crystal which shows kinking near to a micro shear zone and a few others that show recrystallisation and neoblast (50 micron diameter) development at grain margins next to micro shear zones. The neoblasts are polygonal & equant.

Interval domain no: 2 Domain rel. abundance (%): 18 Domain name: microfabric

Microstructure: submagmatic Observer: MJC

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	inequigranular	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	none present
Plagioclase:	Plagioclase crystals in the intrusive microgabbro range in grainsize from 30 microns to 1.5mm. Larger grains show subgrain development and elongation parallel to the intrusion margins. Smaller grains show deformation twinning and undulose extinction. The smallest grains (neoblasts) are equant and 30 microns in diameter.
Clinopyroxene:	Clinopyroxenes in the fine grained layer are unstrained, anhedral and equant to elongate, The elongate grains are sub-parallel to the margins of the intrusion and likely reflect the original magmatic fabric of the microgabbro. Grainsize averages 0.3mm in diameter.

THIN SECTION LABEL ID: **360-U1473A-37R-2-W 86/90-TSB-TS_120** Piece no.: #07 TS no.: 120

Group	Summary
Igneous petrology:	A medium-grained gabbro. Primary magmatic texture is not preserve, but is likely to be subophitic or ophitic, as plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Dynamically recrystallized neoblasts are olivine, clinopyroxene and plagioclase. Static background alteration intensity is slight to moderate. Olivine alteration is relatively intense. Dominant alteration phases are amphibole, talc and clay minerals.
Structure:	Coarse cpx, olivine and plag clasts are immersed in a fine-grained recrystallized mixture of plag+cpx+ol and minor oxides.

Plane-polarized

33058771

Cross-polarized

33058791

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Small amount of olivine is present and is moderately altered. Plagioclase is elongated and partly recrystallized. Clinopyroxene is recrystallized and the porphyroclasts are partly replaced by neoblasts, commonly in association with brown amphibole. Occasionally, clinopyroxene preserves a poikilitic texture, as plagioclase is partly or fully enclosed within clinopyroxene. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.5			0.2	anhedral	subequant	partly altered
Plagioclase	65		4	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	34		8	4	anhedral	subequant	partly recrystallized
Amphibole	0.2		0.4	0.1	anhedral	interstitial	
Opaques	0.3						
Ilmenite	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Olivine is replaced by talc at rims and along fractures; by brown clay along fractures. Clinopyroxene is replaced by secondary clinopyroxene patches, by brown amphibole patches, blebs and fringes at rims; by green/colorless amphibole fringes; by brown clay along cleavage surfaces and fractures. Plagioclase is replaced by secondary plagioclase and by chlorite and clay minerals along fractures.

Comment type	Comment
Mylonite comments:	Ol,Cpx, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	10		10
Amphibole, brown	n/a	45	n/a	n/a
Amphibole, colorless		10		
Amphibole, green		20		
Chlorite				30
Clay minerals	45			20
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	3	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Sulfide	2	1		n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description this rock comes from a contact between fine-grained and coarse-grained gabbro in the core section. Coarse cpx, olivine and plag clasts are immersed in a fine-grained recrystallized mixture of plag+cpx+ol and minor oxides. Plagioclase grain size is finer in contact with alteration of olivine, developping plag+ol+cpx mixtures alternated with plagioclase layers.

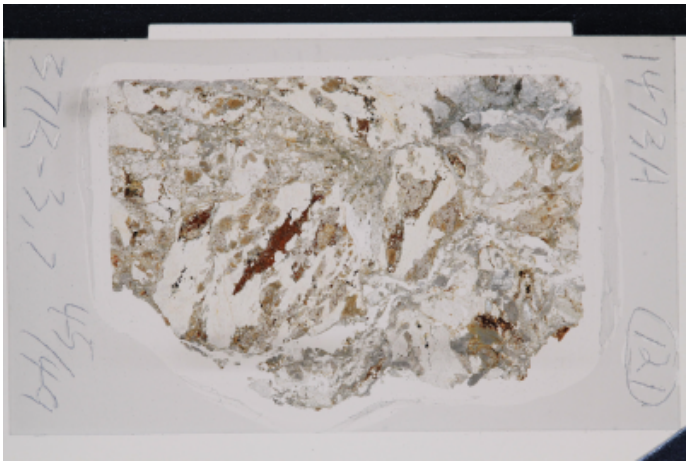
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine (recrystallized) shape: anhedral boundaries: curved undulose extinction: irregular, locally observed texture: observed as altered clasts and fine-grained recrystallized grains in the matrix, commonly associated with oxides.
Plagioclase:	size: coarse clasts and fine recrystallized grains shape: anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight boundaries texture: recrystallized matrix and some porphyroclasts.
Clinopyroxene:	size: coarse clasts and fine recrystallized grains shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: partially altered clasts and fine recrystallized grains.
Oxide:	geometry: thin bands in contact with olivine.

THIN SECTION LABEL ID: **360-U1473A-37R-3-W 45/49-TSB-TS_121** Piece no.: #07 TS no.: 121

Group	Summary
Igneous petrology:	An olivine gabbro. Primary magmatic texture is not preserved.
Metamorphic petrology:	The alteration intensity of this thin section is extensive. The alteration of this rock mainly occurred at low temperature with pervasive carbonate and clay presented. In the mylonitic gabbro clasts, Ol totally altered into pseudomorphic dark clay and partly pseudomorphic carbonate; Cpx altered into clay and pale color amphibole; Pl mainly altered into secondary Pl and clay. In the carbonate matrix, Ol were totally replaced by carbonate and showed wave extinction; Cpx displaying several individual lamellas broke off by cataclastic deformation and were partly replaced by carbonate, pseudomorphic carbonate showed wave extinction; Pl showed sandstone-like texture. The wave extinction of pseudomorphic carbonate after Ol and Cpx indicated that carbonate were slightly deformed by cataclastic deformation. In addition, carbonate replaced two parts of Cpx broken off by cataclastic deformation, which suggested that carbonate injection occurred after cataclastic deformation. As mentioned above, carbonate injection occurred before the end of cataclastic deformation.
Structure:	Extensively carbonated fault breccia. Original rock is a recrystallized olivine gabbro.

Plane-polarized



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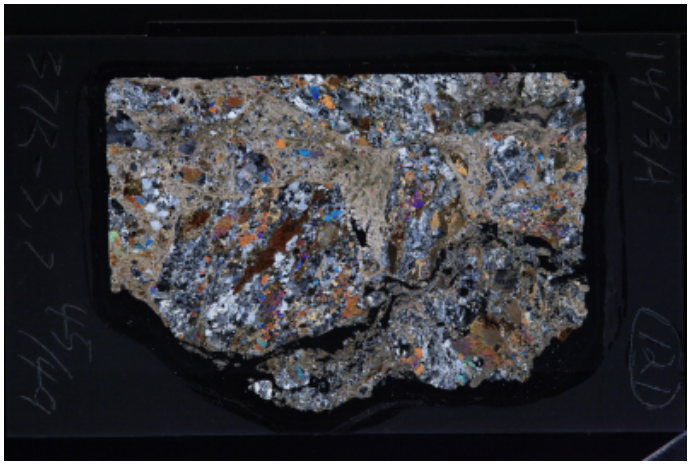
Cross-polarized



33067341

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is strongly elongated but completely altered. Plagioclase is highly recrystallized and foliated. Clinopyroxene is recrystallized and aligned along the foliation. Brittle deformation is preserved in some clinopyroxene porphyroclasts. Opaque minerals consist of ilmenite and magnetite, with an intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5						completely altered and original shape is not preserved
Plagioclase	50		1	0.1	anhedral	subequant	undulose extinction
Clinopyroxene	45		2.8	0.8	anhedral	subequant	heavily replaced by green amphibole and subjected to brittle deformation
Opaques	0.5						
Magnetite	0.1						
Ilmenite	0.4						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 70 Observer(s): QM

Detailed description

The alteration intensity of this thin section is extensive. The alteration of this rock mainly occurred at low temperature with pervasive carbonate and clay presented. In the mylonitic gabbro clasts, Ol totally altered into pseudomorphic dark clay and partly pseudomorphic carbonate; Cpx altered into clay and pale color amphibole; Pl mainly altered into secondary Pl and caly. In the carbonate matrix, Ol were totally replaced by carbonate and showed wave extinction; Cpx displaying several individual lamellas broke off by cataclastic deformation and were partly replaced by carbonate, pseudomorphic carbonate showed wave extinction; Pl showed sandstone-like texture. The wave extinction of pseudomorphic carbonate after Ol and Cpx indicated that carbonate were slightly deformed by cataclastic deformation. In addition, carbonate replaced two parts of Cpx broken off by cataclastic deformation, which suggested that carbonate injection should occurred after cataclastic deformation. As mentioned above, carbonate injection occurred before the end of cataclastic deformation.

Comment type	Comment
Cataclasite comments:	In the mylonitic gabbro clasts, Ol totally altered into pseudomorphic dark clay and partly pseudomorphic carbonate; Cpx altered into clay and pale color amphibole;

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	65		70
Amphibole, colorless		35		
Carbonate	20	n/a	n/a	n/a
Chlorite				10
Clay minerals	70	50		20
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	2	n/a		n/a
Other		15		
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: fault rock extensively brecciated and carbonated olivine gabbro Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a
Fault rock intensity:	well developed fault, breccia	4

Type	Comment
Olivine:	Grain size: coarse grained; Grain shape: anhedral; Grain boundary: altered; Texture: completely altered
Plagioclase:	Grain size: medium-grained porphyroclasts, medium- to fine-grained neoblasts; Grain shape: anhedral porphyroclasts; anhedral, in some cases elongated, neoblasts; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Texture: rare porphyroclasts with extensive network of medium-grained neoblasts; fine-grained neoblasts form localized shear bands
Clinopyroxene:	Grain size: medium- to coarse-grained porphyroclasts, recrystallized; Grain shape: anhedral; Grain boundary: curved, altered; Texture: partly altered, recrystallized porphyroclasts
Oxide:	interstitial oxide

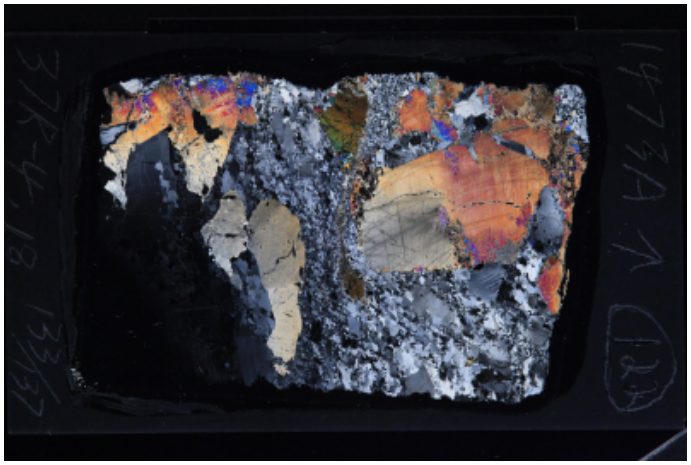
THIN SECTION LABEL ID: **360-U1473A-37R-4-W 133/137-TSB-TS_122** Piece no.: #18 TS no.: 122

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Primary magmatic texture is not preserved, but could be subophitic or ophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Moderately altered mylonitic olivine gabbro. Olivine is the most altered phase and is substantially replaced by clay and talc.
Structure:	Protomylonite. Porphyroclastic olivine gabbro. The sample is a classic grade 3 protomylonite, with olivine and cpx porphyroclasts. The olivine is stretched out and recrystallised along it's ends to form a flattened "fish" of olivine. Cpx is less deformed, but is kinked, leading to subgrains forming along the fold axes. Plagioclase is extensively deformed and recrystallised to form the proto-mylonitic foliation that wraps around the poprhyroclasts.

Plane-polarized

33067281

Cross-polarized



33067301

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Subhedral plagioclase is partly or fully enclosed within clinopyroxene, indicating that the primary texture could be subophitic or ophitic. Olivine is elongated and moderately altered. It is rimmed by orthopyroxene. Plagioclase is strongly recrystallized and foliated. It displays undulose extinction. Clinopyroxene is weakly deformed and the porphyroclasts show a consertal intergrowth texture. Brown amphibole associates with clinopyroxene neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			4	anhedral	elongate	moderately altered
Plagioclase	55		3.6	0.1	anhedral	subequant	undulose extinction
Clinopyroxene	40		14	6	anhedral	subequant	partly recrystallized
Amphibole	0.1		0.2	0.1	anhedral	interstitial	commonly associates with clinopyroxene neoblasts
Opaques	0.2						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Sample is deformed and exhibit mylonitic foliation. Most of the plagioclase occurs as polygonal aggregates. Cpx seems to show initial fragmentation. Olivine is highly deformed. Static background alteration ismoderate overall. Olivine is the most altered primary mineral and is mostly replaced by talc and clay.

Comment type	Comment
Mylonite comments:	Sample is deformed. Large plagioclase grains are surrounded by recrystallized grains. Cpx show initial fragmentation into smaller crystals, often associated with brown hornblende and oxide. Olivine is elongated. Olivine neoblasts and small fragments seems to be altered into talc.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	15		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, green		70		
Chlorite				30
Clay minerals	40	10		20
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: MJC

Detailed description "Protomylonite. Porphyroclastic olivine gabbro. The sample is a classic grade 3 protomylonite, with olivine and cpx porphyroclasts. The olivine is stretched out and recrystallised along it's ends to form a flattened ""fish"" of olivine. Cpx is less deformed, but is kinked, leading to subgrains forming along the fold axes and ultimately free rotation of the separated halfs of the cpx porphyroclast. Plagioclase is extensively deformed and recrystallised to form the proto-mylonitic foliation that wraps around the poprhyroclasts. Larger plagioclase crystals are protected within the remains of cpx oikocrysts and by the shadows of the both the cpx and olivine porphyroclasts."

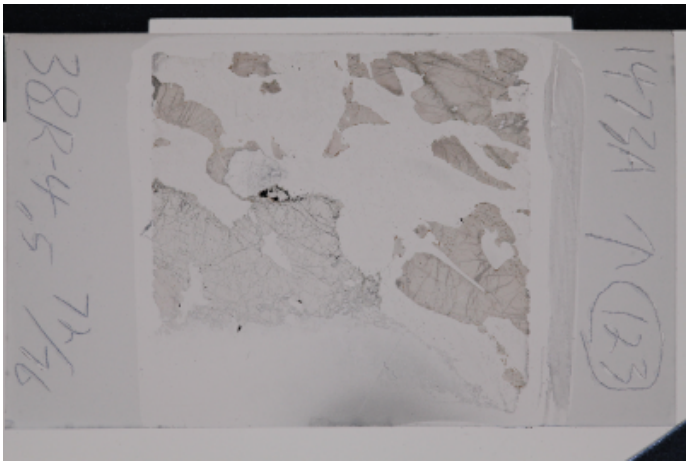
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Magmatic fabric intensity:		0
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a
Fault rock intensity:	undeformed	0

Type	Comment
Olivine:	One olivine porhyroclast that has been recrystallised and streaked out. The most extreme end is altered to iddingsite. Central part is fresh, approximately 5mm long. The porphyroclast shows undulose extinction and shows neoblast development at its ends. The remaining, unaltered neoblasts are 0.05-0.5mm The smaller streaked out ones) are altered to talc and serpentine.
Plagioclase:	Larger remains of relict plagioclase crystals are found between the arms of the cpx oikocrysts and in the shadows of the olivine and cpx porhyroclasts. These show undulose extinction, deformation twins, subgrains and rare kinking/bending. The foliation is defined by the finer grained recrystallised plagioclase; the larger ones of which are elongate parallel to the foliation. Undulose extinction and deformation twins are present in the neoblasts. Neoblast grainsize varies from 0.1mm to 30 microns.
Clinopyroxene:	Larger cpx porphyroclasts show minor undulose extinction. In the smaller porphyroclasts, kinking has led to sub-grain and neoblast development along the fold axes and ultimately rotation of the various parts of the porphyroclast. Neoblasts range from 0.1mm to 0.01mm. They tend to be elongate (controlled by the cleavage) to equant and anhedral.

THIN SECTION LABEL ID: **360-U1473A-38R-4-W 72/76-TSB-TS_123** Piece no.: #05 TS no.: 123

Group	Summary
Igneous petrology:	An olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Subhedral tabular plagioclase is partly enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	Protomylonite. Porphyroclastic olivine gabbro exhibiting almost complete recrystallisation of plag, substantial recrystallisation of olivine and limited recrystallisation of cpx.. Resistant cpx's partially retain their original poikolitic geometries , but outside the cpx oikocrysts the plagioclase is highly recrystallised forming a foliation that wraps around the porphyroclasts.

Plane-polarized



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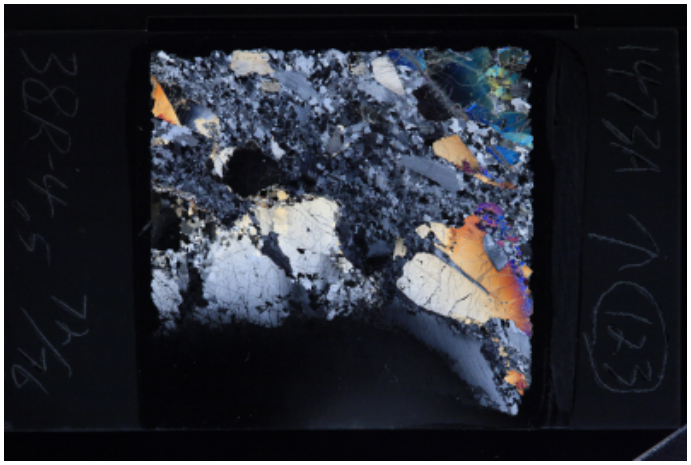
Cross-polarized



33067261

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Texture comment: deformed

Detailed description: An olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is commonly recrystallized and show undulose extinction. Subhedral tabular plagioclase is partly enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture. Opaque minerals are predominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	20			5	anhedral	subequant	
Plagioclase	50		8	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	30		10	5	anhedral	subequant	partly recrystallized
Amphibole	0.1		0.1	0.05	anhedral	interstitial	associate with clinopyroxene neoblasts
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 9 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol developed typical mesh texture and slightly altered. The mesh core were fresh olivine and the mesh rim were filled by mixture with serpentine, oxides and minor talc. Cpx mainly altered into pale color amphibole with minor chlorite occurring in the cleavages of Cpx. Pl were mostly replaced by secondary Pl with minor tiny pale color amphibole occurring in the cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	10		12
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		85		2
Amphibole, green		5		
Oxide	55			n/a
Plagioclase, sec.	n/a	n/a	n/a	98
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: MJC

Detailed description Protomylonite. Porphyroclastic olivine gabbro exhibiting almost complete recrystallisation of plag, substantial recrystallisation of olivine and limited recrystallisation of cpx.. Resistant cpx's retain original poikolitic geometries and protect plagioclase crystals within them, but outside the oikocrysts the plagioclase is highly recrystallised forming a foliation that wraps around the porphyroclasts. Olivines are recrystallised at their margins allowing them to extend parallel to the foliation.

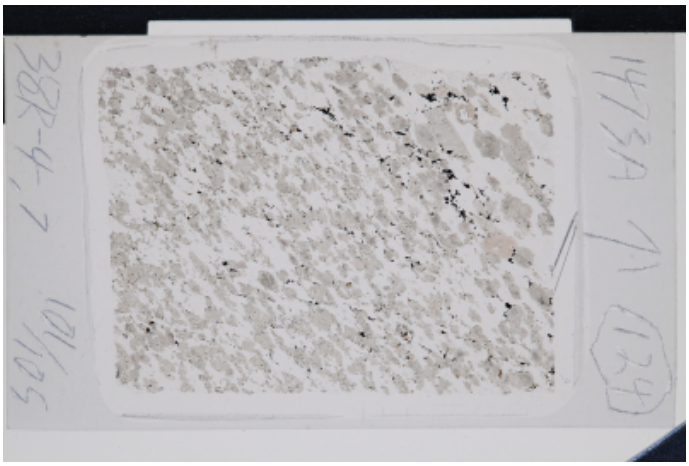
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a
Fault rock intensity:	minor fracturing	1

Type	Comment
Olivine:	Large olivine porphyroclasts are recrystallised at their ends parallel to the foliation. Olivine shows a progression from extensive undulose extinction verging on kink banding, through subgrain and polygonal neoblast development. Neoblast grain size from 0.3-0.03mm diameter. Porphyroclasts show minor fracturing.
Plagioclase:	Plagioclase is extensively recrystallised and stretched into thin zones which wrap around the porphyroclasts and define the foliation. The plagioclase shows extensive spectacular deformation twinning. Larger relict crystals show undulose extinction and rare kink bands. Neoblasts show a wide range in grain size from 0.1mm to 30 microns in diameter. Smaller grains are polygonal and equant.
Clinopyroxene:	Clinopyroxene porphyroclasts show minor bending, minor undulose extinction and minor recrystallisation into subgrains and neoblasts. There is one nice example of a cpx crystal showing a tail. Neoblasts are polygonal and 0.1mm in diameter. The cpx is bent and kinked in at least 3 places and in one case has led to subgrain development along the kink axis.

THIN SECTION LABEL ID: **360-U1473A-38R-4-W 101/105-TSB-TS_124** Piece no.: #07 TS no.: 124

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro with a granular texture. The igneous lamination is defined by the preferred orientation of plagioclase and clinopyroxene.
Metamorphic petrology:	Fresh rock with 3 vol% of alteration minerals including secondary clinopyroxene and brown amphibole.
Structure:	Olivine gabbro mylonite with extensively recrystallized plagioclase.

Plane-polarized



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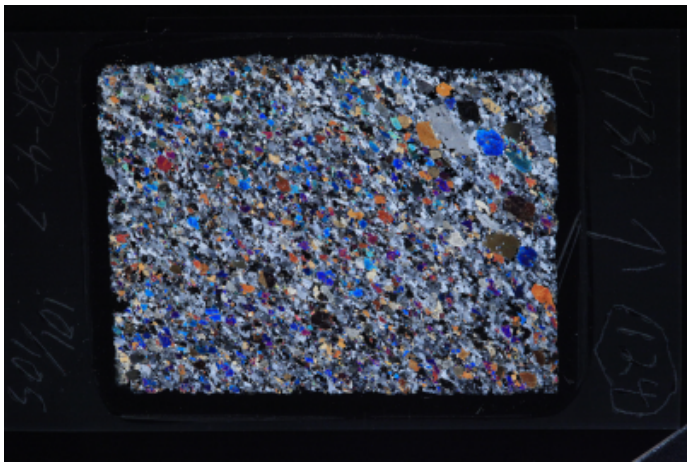
Cross-polarized



33067221

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: An olivine-bearing gabbro with a granular texture. The igneous lamination is defined by the preferred orientation of plagioclase and clinopyroxene. Plagioclase shows magmatic twins and undulose extinction. Exsolution of ilmenite can be seen in some clinopyroxenes. Small amount of orthopyroxene are present, which is in a tabular to equant shape. Brown amphibole commonly associates with opaque minerals, which are mainly composed of ilmenite. Intergrowth of ilmenite with sulfides can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	4			0.2	anhedral	subequant	
Plagioclase	50		1	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	45		2	1	anhedral	subequant	
Orthopyroxene	0.5		4	4	subhedral	tabular	
Amphibole	0.1		0.4	0.2	anhedral	interstitial	associates with opaque oxides
Opaques	0.9						
Ilmenite	0.7						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): TN

Detailed description Olivine is replaced by talc and at rims, and by greenish clay along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patches and blebs, and by green amphibole fringes. Orthopyroxene and plagioclase are fresh and only have fractures filled with actinolite or chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5	2	1
Amphibole, brown	n/a	60	n/a	n/a
Amphibole, colorless			100	50
Amphibole, green		25		
Chlorite				50
Clay minerals	45			
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	4	3		n/a
Sulfide	1	2		n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium to fine grained neoblasts; Grain shape: anhedral; Grain boundary: curved; Undulose extinction: irregular; Texture: subequant olivine neoblasts parallel to foliation
Plagioclase:	Grain size: medium- to fine-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Texture: one coarse grained porphyroclast, majority of grains are recrystallized medium- to fine-grained neoblasts
Clinopyroxene:	Grain size: medium-grained porphyroclasts; fine-grained neoblasts; Grain shape: anhedral Grain boundary: curved Texture: medium-grained porphyroclasts sub-parallel to foliation with fine-grained neoblasts around grain boundaries; cpx porphyroclasts include plagioclase
Oxide:	interstitial oxides, alinged sub-parallel to foliation

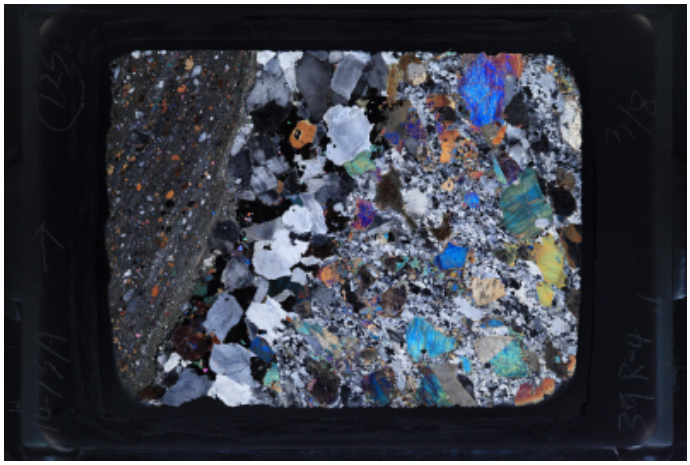
THIN SECTION LABEL ID: **360-U1473A-39R-4-W 3/8-TSB-TS_125** Piece no.: #01 TS no.: 125

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro crosscut by a mylonite. Primary magmatic texture of the olivine gabbro is not preserved, but is likely to be subophitic and ophitic, as plagioclase is partly or fully enclosed within clinopyroxene. A halo with subhedral plagioclase and oxides exists in the boundary.
Metamorphic petrology:	Sample consist of three lithologic domains with different alteration degree and replacement. The most conspicuous alteration mode are the brown and green amphibole replacement on the host rock's Cpx grains and the total replacement of brownish and reddish clays in some olivine grains.
Structure:	Pophyroclastic olivine gabbro with plagioclase, olivine and clinopyroxene partially recrystallized, is cross-cut by a felsic vein at high angle. The felsic vein is in contact with a mylonite, and the contact is sharp and parallel to the extenction of the vein.

Plane-polarized

33074131

Cross-polarized



33074191

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro crosscut by a mylonite. The olivine gabbro displays a porphyroclastic texture. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is near completely recrystallized and shows undulose extinction. Partly or fully enclosed plagioclase within clinopyroxene can be seen. Clinopyroxene displays a consertal intergrowth texture. There is a halo between the gabbro and mylonite, in which clinopyroxene is heavily replaced by amphibole. The halo contains more opaque minerals than the gabbro. Abundant zircons and apatites are present in the halo and mylonite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			4	anhedral	subequant	partly recrystallized
Plagioclase	45		3.2	0.4	subhedral	subequant	undulose extinction
Clinopyroxene	45		8	6	anhedral	subequant	partly recrystallized
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Interval domain no: 2 Domain rel. abundance (%): 25 Domain name:

Total rock alteration estimate (%): 50 Observer(s): JL

Detailed description This domain is composed of plagioclase and brown amphibole, and accessory zircons. The plagioclase is substantially replaced by 2nd plagioclase and near oxides, by reddish clays or iron oxyhydroxide. The brown amphibole is substantially replaced by green amphibole at the grain edge. Zircon and oxide (likely ilmenite) are fresh.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				50
Clay minerals				10
Plagioclase, sec.	n/a	n/a	n/a	90
Other			100	100
Subtotals replaced			100	100

Interval domain no: 1 Domain rel. abundance (%): 25 Domain name:

Total rock alteration estimate (%): 30 Observer(s): JL

Detailed description The domain is an ultramylonite composed of plagioclase, brown amphibole, zircon and probably sphene porphyroclasts. The fine-grained neoblasts are composed mostly of plagioclase and oxides, with a few zircon grains. Alteration is moderate. Plagioclase grains seems to have been affected by 2nd plagioclase replacement. Brown amphibole are rimmed by green amphibole. Towards the contact with the felsic vein (or diorite), the neoblast seems to look dusty and have a brownnish color in PPL. This was interpreted as clay overprinting some neoblastic or filling in grain boundaries. This boundary can serve as conduits for fluid infiltration and clay replacement.

Comment type	Comment
Mylonite comments:	The domain has an ultramylonitic texture. Porphyroclasts consist of plagioclase, brown amphibole, zircons and minor sphene. The neoblasts is dominantly plagioclase with some stings of oxides. Tiny grains of zircons are also possibly recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				30
Clay minerals				30
Plagioclase, sec.	n/a	n/a	n/a	70
Subtotals replaced				100

Interval domain no: 3 Domain rel. abundance (%): 50 Domain name:

Detailed description The domain is moderately altered. Alteration is more intense near the felsic vein. Olivine is significantly replaced by reddish and brownish clay minerals. and rimmed by pale amphibole. Cpx, especially those near the felsic vein is partially replaced by brown and green amphibole. Plagioclase crystals are mostly recrystallized. Large plagioclase grains exhibit a moderate 2nd plagioclase replacement.

Comment type	Comment
Mylonite comments:	The domain exhibit a mylonitic texture with a foliation oblique to that of the ultramylonite and the felsic vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	70	40		20
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	20	10		
Amphibole, green		20		
Clay minerals	60			100
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	10			n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and medium recrystallized Grain shape: anhedral Grain boundary: curved and altered Undulose extinction: weak in neoblast Texture: porphyroclastic partially recrystallized, neoblasts are observed in aggregates in association with recrystallized clinopyroxene
Plagioclase:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: anhedral Grain boundary: curved to straight Undulose extinction: regular to irregular Texture: porphyroclastic mainly recrystallized with rare deformed porphyroclasts; weakly elongated neoblasts define the foliation
Clinopyroxene:	Grain size: coarse porphyroclasts and medium recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: weak and regular Texture: porphyroclastic partially recrystallized, neoblasts are observed in aggregates in association with recrystallized olivine at porphyroclasts grain boundaries

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Oxide:	interstitial pods including zircon
Vein:	policrystalline felsic vein composed of plagioclase, amphibole, and minor zircon and oxides. Zircons are included in oxides pods. This felsic vein cross-cut the porphyroclastic gabbro.

Interval domain no: 3 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: crystal-plastic cross-cut the felsic vein with normal sinistral sense of shear. Minor zircons are observed. Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: very fine Grain shape: anhedral Grain boundary: curved Texture: completely recrystallized, defines the matrix of mylonite
Clinopyroxene:	Grain size: medium porphyroclasts and very fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: weak in porphyroclasts Texture: porphyroclastic partially recrystallized

THIN SECTION LABEL ID: **360-U1473A-39R-4-W 15/18-TSB-TS_126** Piece no.: #01 TS no.: 126

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction. Euhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene commonly displays a consertal intergrowth texture and rimmed by brown amphibole. Opaque minerals consist of ilmenite and sulfides.
Metamorphic petrology:	The alteration intensity of this thin section is moderate. Ol developed typical mesh texture.
Structure:	Porphyroclastic olivine gabbro with recrystallized plagioclase, olivine, and clinopyroxene.

Plane-polarized

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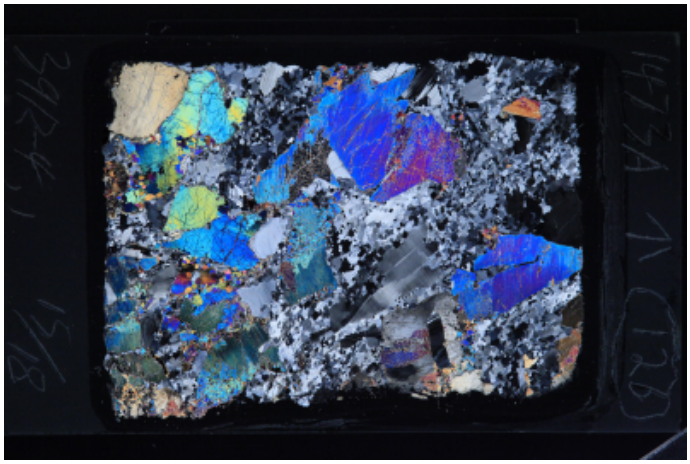
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction and is commonly recrystallized. Euhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene commonly displays a consertal intergrowth texture and rimmed by brown amphibole. It is also partly recrystallized and the neoblasts associate with brown amphibole. Opaque minerals consist of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			5	anhedral	subequant	partly recystallized and altered
Plagioclase	50		8	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	40		12	6	anhedral	subequant	with a consertal texture
Amphibole	0.5		0.4	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 18 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol developed typical mesh texture. The mesh core were fresh olivine and the mesh rim mainly consisted of oxide, serpentine and clay. Cpx altered into pale color amphibole and brown amphibole. Pl were mostly replaced by secondary plagioclase with minor pale color amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		30
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless	30	65		2
Clay minerals	15			
Oxide	25			n/a
Plagioclase, sec.	n/a	n/a	n/a	98
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Porphyroclastic olivine gabbro with recrystallized plagioclase, olivine, and clinopyroxene. The plagioclase neoblasts are polygonal suggesting some annealing.

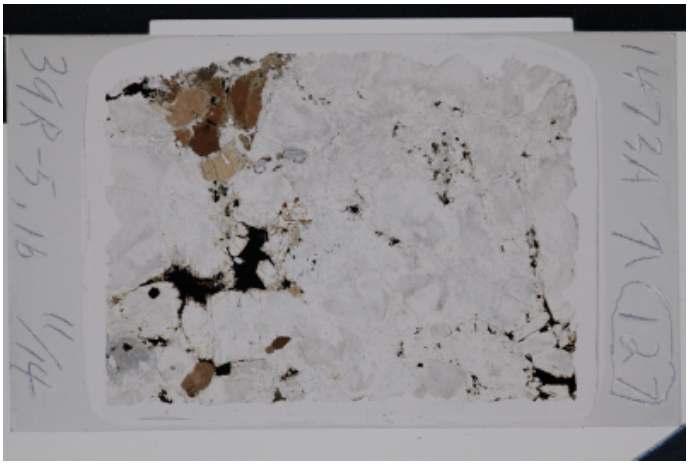
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	strong	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: porphyroclasts: 1.5-8 mm. neoblasts: ~0.25 mm. Grain shape: elongate to equigranular. Grain boundary: straight to curved. Undulose extinction: complete, straight subgrain boundaries. Texture: Porphyroclastic with tails of neoblasts.
Plagioclase:	Grain size: porphyroclasts: 2.5-5.5 mm. neoblasts: 0.1-0.5 mm. Grain shape: elongate porphyroclasts, equigranular neoblasts. Grain boundary: curved to polygonal. Twinning: tapered in most grain sizes. Undulose extinction: patchy. Subgrains: curved. Texture: porphyroclastic with bands of equigranular polygonal neoblasts.
Clinopyroxene:	Grain size: porphyroclasts: ~1 mm. neoblasts: ~0.25 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: porphyroclasts with limited recrystallization. neoblasts are in aggregates with neoblasts of olivine.

THIN SECTION LABEL ID: **360-U1473A-39R-5-W 11/14-TSB-TS_127** Piece no.: #01 TS no.: 127

Group	Summary
Igneous petrology:	A coarse-grained oxide-bearing diorite. It displays a granular texture and is predominated by plagioclase, with minor amphibole and quartz.
Metamorphic petrology:	Felsic patch/vein is moderately altered. Plagioclase is replaced by 2nd plagioclase, clay minerals and iron-oxyhydroxides. Presence of quartz and brown amphibole.
Structure:	Magmatic breccia composed of large porphyroclasts with interstitial euhedral to subhedral plagioclase grains as well as large pods of oxides.

Plane-polarized



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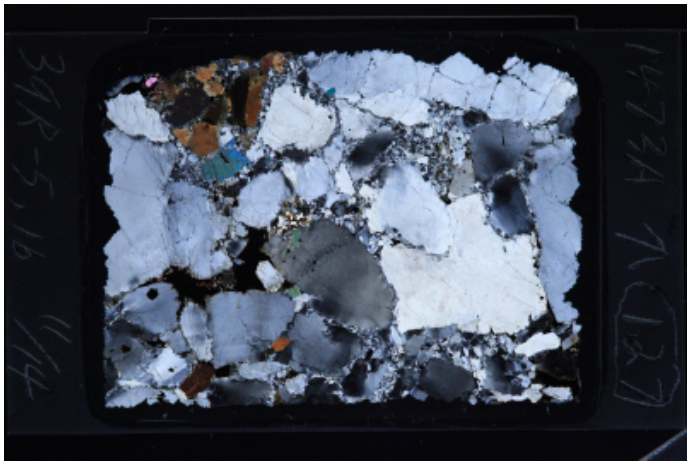
Cross-polarized



33067141

IGNEOUS PETROLOGY

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained oxide-bearing diorite. It displays a granular texture and is predominated by plagioclase, with minor amphibole and quartz. Amphibole is subhedral and has a brown color. Opaque oxides are predominated by ilmenite. Big zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		12	6	subhedral	subequant	
Amphibole	2		4	2.4	anhedral	subequant	
Opaques	6						
Ilmenite	6						
Quartz	2		0.4	0.4	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): JL

Detailed description The sample is a felsic vein composed mainly of plagioclase and brown amphibole with minor quartz and accessory zircon. Plagioclase are substantially altered into secondary plagioclase. Clay minerals were also observed in highly fractured parts of the grain. Iron oxyhydroxides were also observed in plagioclase and quartz rims and microfractures near oxides and mafic minerals. Brown amphibole is replaced by pale brown amphibole at the grain edges and usually by green amphibole in smaller grains surrounded by plagioclae. The vein also exhibit deformation as observed in the recrystallized polygonal crystals of plagioclase.

Comment type	Comment
Mylonite comments:	Polygonal aggregates of plagioclase were observed to surround larger plagioclase grains.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				40
Clay minerals				5
Plagioclase, sec.	n/a	n/a	n/a	85
Other			100	100
Subtotals replaced			100	100

MICROSTRUCTURES

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	absent	n/a

Type	Comment
Plagioclase:	Grain size: coarse-grained porphyroclasts with medium- to fine-grained interstitial plagioclase grains Grain shape: anhedral porphyroclasts; euhedral to subhedral interstitial plagioclase grains Grain boundary: straight to curved Twinning: tapered (porphyroclasts) Undulose extinction: irregular Texture: porphyroclasts with interstitial plagioclase grains
Oxide:	interstitial oxide pods

THIN SECTION LABEL ID: **360-U1473A-39R-5-W 125/128-TSB-TS_128** Piece no.: #11 TS no.: 128

Group	Summary
Igneous petrology:	A medium-grained diorite predominated by plagioclase. It displays a granular texture. Plagioclase is subhedral and shows an oscillatory zoning.
Metamorphic petrology:	Felsic melt infiltrated a gabbro and incorporated many xenocrysts from the gabbro which form the major part of the mafic minerals. All show significant replacements due to interaction with the felsic melt, producing amph-cpx symplectite in the clinopyroxene, overgrowth of brown amphibole, and biotite formation. Latest metamorphic event produced clayminerals and quartz/calcite assemblages.
Structure:	This rock comes from a felsic pocket in the core section. It is an undeformed diorite with coarse plagioclase and amphibole grains. Alteration is observed in both phases, associated with oxides.

Plane-polarized

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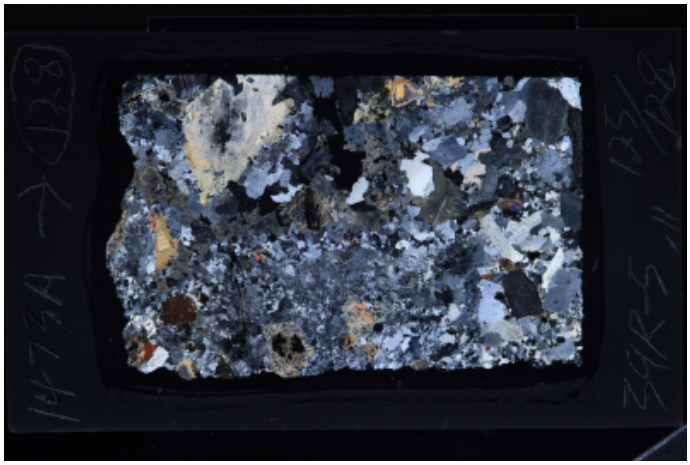
Cross-polarized



33067101

IGNEOUS PETROLOGY

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained diorite predominated by plagioclase. It displays a granular texture. Plagioclase is subhedral and commonly shows an oscillatory zoning. Amphibole has a light brown color and has the typical cleavages. Some zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	85		3.2	2	subhedral	tabular	moderately altered
Amphibole	5		2.4	1	subhedral	subequant	
Quartz	10		2.8	2	anhedral	subequant	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 100 Domain name: quartz diorite

Total rock alteration estimate (%): 20 Observer(s): JK

Detailed description Felsic melt infiltrated a gabbro and incorporated many xenocrysts from the gabbro which form the major part of the mafic minerals. All show significant replacements due to interaction with the felsic melt, producing amph-cpx symplectite in the clinopyroxene, overgrowth of brown amphibole, and biotite formation. Latest metamorphic event produced clayminerals and quartz/calcite assemblages.

Comment type	Comment
Alteration general comments:	felsic melt infiltrated a gabbro and incorporated many xenocrysts from the gabbro which form the major part of the mafic minerals. All show significant replacements due to interaction with the felsic melt, producing amph-cpx symplectite in the clinopyroxene, overgrowth of brown amphibole, and biotite formation.
Mylonite comments:	fragments of the gabbro show plastic deformation
Cataclasite comments:	the whole was cataclastically overprinted; slight mortar texture
Vein 1 minerals:	chlorite
Vein 2 minerals:	iron oxide or hydroxide

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	80		20
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		10		10
Amphibole, green	20	20		10
Chlorite	10			10
Clay minerals	10			20
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic amphibole is present as coarse to medium grains, altered. Observer: GV

Detailed description This rock comes from a felsic pocket in the core section. It is an undeformed diorite with coarse plagioclase and amphibole grains. Alteration is observed in both phases, associated with oxides.

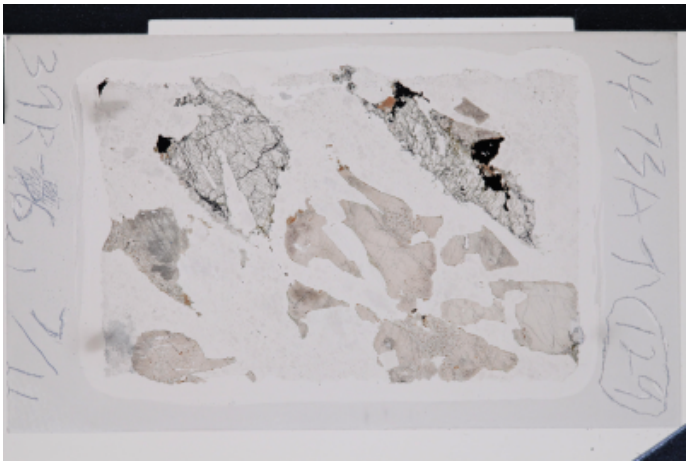
Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	size: medium to coarse grained shape: anhedral boundaries: curved twinning: tapered, altered, locally observed undulose extinction: irregular texture: coarse to medium grained plag, altered

THIN SECTION LABEL ID: **360-U1473A-39R-6-W 7/11-TSB-TS_129** Piece no.: #01 TS no.: 129

Group	Summary
Igneous petrology:	A coarse-grained disseminated oxide olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and brown amphibole. Subhedral plagioclase is partly or fully enclosed within olivine and clinopyroxene. Clinopyroxene contains blebs of brown amphibole. Opaque minerals are predominated by ilmenite.
Metamorphic petrology:	Olivine is moderately altered into serpentine, talc and oxides. Cpx is rimmed by brown and green amphibole. Plagioclase is only slighlty altered. Most plagioclase grains are neoblastic.
Structure:	porphyroclastic rock composed of fine-grained recrystallized plag aggregates and clasts of olivine, cpx and plag.

Plane-polarized



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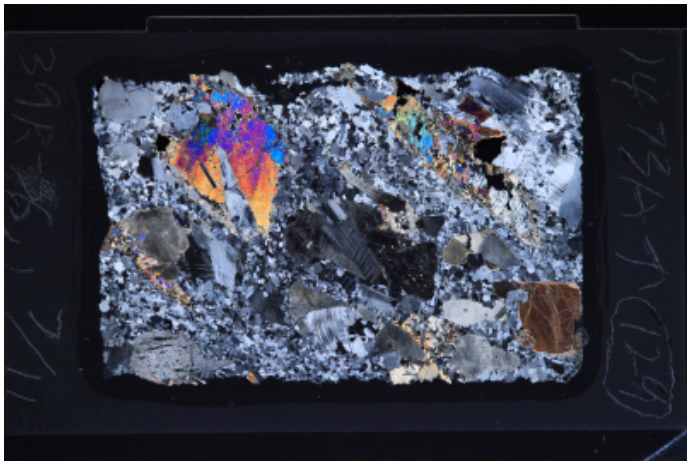
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **disseminated oxide olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained disseminated oxide olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and brown amphibole. Plagioclase is strongly recrystallized and the neoblasts display magmatic twins. Subhedral plagioclase is partly or fully enclosed within olivine and clinopyroxene. Clinopyroxene is partly recrystallized and contains blebs of brown amphibole. Opaque minerals are predominated by ilmenite, and intergrowth with sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			10	anhedral	elongate	rimmed by orthopyroxene and brown amphiboles
Plagioclase	65		4	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	22		8	5	anhedral	poikilitic	with brown amphibole at the rim
Amphibole	0.5		0.2	0.1	anhedral	interstitial	sometimes associates with opaque minerals
Opaques	1						
Ilmenite	1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Olivine is moderately altered into serpentine and oxide in a mesh texture and surrounded by a talc and oxide rim. Cpx alteration occurs at the grain edge where primary grains are rimmed by brown and green amphibole. Brown amphibole blebs also occurs within the Cpx crystals. Plagioclase porphyroclasts is only slightly replaced by 2nd plagioclase. Neoblastic aggregates of plagioclase are abundant. Cpx starts to fragment into smaller grains. Neoblastic Cpx grains occurs together with neoblastic brown amphibole veins. Olivine grains are elongated and fragmented.

Comment type	Comment
Mylonite comments:	Olivine grains are elongated. Cpx grains shows development of finer grained aggregates within big Cpx crystals. A bulk of the plagioclase are recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	15	0	10
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless	5	20		
Amphibole, green		40		
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description porphyroclastic rock composed of fine-grained recrystallized plag aggregates and clasts of olivine, cpx and plag. Olivine is partially recrystallized and altered. Cpx is fractured and plagioclase clasts have bent twins.

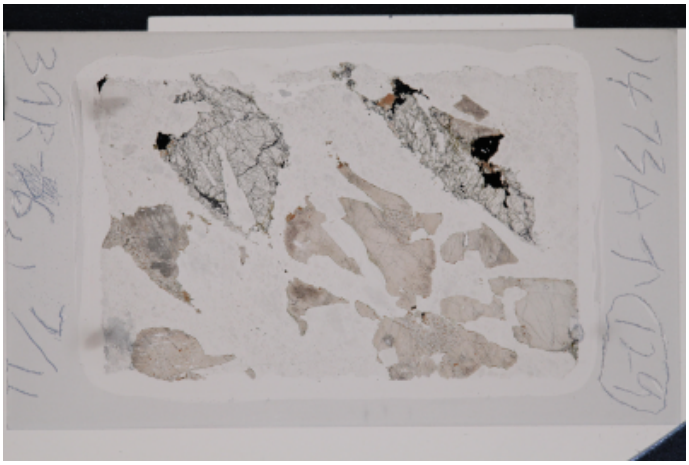
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse clasts and recrystallized fine grains shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse clasts partially altered and recrystallized in the borders.
Plagioclase:	size: coarse clasts and fine recrystallized grains shape: subhedral to anhedral boundaries: curved to straight twinning: tapered undulose extinction: irregular subgrains: curved to straight boundaries texture: fine recrystallized matrix with some medium to coarse porphyroclasts.
Clinopyroxene:	size: coarse to medium shape: anhedral boundaries: curved fractures: common texture: partially altered porhyroclasts
Oxide:	geometry: irregular pods commonly associated with alteration of olivine

THIN SECTION LABEL ID: **360-U1473A-40R-1-W 69/73-TSB-TS_130** Piece no.: #05 TS no.: 130

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and brown amphibole. Plagioclase is partly recrystallized and the neoblast show undulose extinction. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture.
Metamorphic petrology:	The sample shows the dynamic recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are typically associated with minor amounts of red-brown Amp and, locally, of opaque phases. The static alteration is negligible.
Structure:	Porphyroclastic zone with almost completely recrystallized plagioclase and limited recrystallization of pyroxene and olivine, defining a fabric.

Plane-polarized



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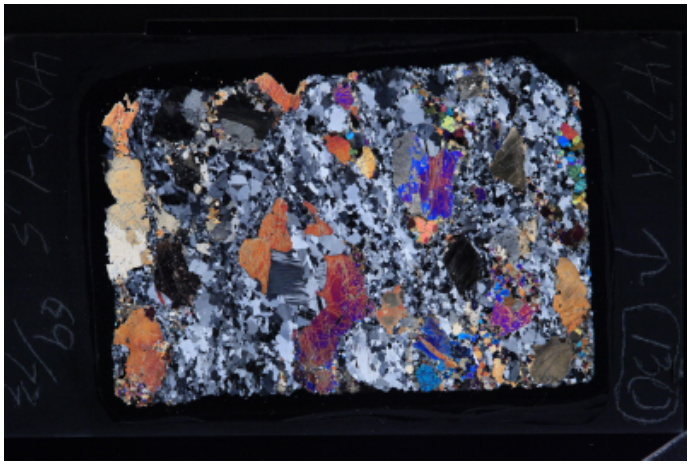
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is in a subequant shape, and rimmed by orthopyroxene and brown amphibole. Plagioclase is partly recrystallized and the neoblast show undulose extinction. Magmatic twins can be seen in big plagioclase grains. Subhedral plagioclase is partly enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture. It is rimmed by brown amphibole patches together with opaque oxides. Intergrowth of ilmenite and sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.2	subhedral	subequant	rimmed by brown amphibole and orthopyroxene
Plagioclase	55		2	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	40		8	3.2	anhedral	subequant	replaced by brown amphibole at the rim
Amphibole	0.5		0.6	0.6	subhedral	subequant	sometimes associates with opaque minerals
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The sample shows the dynamic recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are typically associated with minor amounts of red-brown Amp and, locally, of opaque phases. The static alteration is negligible.

Comment type	Comment
Alteration general comments:	The static alteration is negligible.
Mylonite comments:	The sample shows the dynamic recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are typically associated with minor amounts of red-brown Amp and, locally, of opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	2		2
Amphibole, colorless		100		80
Chlorite				20
Clay minerals	40			
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Porphyroclastic zone with almost completely recrystallized plagioclase defining a fabric. The olivine and pyroxene have limited recrystallization. The plagioclase neoblasts are polygonal with irregular boundaries suggestive of grain boundary migration recrystallization.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: porphyroclasts: ~2.5 mm. neoblasts: ~0.25 mm. Grain shape: anhedral. Grain boundary: irregular. Undulose extinction: complete.
Plagioclase:	Grain size: porphyroclasts: 1.5-5 mm. neoblasts: 0.075-0.25 mm. Grain shape: equigranular. Grain boundary: straight to curved. Twinning: tapered. Undulose extinction: patchy, better developed in larger crystals. Texture: Porphyroclastic with few porphyroclasts. Most neoblasts are equigranular and polygonal.
Clinopyroxene:	Grain size: porphyroclasts: 2.5-8 mm. neoblasts: ~0.25. Grain shape: subhedral. Grain boundary; straight to curve. Texture: porphyroclastic with limited neoblasts.
Oxide:	Small pods near mafic porphyroclasts.

THIN SECTION LABEL ID: **360-U1473A-40R-1-W 121/128-TSB-TS_131** Piece no.: #10 TS no.: 131

Group	Summary
Igneous petrology:	An olivine gabbro mylonite. Primary magmatic texture could be subophitic or ophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is substantial. Clay minerals were pervasively present in this thin section.
Structure:	Inclined porphyroclastic fabric crosscut by a sub-vertical reverse sense mylonite with a weakly deformed plagioclase-rich, amphibole-bearing patch.

Plane-polarized

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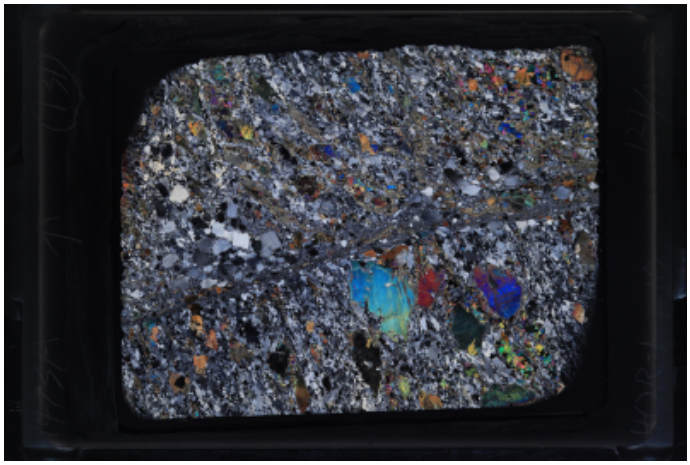
Cross-polarized



33074111

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A deformed olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is recrystallized and highly foliated. Olivine is elongated along the foliation and moderately altered. Clinopyroxene is partly recrystallized and the neoblasts are distributed along the foliation. Clinopyroxene porphyroclasts are less deformed and contain plagioclase inclusions. Clinopyroxene is strongly replaced by brown amphibole. It is crosscut by several trondhjemite veins, in which a few zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	20			0.6	anhedral	elongate	
Plagioclase	60		2.8	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	20		9	6	anhedral	elongate	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 47 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Talc, pale color amphibole and oxides occurred as rims of Ol neoblasts. Ol developed typical mesh texture which consisted of Ol cores and clay minerals, serpentine and oxides mixture rims. Cpx altered into pale color amphibole, brown amphibole, secondary Cpx and clay minerals. Pl were mostly replaced by secondary Pl with minor tiny pale color amphibole, chlorite and clay occurring in the cleavages.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro charactered by recrystallization of Ol, Cpx, Pl and quartz. Most of Cpx neoblasts were more or less associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	45	40		50
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		65		4
Amphibole, green	30			
Chlorite				3
Clay minerals	15	10		8
Clinopyroxene, sec.	n/a	5	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 85 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description

Inclined porphyroclastic fabric crosscut by a sub-vertical reverse sense mylonite with a patchy, weakly deformed plagioclase-rich, amphibole-bearing zone. The porphyroclastic shear zone has almost complete recrystallization of plagioclase, aggregates of porphyroclasts and neoblasts of olivine, and limited recrystallization in pyroxene. The sub-vertical mylonite transposes the porphryclastic fabric indicating reverse sense of shear and has amphibole. The plagioclase rich patch has a thinner vein of plagioclase leading to it. The weakly deformed patch is plagioclase rich and has amphibole present. The cross-cutting relationships indicate the host olivine gabbro formed first, then the mylonite, then the weakly deformed plagioclase-rich patch.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fault sense of shear:	reverse-sinistral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: 1-3 mm. neoblasts: ~0.25 mm. Grain shape: subhedral. Grain boundary: curved to straight. Undulose extinction: patchy. Texture: aggregates of porphyroclasts and neoblasts.
Plagioclase:	Grain size: porphyroclasts: ~2 mm. neoblasts: 0.1-0.25 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered. Undulose extinction: patchy. Subgrains: present in porphyroclasts and larger neoblasts. Texture: strongly recrystallized foliated plagioclase in aggregates.
Clinopyroxene:	Grain size: porphyroclasts: 2.5-8 mm. neoblasts: ~0.25 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: porphyroclastic with limited recrystallization.
Oxide:	In low abundance near pyroxene porphyroclasts and with the alteration of olivine.

Interval domain no: 2 Domain rel. abundance (%): 5 Domain name: microfabric

Microstructure: submagmatic Observer: JD

Detailed description

Inclined porphyroclastic fabric crosscut by a sub-vertical reverse sense mylonite with a patchy, weakly deformed plagioclase-rich, amphibole-bearing zone. The porphyroclastic shear zone has almost complete recrystallization of plagioclase, aggregates of porphyroclasts and neoblasts of olivine, and limited recrystallization in pyroxene. The sub-vertical mylonite transposes the porphryclastic fabric indicating reverse sense of shear and has amphibole. The plagioclase rich patch has a thinner vein of plagioclase leading to it. The weakly deformed patch is plagioclase rich and has amphibole present. The cross-cutting relationships indicate the host olivine gabbro formed first, then the mylonite, then the weakly deformed plagioclase-rich patch.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	isotropic	0
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	Absent.
Plagioclase:	Grain size: porphyroclasts: 1-3 mm. neoblasts: ~0.125 mm. Grain shape: anhedral to subhedral. Grain boundary: straight to curved. Twinning: absent. Undulose extinction: patchy. Subgrains: patchy. Texture: :Larger porphyroclasts with limited recrystallization, no shape preferred orientation.
Clinopyroxene:	Grain size: Grain shape: Grain boundary: Texture:

Interval domain no: 3 Domain rel. abundance (%): 10 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description

Inclined porphyroclastic fabric crosscut by a sub-vertical reverse sense mylonite with a patchy, weakly deformed plagioclase-rich, amphibole-bearing zone. The porphyroclastic shear zone has almost complete recrystallization of plagioclase, aggregates of porphyroclasts and neoblasts of olivine, and limited recrystallization in pyroxene. The sub-vertical mylonite transposes the porphryclastic fabric indicating reverse sense of shear and has amphibole. The plagioclase rich patch has a thinner vein of plagioclase leading to it. The weakly deformed patch is plagioclase rich and has amphibole present. The cross-cutting relationships indicate the host olivine gabbro formed first, then the mylonite, then the weakly deformed plagioclase-rich patch.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	reverse-sinistral	n/a

Type	Comment
Olivine:	Absent. If present, small and altered.
Plagioclase:	Grain size: porphyroclasts: ~0.5 mm. neoblasts: 0.01-0.5 mm. Grain shape: anhedral. Grain boundary: irregular Twinning: limited, if present, tapered. Undulose extinction: patchy. Subgrains: curved in porphyroclasts. Texture: very fine grained aggregates of plagiolcase with few porphyroclasts.
Clinopyroxene:	Grain size: Grain shape: Grain boundary: Texture:
Oxide:	Thin ribbons of oxide. Low abundance.

THIN SECTION LABEL ID: **360-U1473A-40R-2-W 3/10-TSB-TS_132** Piece no.: #01 TS no.: 132

Group	Summary
Igneous petrology:	An olivine gabbro mylonite. Primary magmatic texture could be subophitic or ophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Dynamically recrystallized neoblasts are olivine, clinopyroxene and plagioclase. Olivine is more abundant in fine-grained rock than in coarser one. Static alteration intensity is slight.
Structure:	Inclined normal-sense porphyroclastic crystal plastic fabric overprinted by ultramylonitic plagioclase-rich bands.

Plane-polarized

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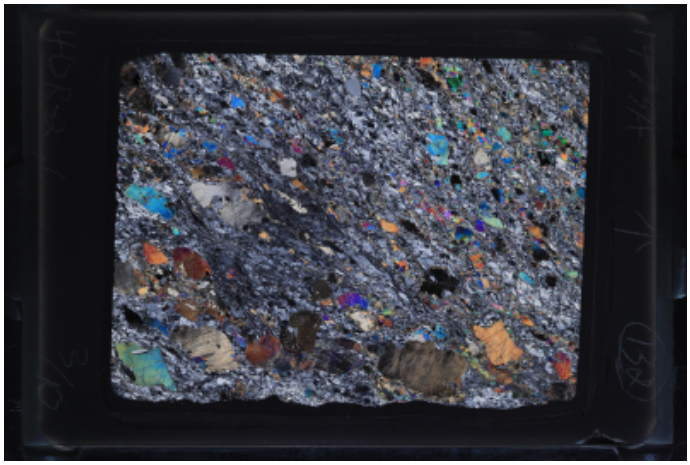
Cross-polarized



33074071

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: mylonitic Ave. grain size: medium grained [345]

Detailed description: An olivine gabbro mylonite. Primary magmatic texture could be subophitic or ophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1.2	anhedral	elongate	
Plagioclase	68		2	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	24		8	5	anhedral	elongate	with plagioclase inclusions

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): TN

Detailed description Fine-grained rock is richer in olivine than coarse-grained rock. In bothe rocks, neoblasts are olivine, clinopyroxene and plagioclase. Olivine ie statically replaced by talc and clay with oxide and sulfide. Clinopyroxene is replaced by secondary clinopyroxene patches, by brown amphibole patches and blebs, and by green or colorless amphibole rims. Very fine-grained plagioclase is completely coloreless, and so could be secondary plagioclase (Ab-component rich).

Comment type	Comment
Mylonite comments:	Ol, Cpx, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	8		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		15		
Amphibole, green		20		
Chlorite				10
Clay minerals	50			
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Sulfide	1	1		n/a
Talc	45	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Inclined normal-sense porphyroclastic crystal plastic fabric overprinted by ultramylonitic plagioclase-rich bands. The porphyroclastic crystal plastic fabric is defined by porphyroclasts of plagioclase, olivine, and pyroxene. The ultramylonite is anastomosing surrounding phacoids of plagioclase and pyroxene.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: 1-2 mm. neoblasts: ~0.15 mm. Grain shape: anhedral. Grain boundary: straight to curved. Undulose extinction: patchy Texture: elongate aggregates of porphyroclasts and neoblasts parallel to the foliation.
Plagioclase:	Grain size: porphyroclasts: 2-5 mm. neoblasts: 0.025-0.125 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered, better developed in larger clasts. Undulose extinction: complete to patchy. Subgrains: present, curved. Texture: asymmetric elongate porphyroclasts.
Clinopyroxene:	Grain size: porphyroclasts: 1-10 mm. neoblasts: ~0.25 mm. Grain shape: subhedral. Grain boundary: shape to curved. Texture: porphyroclasts with limited recrystallization.
Oxide:	Limited abundance, in pressure shadows near olivine and pyroxene porphyroclasts.

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Inclined normal-sense porphyroclastic crystal plastic fabric overprinted by ultramylonitic plagioclase-rich bands. The porphyroclastic crystal plastic fabric is defined by porphyroclasts of plagioclase, olivine, and pyroxene. The ultramylonite is anastomosing surrounding phacoids of plagioclase and pyroxene.

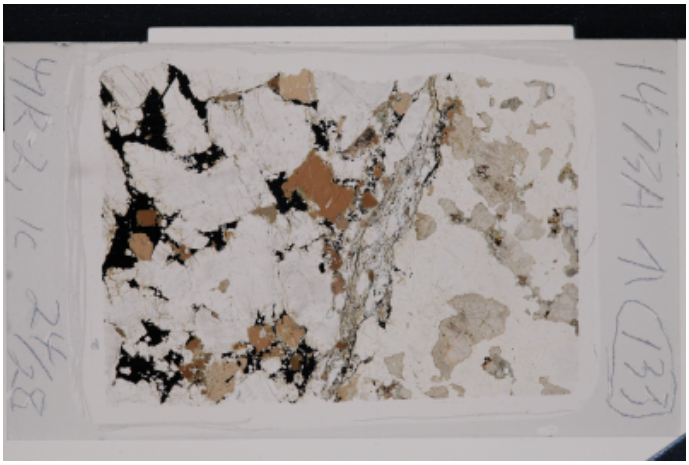
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	ultramylonitic [CPF_fabric]	5
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	low abundance to absent.
Plagioclase:	Grain size: neoblasts: ~0.0125 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: none. Undulose extinction: patchy. Subgrains: limited. Texture: very fine grained aggregates of plagioclase.
Clinopyroxene:	Limited if present.

THIN SECTION LABEL ID: **360-U1473A-41R-2-W 24/28-TSB-TS_133** Piece no.: #01 TS no.: 133

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro intruded by a diorite vein. Primary magmatic texture of the gabbro is not preserved. The diorite shows a granular texture.
Metamorphic petrology:	The sample includes a contact between a gabbronorite and an oxide-rich diorite. In the gabbronorite, Pl is frequently recrystallized into nearly polygonal aggregates, and Cpx is rimmed by brown Amp coronas. In addition, Cpx shows symplectitic aggregates made up of secondary Cpx and vermicular brown Amp. The oxide-rich diorite has relatively high amounts of brown Amp. The static alteration is overall moderate.
Structure:	Felsic material/breccia and oxide-rich zone in contact with an olivine gabbro with the contact defined by a mylonite.

Plane-polarized



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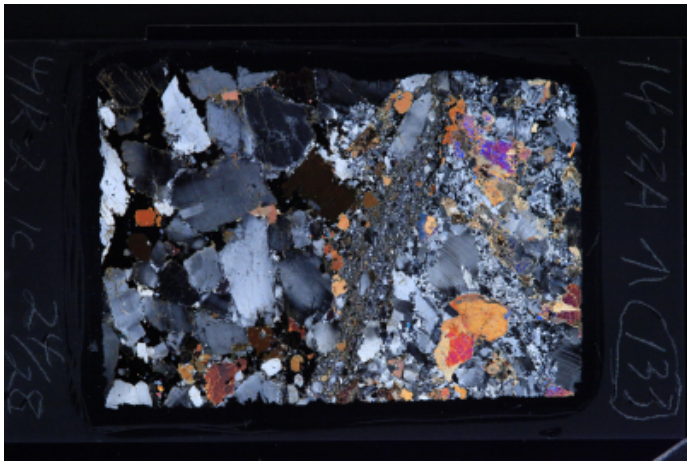
Cross-polarized



33069711

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 40 Domain name: lithology

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: This domain is an olivine-bearing gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is heavily altered. Plagioclase is strongly recrystallized and displays undulose extinction. Clinopyroxene displays a consertal intergrowth texture and contains abundant inclusions.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1			0.6			strongly altered
Plagioclase	75		4.4	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	23		3.6	2.8	anhedral	subequant	abundant inclusions
Amphibole	0.5		0.2	0.2	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.5						

Interval domain no: **2** Domain rel. abundance (%): 60 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: This domains is a diorite with a granular texture. It is predominated by plagioclase, with small amount of amphibole and sulfides. Plagioclase displays undulose extinction. Amphibole is in a subequant shape, with inclusions of apatite and zircons. Few biotites are present. Some opaque minerals are also enclosed within amphibole. Opaque minerals are predominated by ilmenite. The boundary between gabbro and diorite is highly deformed. Abundant zircons are present along the boundary.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		7	3	anhedral	subequant	undulose extinction
Amphibole	5		4.4	2.4	subhedral	subequant	
Opaques	5						
Ilmenite	5						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): Domain name: gabbronorite

Total rock alteration estimate (%): 20 Observer(s): RT

Detailed description The sample includes a contact between a gabbronorite and an oxide-rich diorite. Along the contact, there is a fault zone characterized by fine-grained plagioclase aggregates, frequently associated with oxide phases, and alignment of relatively large crystals of Pl and Amp. In the gabbronorite, Pl is frequently recrystallized into nearly polygonal aggregates, and Cpx is rimmed by brown Amp coronas. In addition, Cpx shows symplectitic aggregates made up of secondary Cpx and vermicular brown Amp. This structure is typically observed towards the margin of the Cpx and is rimmed by the outermost rim of brown Amp, Opx is rimmed by aggregates made up of brown to green Amp. The inner portion of Opx are extensively replaced by clay, calcite and minor talc and oxide phases. Pl alteration is restricted to clay along micro-veins and along grain boundaries among Pl neoblasts. The alteration is overall moderate.

Comment type	Comment
Alteration general comments:	The alteration is moderate
Mylonite comments:	The sample includes a contact between a gabbronorite and an oxide-rich diorite. Along the contact, there is a fault zone characterized by fine-grained plagioclase aggregates, frequently associated with oxide phases, and alignment of relatively large crystals of Pl and Amp. In the olivine-gabbronorite, Pl is frequently recrystallized into nearly polygonal aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		40	90	5
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, green			15	
Clay minerals			30	100
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide			5	n/a
Talc		n/a	5	n/a
Other			45	45
Subtotals replaced		100	100	100

Interval domain no: 2 Domain rel. abundance (%): Domain name: oxide-rich diorite

Total rock alteration estimate (%): Observer(s): RT

Detailed description The oxide-rich diorite has relatively high amounts of brown Amp that is partially altered into green Amp. It also includes Bt and relatively high amounts of zircon. Pl is locally altered into secondary plagioclase or clay minerals. The alteration is overall slight.

Comment type	Comment
Alteration general comments:	The alteration is overall slight.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				10
Clay minerals				50
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced				100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: magmatic Observer: JD

Detailed description Felsic material/breccia and oxide-rich zone in contact with an olivine gabbro with a mylonitic boundary. The breccia has porphyroclasts of plagioclase rimmed by neoblasts. The oxide pods are in the interstitial spaces between the plagioclase. The oxide pods surround amphibole phenocrysts. The mylonite has very fine grained plagioclase with some porphyroclasts of amphibole. The sense of shear is normal. The gabbro has weak to moderate recrystalization with almost no deformation in the pyroxene.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Plagioclase:	Grain size: porphyroclasts: 2-10 mm. neoblasts: 0.05-0.25 mm. Grain shape: sub to anhedral. Grain boundary: Twinning: magmatic to tapered. Subgrain boundaries: not well developed, curved. Undulose extinction: patchy. Texture: Only recrytsallization near grain boundaries, most of the sample is not recrystallized.
Clinopyroxene:	amphibole and biotite instead.
Oxide:	Interstitial oxide pods between porphyroclasts of plagioclase. The oxide pods completely surround neoblasts of plagioclase and phenocrysts of amphibole.

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Felsic material/breccia and oxide-rich zone in contact with an olivine gabbro with a mylonitic boundary. The breccia has porphyroclasts of plagioclase rimmed by neoblasts. The oxide pods are in the interstitial spaces between the plagioclase. The oxide pods surround amphibole phenocrysts. The mylonite has very fine grained plagioclase with some porphyroclasts of amphibole. The sense of shear is normal. The gabbro has weak to moderate recrystalization with almost no deformation in the pyroxene.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Plagioclase:	Grain size: porphyroclasts: 1-8 mm. neoblasts: 0.1-0.5 mm. Grain shape: equigranular. Grain boundary: curved to straight. Twinning: tapered, better developed in larger crystals. Subgrain boundaries: curved. Undulose extinction: patchy. Texture: porphyroclastic with polygonal, equigranular neoblasts.
Clinopyroxene:	Grain size: porphyroclasts: ~5 mm. neoblast: altered. Grain shape: subhedral. Grain boundary: curved to straight. Texture: mostly magmatic with limited deformation.

Interval domain no: 3 Domain rel. abundance (%): 10 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Felsic material/breccia and oxide-rich zone in contact with an olivine gabbro with a mylonitic boundary. The breccia has porphyroclasts of plagioclase rimmed by neoblasts. The oxide pods are in the interstitial spaces between the plagioclase. The oxide pods surround amphibole phenocrysts. The mylonite has very fine grained plagioclase with some porphyroclasts of amphibole. The sense of shear is normal. The gabbro has weak to moderate recrystalization with almost no deformation in the pyroxene.

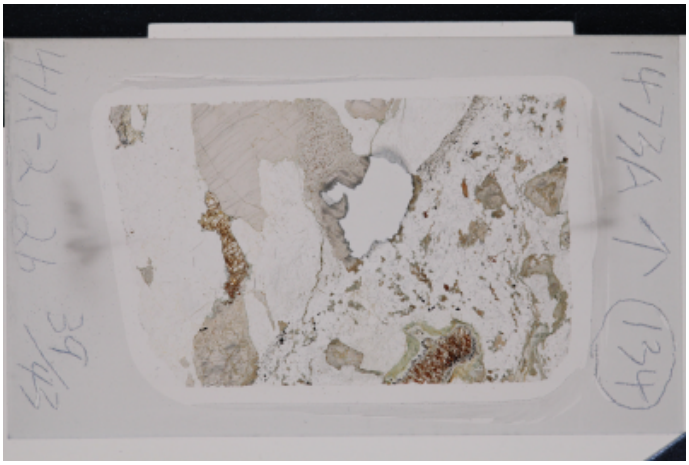
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fault sense of shear:	normal-dextral	n/a

Type	Comment
Plagioclase:	Grain size: porphyroclasts: ~2 mm. neoblasts: 0.01-0.1 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered when present Subgrain boundaries: curved Undulose extinction: patchy to complete. Texture: strongly to completely recrystallized very fine grained plagioclase with a few larger porphyroclasts.
Clinopyroxene:	All amphibole, no pyroxene present.

THIN SECTION LABEL ID: **360-U1473A-41R-2-W 39/43-TSB-TS_134** Piece no.: #02 TS no.: 134

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing gabbro intruded by a diorite vein. Primary magmatic texture of the olivine-bearing gabbro is not preserved. The diorite displays a granular texture.
Metamorphic petrology:	The thin section shows a contact between an Ol-gabbro and a felsic vein that includes Cpx and Ol grains. The contact between the two rock-types is characterized by a thin fine-grained band rich in amphibole and oxide phases. In the Ol-gabbro, Ol and Cpx are rimmed by brown to green Amp coronas. The felsic vein mostly consists of subhedral to euhedral Pl and minor amounts of brown Amp and biotite. The included Cpx grains are rimmed by brown Amp, locally in association with biotite. The felsic veins also includes a psudomorph after olivine that is rimmed by a corona made up of green Amp and biotite. The rock alteration is overall moderate.
Structure:	This rock consists of a fine-grained plagioclase matrix in which porphyroclasts of plag and cpx are contained. the matrix is recrystallized to polygonal aggregates of equant grain size.

Plane-polarized



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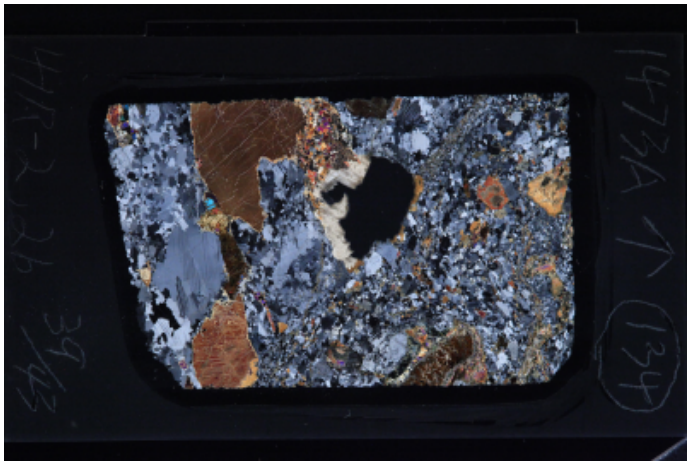
Cross-polarized



33069671

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 55 Domain name: lithology

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained [345]

Detailed description: This domain is an olivine-bearing gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Olivine is partly altered and plagioclase is strongly recrystallized. Clinopyroxene is partly recrystallized and the neoblasts associate with brown amphibole. Brown amphibole also occurs at the rim of olivine and clinopyroxene. Small amount of opaque oxides are present and are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			0.4	subhedral	subequant	partly altered
Plagioclase	65		7	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	33		10	10	anhedral	subequant	

Interval domain no: **2** Domain rel. abundance (%): 45 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: fine grained [345]

Detailed description: This domain is a diorite vein with a granular texture. It mainly consist of plagioclase, with minor amphibole and quartz. The subhedral plagioclase displays an oscillatory zoning. Amphibole has a green to brown color. Quartz is interstitial between plagioclase and shows undulose extinction. Abundant zircons are present in the boundary between gabbro and diorite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	85		1.2	0.6	euhedral	subequant	undulose extinction
Amphibole	10		1	0.4	subhedral	subequant	
Quartz	5		0.5	0.2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): Domain name: Ol-gabbro

Total rock alteration estimate (%): 10 Observer(s): RT

Detailed description The thin section shows a contact between an Ol-gabbro and a felsic vein including pieces of gabbros. The contact between the two rock-types is characterized by a thin fine-grained band rich in amphibole and oxide phases, locally including biotite and zircon. In the Ol-gabbro, Ol is moderately altered into clay and is rimmed by a thin green Amp corona. Cpx is rimmed by brown to green Amp coronas and locally contains micro-veins filled with clay. Pl alteration is confined to clay minerals in micro-veins. The alteration is overall slight.

Comment type	Comment
Alteration general comments:	The alteration is overall slight,
Mylonite comments:	The Ol-gabbro shows the frequent recrystallization of Pl into nearly polygonal aggregates. Cpx is locally recrystallized into neoblastic clinopyroxene associated with minor amounts of red-brown Amp and, probably, orthopyroxene.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	10		5
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	20			
Amphibole, green		20		
Clay minerals	80	30		100
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): Domain name: felsic vein

Total rock alteration estimate (%): Observer(s): RT

Detailed description The felsic vein mostly consists of subhedral to euhedral Pl and minor amounts of brown Amp and biotite. It includes Cpx grains that are rimmed by brown Amp, locally in association with biotite. There is also a pseudomorph after olivine, mostly made of clay mineral and minor calcite, that is entirely rimmed by a corona made up of green Amp and biotite. This corona is substantially altered into pale green Amp and chlorite.

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description This rock consists of a fine-grained plagioclase matrix in which porphyroclasts of plag and cpx are contained. the matrix is recrystallized to polygonal aggregates of equant grain size. When in association with oxides and alteration products, plag grain size becomes finer.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	size: medium to fine grained shape: anhedral boundaries: straight to curved undulose extinction: irregular subgrains: curved boundaries texture: fractured and altered porphyroclasts commonly associated with green amphibole and oxides.
Plagioclase:	size: medium to fine shape: anhedral boundaries: straight twinning: tapered undulose extinction: irregular subgrains: curved to straight boundaries texture: fine recrystallized polygonal grains and some deformed clasts.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: curved fractures: common texture: medium grained clasts altered and recrystallized.
Oxide:	geometry: irregular pods at the peryphery of olivine grains.

THIN SECTION LABEL ID: **360-U1473A-41R-3-W 73/76-TSB-TS_135** Piece no.: #08 TS no.: 135

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro intruded by a trondhjemite vein. The gabbro preservs a subophitic texture and the trondhjemite displays a graphic texture between plagioclase and quartz.
Metamorphic petrology:	The olivine gabbro hosting the vein is weakly altered; cpx at the contact to the trondhjemite is replaced by a zoned assemblage of first brown-green amphibole and then by biotite which is also a crystallized phase in the trondhjemite. The trondhjemite cutting the gabbro is intensely altered expressed by recrystallization of plagioclase to secondary plagioclase which is very dusty due to millions of microcrystalline inclusions. Further alteration phases in the trondhjemite are green amphibole and clay minerals.
Structure:	Moderately deformed olivine gabbro with partially recrystallized plagioclase and minor neoblasts of olivine and clinopyroxene. The structure is cross-cut by the felsic vein.

Plane-polarized

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Cross-polarized

33069631

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): Domain name: lithology domain 1 major

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: This domain is an olivine-bearing gabbro with a subophitic texture. Olivine is partly altered. Plagioclase is partly recrystallized and commonly shows undulose extinction. Subhedral plagioclase is partly enclosed within clinopyroxene, which is rimmed by green amphibole. Opaque oxides are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			3.2	anhedral	subequant	partly altered
Plagioclase	75		6	2	subhedral	subequant	undulose extinction
Clinopyroxene	22		10	2.8	anhedral	subequant	partly altered
Opaques	0.5						
Ilmenite	0.5						

Interval domain no: **2** Domain rel. abundance (%): Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: fine grained [345]

Detailed description: This domain is a trondhjemite vein. It is composed of plagioclase and quartz, which display a microgrpahic texture. A few biotites and zircons are present in the vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	80		1.2	0.1	anhedral	elongate	showing a graphic texture with quartz
Quartz	20		0.8	0.2	anhedral	interstitial	show micrographic with plagioclase

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JK

Detailed description The olivine gabbro hosting the vein is weakly altered; cpx at the contact to the trondhjemite is replaced by a zoned assemblage of first brown-green amphibole and then by biotite which is also a crystallized phase in the trondhjemite. The trondhjemite cutting the gabbro is intensely altered expressed by recrystallization of plagioclase to secondary plagioclase which is very dusty due to millions of microcrystalline inclusions. Further alteration phases in the trondhjemite are green amphibole and clay minerals.

Comment type	Comment
Alteration general comments:	The olivine gabbro hosting the vein is weakly altered. The trondhjemite cutting the gabbro is intensely altered expressed by recrystallization of plagioclase to secondary plagioclase which is very dusty due to millions of microcrystalline inclusions. Further alteration phases in the trondhjemite are green amphibole and clay minerals.
Vein 1 minerals:	green amphibole
Vein 2 minerals:	biotite
Vein 3 minerals:	clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	20		20
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, green	20	50		
Chlorite				10
Clay minerals	15			10
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	50	n/a		n/a
Other		10		
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 55 Domain name:

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: curved and altered Undulose extinction: common and straight Texture: fractured and partially altered
Plagioclase:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinning: tapered Undulose extinction: regular and common Texture: pophyroclastic partially recrystallized, neoblasts occur at grain boundaries of pophyroclasts
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: straight undulose extinction: regular Texture: porphyroclastic locally recrystallized in aggregates
Oxide:	interstitial between neoblasts

Interval domain no: 2 Domain rel. abundance (%): 45 Domain name:

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Vein:	felsic vein with intergrowth of plagioclase and quarz, cross-cut deformed olivine gabbro

THIN SECTION LABEL ID: **360-U1473A-41R-3-W 112/115-TSB-TS_136** Piece no.: #12 TS no.: 136

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase shows deformation twins and undulose extinction. Olivine is moderately recrystallized. Clinopyroxene displays a consertal intergrowth texture. Opaque minerals are predominated by ilmenite, with minor sulfides.
Metamorphic petrology:	The alteration intensity of this thin section is moderate. Clay were present in all the primary minerals.
Structure:	Foliated gabbro. Foliation defined by recrystallised plagioclase crystals wrapping around relatively large cpx . bent plagioclase and recrystallised olivine porphyroclasts. Rare, small plagioclase chadacrysts within the cpx suggest that the original magmatic grain size was variable. Cpx is extensively recrystallised at grain margins next to the shear zone.

Plane-polarized

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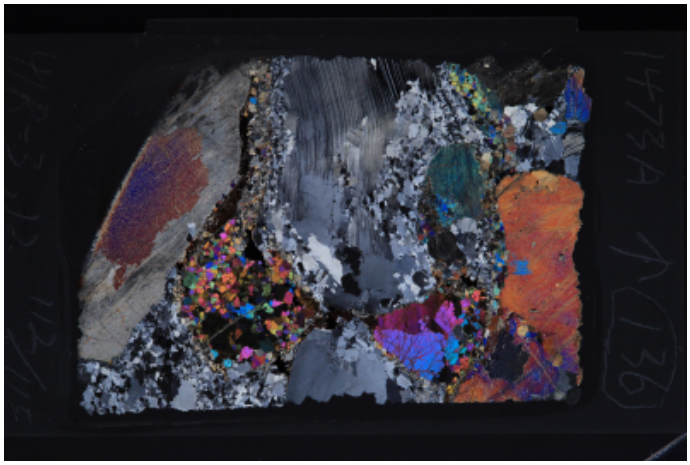
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is strongly recrystallized and displays undulose extinction. The big grain shows deformation twins. Olivine is moderately recrystallized. Euhedral olivines with trip junctin are aggregated. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture. Abundant fluid or melt inclusions can be seen in clinopyroxene. It contains brown amphibole blebs and is also rimmed by brown amphibole together with opaque oxides. Opaque minerals are predominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	18			0.8	subhedral	equant	rimmed by orthopyroxene
Plagioclase	45		14	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	36		20	16	anhedral	subequant	with a consertal texture
Amphibole	0.5		0.2	0.2	subhedral	subequant	anhedral amphibole commonly associates with ilmenite
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Part of the Ol were recrystallized. Ol developed typical mesh texture. The mesh core were fresh olivine and the mesh rim mainly consisted of talc, oxides and clay. Cpx mainly altered into pale color amphibole with some green and brown amphibole. Pl were mostly replaced by secondary plagioclase with minor pale color amphibole and chlorite in the cleavages. Clay were present in all the primary minerals.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	25	20		35
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		70		5
Amphibole, green		15		
Chlorite				2
Clay minerals	45	5		5
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	88
Sulfide	1			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: MJC

Detailed description Foliated gabbro. Foliation defined by recrystallised plagioclase crystals wrapping around relatively large cpx . bent plagioclase and recrysytallised olivine porphyroclasts. Rare, small plagioclase chadacrysts within the cpx suggest that the original magmatic grain size was variable. Cpx is extensively recrystallised at grain margins next to the shear zone. Propagating crack within large plagioclase porphyroclast defined by recrystallised plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Magmatic fabric intensity:	N/A	
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	rare	n/a
Fault rock intensity:	undeformed	0

Type	Comment
Olivine:	Olivine is beautifully recrystallised and streaked out. One olivine is almost totally recrystallised. Neoblasts are polygonal and range in dia. from .03mm to 1mm . The larger neoblasts show undulose extinction and incipient sub-grains. A second olivine porphyroclast (~ 7 mm dia) is less completely recrystallised and shows sub grains, kink banding and undulose extinction as well as polygonal neoblasts (0.7 to 0.1mm dia.). A shear zone is located on the margin of this crystal and here the olivine shows extreme grain size reduction.
Plagioclase:	The large relict plagioclase porphyroblasts show undulose extinction, deformation twinning, minor bending and subgrain development. Notably the largest porphyroclast exhibits a propagating high temperature fracture along which the plagioclase porphyroclast has developed sub-grains and recrystallised. Elsewhere the plagioclase is totally recrystallised to varying extents and grainsizes. Some areas contain beautifully polygonal (grainsize 0.25mm) neoblasts. in other the neoblasts are smaller (0.1-0.02mm), but more irregular (anhedral) in shape. The smallest plagioclase crystals define a foliation around the large olivine and cpx porphyroclasts. All neoblasts show deformation twins, and undulose extinction, suggesting a complex history of deformation.
Clinopyroxene:	Large cpx porphyroblasts show only very weak undulose extinction, but show extensive recrystallisation and neoblast development along grain margins especially adjacent to the shear zones, there the neoblasts are strung out. Neoblasts are 0.7 to 0.05mm in diameter and anhedral equant. The larger ones show undulose extinction.

THIN SECTION LABEL ID: **360-U1473A-41R-4-W 92/96-TSB-TS_137** Piece no.: #08 TS no.: 137

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. Olivine is occasionally rimmed by orthopyroxene. Plagioclase is displays undulose extinction and magmatic twins. Clinopyroxene displays a consertal texture and is rimmed by brown amphibole. Opaque minerals consist of ilmenite and sulfides.
Metamorphic petrology:	Sample is rather fresh. Rimming secondary minerals are rare.
Structure:	weakly foliated rock characterized by elongated cpx porphyroclasts and recrystallized olivine in matrix of polygonal recrystallized plagioclase.

Plane-polarized

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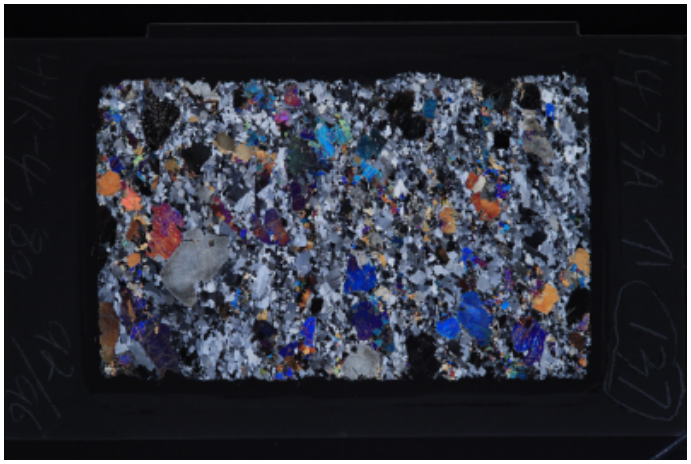
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a granular texture. Olivine is occasionally rimmed by orthopyroxene. Plagioclase is commonly recrystallized and displays undulose extinction. Magmatic twins are common in plagioclase. Clinopyroxene occasionally displays a consertal intergrowth texture and is rimmed by brown amphibole. Opaque minerals consist of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.8	anhedral	elongate	rimmed by orthopyroxene
Plagioclase	60		1.2	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	35		4	2.8	anhedral	subequant	partly replaced by secondary clinopyroxene and brown amphibole
Amphibole	0.2		0.8	0.1	anhedral	interstitial	associates with clinopyroxene neoblasts
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description A rather fresh sample. Olivine is only slightly altered into talc and serpentine. Brown amphibole occurs in association with Cpx grains, and might not be secondary in origin. Plagioclase grains are mostly neoblastic and not affected by background static alteration.

Comment type	Comment
Mylonite comments:	Grains are deformed. Plagioclase grains are mostly recrystallized and occur in polygonal aggregates. Olivine grains are elongated and fragmented. Cpx shows initial fragmentation. Brown amphibole are very common within Cpx grains, at the grain edge and as part of the fragmented grains.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	10		3
Amphibole, brown	n/a	100	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description weakly foliated rock characterized by elongated cpx porphyroclasts and recrystallized olivine in matrix of polygonal recrystallized plagioclase.

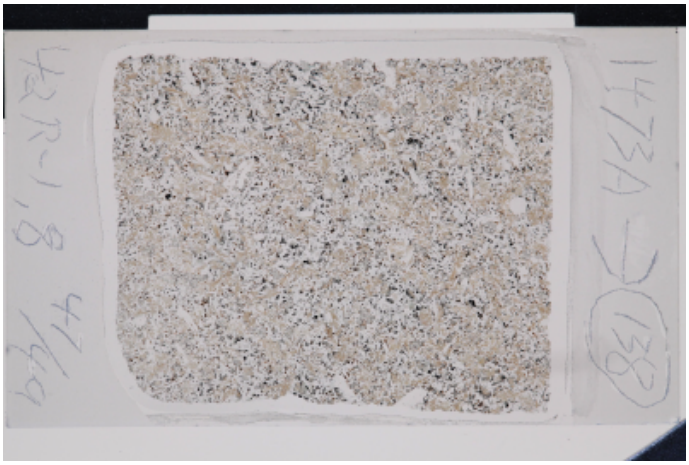
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: meidum to fine shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight to curved boundaries texture: medium grained clasts recrystallized and partially altered.
Plagioclase:	size: fine grained shape: anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved texture: fine grained polygonal recrystallized aggregates.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: fractured porphyroclasts and fine recrystallized grains.
Oxide:	geometry: fine pods aligned with the foliation and commonly associated with brown amphibole

THIN SECTION LABEL ID: **360-U1473A-42R-1-W 47/49-TSB-TS_138** Piece no.: #08 TS no.: 138

Group	Summary
Igneous petrology:	A fine-grained diabase with an intergranular texture. Euhedral olivine and plagioclase occur as phenocryst. Anhedral clinopyroxene occupies the space between subhedral plagioclase. Brown amphibole is present and commonly associates with opaque oxides, which are predominated by ilmenite.
Metamorphic petrology:	This fine grained rock is rather fresh. Brown amphibole are conspicuously associated with interstitial Cpx grains.
Structure:	Fine grained diabase with an igneous and not granoblastic texture No magmatic foliation. Undeformed.

Plane-polarized



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Cross-polarized

33069471

IGNEOUS PETROLOGY

Lithology: **diabase** Observer: CL

Texture: intergranular Ave. grain size: fine grained [345]

Detailed description: A fine-grained diabase with an intergranular texture. Euhedral olivine and plagioclase occur as phenocrysts. Anhedral clinopyroxene occupies the space between subhedral plagioclase. Brown amphibole is present and commonly associates with opaque oxides, which are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.8	euhedral	equant	occurs as phenocrysts
Plagioclase	50		2	0.8	subhedral	tabular	
Clinopyroxene	42		0.6	0.4	anhedral	interstitial	
Amphibole	1		0.2	0.1	anhedral	interstitial	commonly associates with opaque oxides
Opaques	2						
Ilmenite	2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Like TS # 139, also of similar lithology, this sample is generally fresh. Brown hornblende is associated with Cpx and are likely to be magmatic in origin. Some grains are totally composed of brown amphibole. If they are a product of secondary replacement, then the rock would have a 15% alteration degree.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	40		1
Amphibole, brown	n/a	99	n/a	n/a
Amphibole, green		1		
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: magmatic Observer: MJC

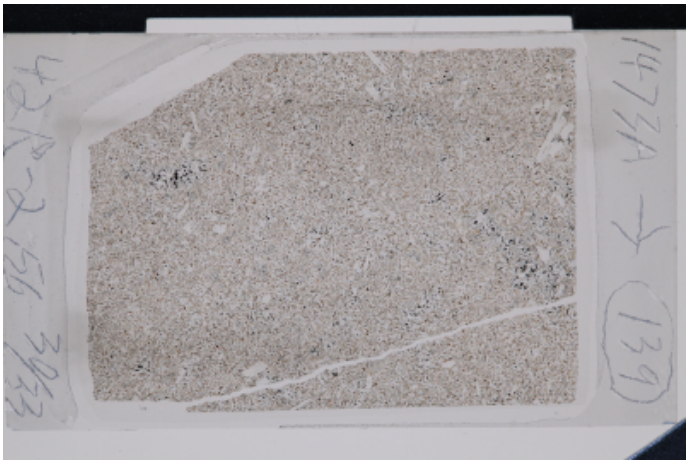
Detailed description Fine grained diabase with an igneous and not granoblastic texture No magmatic foliation. Undeformed.

Feature type	Observation	Intensity rank
Recrystallization grain size:	N/A	n/a
Recrystallization grain shape:	N/A	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	N/A	n/a
CPF dynamic recrystallization:	absent	n/a
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	absent	n/a
Fault rock intensity:	undeformed	0

THIN SECTION LABEL ID: **360-U1473A-42R-2-W 30/33-TSB-TS_139** Piece no.: #05 TS no.: 139

Group	Summary
Igneous petrology:	A fine-grained diabase with an intergranular texture. Euhedral olivine and plagioclase occur as phenocryst. Anhedral clinopyroxene occupies the space between subhedral plagioclase. Small amount of amphiboles are present and commonly associates with opaque minerals, which are predominated by ilmenite, with minor sulfides.
Metamorphic petrology:	The fine-grained rock is rather fresh, with no conspicuous secondary replacement. Brown amphibole is very common and is usually associated with Cpx grains.
Structure:	Patchy extinction in phenocrysts of plagioclase.

Plane-polarized



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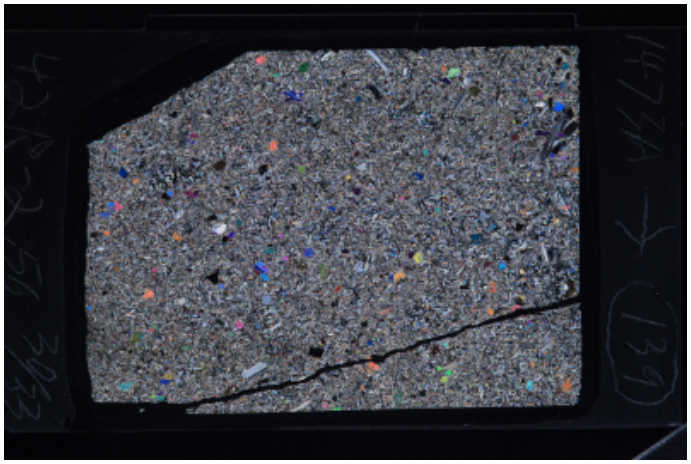
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **diabase** Observer: CL

Texture: intergranular Ave. grain size: fine grained [345]

Detailed description: A fine-grained diabase with an intergranular texture. Euhedral olivine and plagioclase occur as phenocrysts. Anhedral clinopyroxene occupys the space between subhedral plagioclase. Small amount of amphiboles are present and commonly associates with opaque minerals, which are predominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.8	euhedral	equant	occurs as phenocrysts
Plagioclase	50		2	0.8	subhedral	tabular	
Clinopyroxene	42		0.2	0.1	anhedral	interstitial	
Amphibole	1		0.2	0.1	anhedral	interstitial	
Opaques	2						
Ilmenite	1.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Rock is generally fresh with no conspicuous secondary replacement. Brown hornblende is associated with Cpx and are likely to be magmatic in origin. Some grains are totally composed of brown amphibole. If they are a product of secondary replacement, then the rock would have a 10% alteration degree.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	30		0
Amphibole, brown	n/a	100	n/a	n/a
Oxide	40			n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Detailed description Primary igneous texture. Phenocrysts of plagioclase have patchy undulose extinction.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	Patchy undulose extinction, especially in phenocrysts.

THIN SECTION LABEL ID: **360-U1473A-42R-2-W 79/85-TSB-TS_140** Piece no.: #13 TS no.: 140

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro intruded by a fin-grained diabase dike. The gabbro displays a granular texture and olivine is strongly altered. The diabase dike has been metamophosed and displays a granoblastic texture.
Metamorphic petrology:	The gabbro intruded by the basalt is slightly altered. Except for some magmatic relics , the basalt is completely metamorphosed in the hornblende hornfels to pyroxene hornfels facies; granoblastic assemblage consist of secondary plag, brown amphibole, secondary clinopyroxene, oxide plusminus opx. At the contact to the gabbro, the texture develops to granular, implying a pure magmatic regime.
Structure:	Weakly deformed olivine gabbro intruded by basalt dike. Subhedral plagioclase shows SPO along the contact with the wall-rock

Plane-polarized

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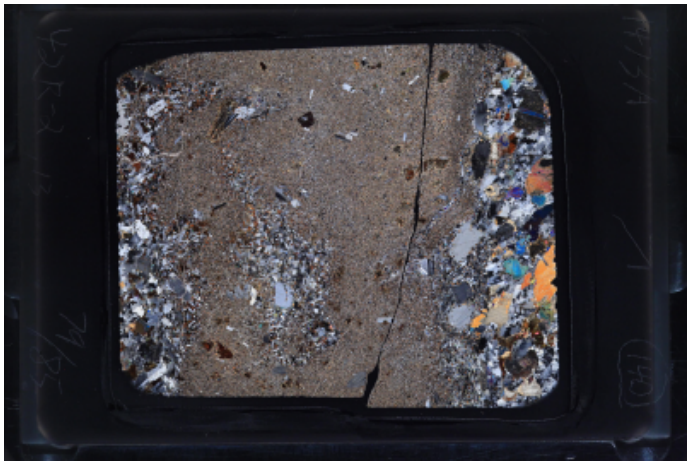
Cross-polarized



33074031

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 10 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a gabbro displays a granular texture. Olivine is strongly altered. Clinopyroxene is moderated altered and replaced by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1	anhedral	subequant	strongly altered
Plagioclase	40		2.8	1.2	anhedral	subequant	
Clinopyroxene	45		5.6	3	anhedral	subequant	

Interval domain no: **2** Domain rel. abundance (%): 90 Domain name: vein

Lithology: **granoblastic two pyroxene amphibolite** Observer: CL

Texture: granoblastic Ave. grain size: fine grained [345]

Detailed description: This is a granoblastic two pyroxene amphibolite. It contains abundant euhedral plagioclase phenocryst (?) and minor clinopyroxene xenocryst (?). Olivine phenocryst (?) is commonly altered. In the boundary, plagioclase shows a obvious shape preferred orientation. Some plagioclase grains show core-rim texture; the core is very clean but many amphibole grains are included in the rim. Some zircons are present along the boundary.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		2	0.05	anhedral	subequant	
Amphibole	40		0.2	0.05	anhedral	subequant	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 20 Domain name: olivine gabbro

Total rock alteration estimate (%): 10 Observer(s): JK

Detailed description The gabbro intruded by the basalt is slightly altered. Except for some magmatic relics , the basalt is completely metamorphosed in the hornblende hornfels to pyroxene hornfels facies; granoblastic assemblage consist of secondary plag, brown amphibole, secondary clinopyroxene, oxide plusminus opx. At the contact to the gabbro, the texture develops to granular, implying a pure magmatic regime.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the basalt is slightly altered
Vein 1 minerals:	amphibole
Vein 2 minerals:	clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	15		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, green	30	30		
Clay minerals	60			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10			n/a
Subtotals replaced	100	100		

Interval domain no: 2 Domain rel. abundance (%): 80 Domain name: granoblastic basalt

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	Except for some magmatic relics , the basalt is completely metamorphosed in the hornblende hornfels to pyroxene hornfels facies; granoblastic assemblage consist of secondary plag, brown amphibole, secondary clinopyroxene, oxide plusminus opx. At the contact to the gabbro, the texture develops to granular, implying a pure magmatic regime.
Vein 1 minerals:	carbonate

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	80	100	90	90
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	30			
Amphibole, green		10		
Clay minerals	50		80	
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10		20	n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Other	10	10		
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium Grain shape: sbhedral Grain boundary: straight to curved and altered Texture: phenocryst within the dike
Plagioclase:	Grain size: fine to medium Grain shape: euhedral Grain boundary: straight Texture: phenocrysts within dike and matrix, elongated crystals along the contact define a stronger fabric parallel to the contact
Clinopyroxene:	Grain size: very fine Grain shape: anhedral Grain boundary: curved Texture: granular texture

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: curved and altered Texture: fractured and altered
Plagioclase:	Grain size: coarse porphyroclast and medium recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: tapered Texture: pophyroclastc partially recrystallized
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Texture: porphyroclasts not deformed, preserved igneous texture

THIN SECTION LABEL ID: **360-U1473A-42R-3-W 4/8-TSB-TS_141** Piece no.: #01 TS no.: 141

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Subhedral plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	Sample is moderately altered. Pale brown and green amphibole rims around Cpx and olivine are common. Late stage clay overprint on the primary minerals were also observed.
Structure:	Weakly deformed with plagioclase locally recrystallized. Olivine and plagioclase porphyroclasts are deformed, whereas clinopyroxene is not deformed.

Plane-polarized

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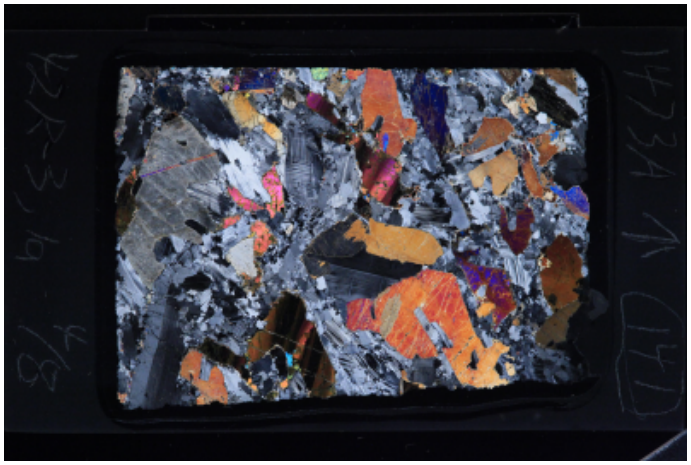
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Subhedral plagioclase is partly enclosed within clinopyroxene. Olivine is elongated and rimmed by orthopyroxene and amphibole. It has been moderately altered. Plagioclase shows magmatic twins and also undulose extinction. Clinopyroxene displays a consertal intergrowth texture and is partly replaced by brown amphibole. It also contains brown amphibole blebs. Opaque oxides are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	17			5.6	anhedral	elongate	
Plagioclase	45		8	2.5	anhedral	tabular	undulose extinction
Clinopyroxene	38		10	5	anhedral	poikilitic	
Amphibole	0.1		0.4	0.1	anhedral	interstitial	
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Sample is moderately altered. Olivine is replaced by serpentine and oxides in a mesh texture. Minor talc rims were observed. Some olivine grains are rimmed by pale brown and green amphibole. Primary Cpx are partially replaced by 2nd Cpx, usually in close association with brown amphibole. Most Cpx grains are rimmed by pale brown and green amphibole. A significant proportion of plagioclase grains exists as aggregates of smaller grains. Large grains are only slightly altered into mostly 2nd plagioclase. A small amount of microfractures were observed and they are usually filled by clay, chlorite and pale green amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	20		10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	20			5
Amphibole, green		20		
Chlorite				10
Clay minerals	40	10		20
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	65
Talc	15	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: curved and altered Undulose extinction: regular Subgrains: straight Texture: fractured and partially altered
Plagioclase:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: euhedral to subhedral porphyroclast and anhedral recrystallized Grain boundary: straight to curved Twinning: rare igneous and common tapered Undulose extinction: regular Texture: partially and locally recrystallized between porphyroclasts. Porphyroclasts are deformed
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight Texture: undeformed porphyroclasts, may include medium grained euhedral plagioclase

THIN SECTION LABEL ID: **360-U1473A-42R-4-W 42/46-TSB-TS_142** Piece no.: #06 TS no.: 142

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. It shows a weak igneous lamination, which is defined by the preferred orientation of plagioclase and clinopyroxene.
Metamorphic petrology:	Total alteration intensity is slight. Amphibolite facies minerals replace primary mafic minerals, and greenschist facies minerals replace both mafic minerals and plagioclase.
Structure:	this is a weakly foliated olivine gabbro. Recrystallization is observed in the development of fine grained plagioclase aggregates. Olivine clasts are partially recrystallized in the boundaries of the grains, and cpx shows fractures and alteration to amphibole.

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a granular texture. It shows a weak igneous lamination, which is defined by the preferred orientation of plagioclase and clinopyroxene. Olivine is commonly rimmed by orthopyroxene and brown amphibole. Plagioclase shows magmatic twins and occasionally occurs as small inclusions within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture and contains brown amphibole blebs. Opaque minerals are predominated by sulfides, with very few ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			0.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		2.4	0.6	anhedral	tabular	occurs as inclusions within clinopyroxene
Clinopyroxene	35		2.4	1	anhedral	subequant	with a consertal texture
Amphibole	0.2		0.4	0.2	anhedral	interstitial	
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): TN

Detailed description Olivine is replaced by colorless amphibole and talc along rims and by clay minerals along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patches, blebs and fringes, and by green or colorless amphibole fringes. A few amount of orthopyroxene is replaced by talc and colorless amphiboles. Plagioclase has fractures filled with chlorite, colorless amphibole and/or zoisite. Secondary plagioclase is distributed irregularly or at rims.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5	3	10
Amphibole, brown	n/a	65	n/a	n/a
Amphibole, colorless	15	10	50	10
Amphibole, green		10		
Chlorite				10
Clay minerals	30			
Clinopyroxene, sec.	n/a	10	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	5
Oxide	3	3		n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Sulfide	2	2		n/a
Talc	50	n/a	50	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description this is a weakly foliated olivine gabbro. Recrystallization is observed in the development of fine grained plagioclase aggregates. Olivine clasts are partially recrystallized in the boundaries of the grains, and cpx shows fractures and alteration to amphibole.

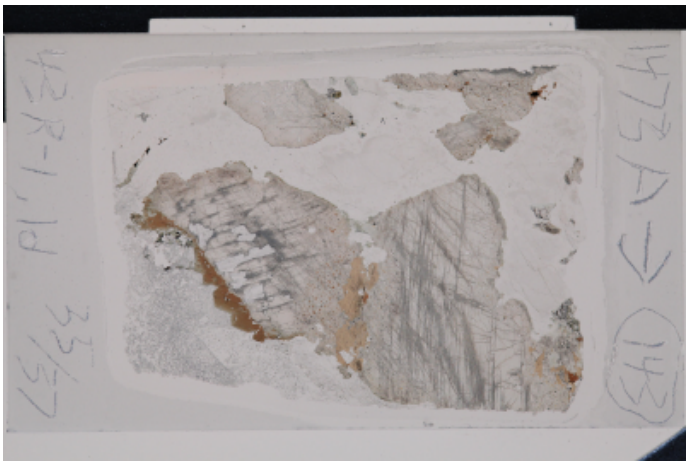
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular texture: medium clasts recrystallized to fine, altered grains.Commonly associated with brown amphibole and oxides.
Plagioclase:	size: medium to fine shape: anhedral boundaries: curved to straight twinning: tapered undulose extinction: irregular subgrains: curved boundaries texture: partially recrystallized grains in nearly polygonal aggregates.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: medium grained porphyroclasts partially altered.
Oxide:	geometry: thin, localized small pods at grain boundaries of cpx and olivine.

THIN SECTION LABEL ID: **360-U1473A-43R-1-W 35/37-TSB-TS_143** Piece no.: #01 TS no.: 143

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing gabbro intruded by a trondhjemite vein. The gabbro displays a granular texture. Plagioclase and quartz in trondhjemite show graphic texture.
Metamorphic petrology:	This sample show a felsic vein intruded into an Ol-gabbro. The latter shows to have experienced dynamic recrystallization, most likely before the intrusion of the felsic vein. The contact between the felsic vein and the Cpx from the host gabbro is characterized by the presence of brown Amp. The felsic vein includes abundant granophyric structures. Near the contact with the felsic vein, the host Ol-gabbro contains a large brown Amp grain with orthopyroxene and apatite inclusions. Close to this large brown Amp crystal, the adjacent clinopyroxenes have a high amount of brown Amp blebs. The static alteration of the Ol-gabbro is moderate.
Structure:	Undeformed felsic vein, (>2cm wide) cross cutting previously deformed coarse grained olivine bearing moderately foliated (cp) gabbro. Contacts are relatively sharp, with minor associated deformation of the host gabbro. The moderately deformed olivine bearing gabbro shows typical deformation. The large cpx's showi only very minor undulose extinction and limited recrystallisation at grain boundaries (associated with the foliation in the plagioclase rich parts of the rock). Large plagioclase porphyroclasts show undulose extinction, kinking and deformation twinning. Neoblasts define the foliation and show deformation twinning and a range of grain sizes.

Plane-polarized



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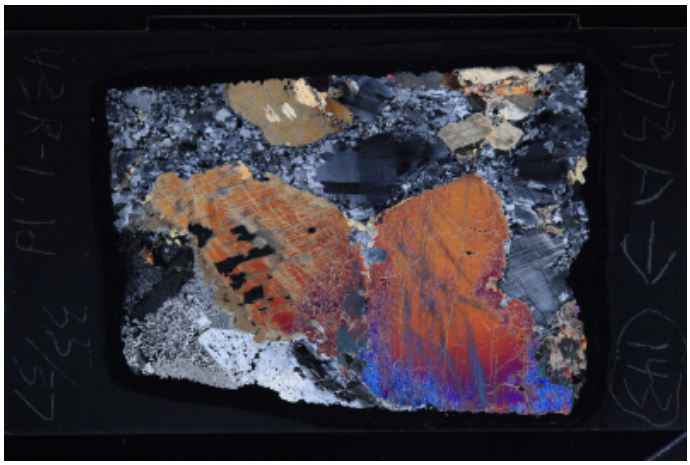
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 90 Domain name: lithology domain 1

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: This domains is a coarse-grained olivine-bearing gabbro with a granular texture. Olivine is completely altered. Plagioclase displays magmatic twins and undulose extinction. Occasionally, it occurs as inclusions within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture and is commonly replaced by brown amphibole. In particular, clinopyroxene in hte boundary is overgrown by subhedral brown amphibole. Both zircon and apatite occur as inclusion within brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1						completely altered and original shape is not preserved
Plagioclase	30		9	0.8	anhedral		undulose extinction
Clinopyroxene	68		16	14	anhedral	subequant	partly replaced by secondary clinopyroxene and brown amphibole
Amphibole	1		4	2	subhedral	subequant	

Interval domain no: **2** Domain rel. abundance (%): 10 Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: graphic Ave. grain size: fine grained [345]

Detailed description: This domains is a trondhjemite venin. It is mainly composed of plagioclase, which shows a micrographic texture with quartz. Apatite occurs as inclusion within plagioclase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		3.6	3	subhedral	subequant	showing a graphic texture with quartz
Quartz	30		0.4	0.3	anhedral	interstitial	shows a micrographic texture with plagioclase

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): RT

Detailed description This sample show a felsic vein intruded into an Ol-gabbro. The latter shows to have experienced dynamic recrystallization, most likely before the intrusion of the felsic vein. In the Ol-gabbro, Pl is largely recrystallized into nearly polygonal aggregates; Cpx is locally recrystallized into neoblastic aggregates, in association with minor red-brown Amp. The contact between the felsic vein and the Cpx from the host gabbro is characterized by the presence of brown Amp. The felsic vein includes abundant granophyric structures. Near the contact with the felsic vein, the host Ol-gabbro contains a large brown Amp grain with orthopyroxene and apatite inclusions. Close to this large brown Amp crystal, the adjacent clinopyroxenes have a high amount of brown Amp blebs. Cpx from the Ol-gabbro is typically rimmed by brown Amp that is in turn frequently rimmed by green Amp. In addition, Cpx is in places altered into secondary clinopyroxene and vermicular brown Amp. The static alteration of the Ol-gabbro is moderate.

Comment type	Comment
Alteration general comments:	The static alteration of the Ol-gabbro is moderate.
Mylonite comments:	The rock shows to have experienced dynamic recrystallization. Pl is largely recrystallized into nearly polygonal aggregates; Cpx is locally recrystallized into neoblastic aggregates, in association with minro red-brown Amp.
Vein 1 minerals:	The Ol-gabbro is crosscut by a felsic vein including granophyric structures. The contact between the felsic vein and the Cpx from the host gabbro is characterized by the presence of brown Amp. Near the contact with the felsic vein, the host Ol-gabbro includes a large brown Amp grain with orthopyroxena and apatite inclusions. Close to this large brown Amp crystal, the adjacent clinopyroxenes have a high amount of brown Amp blebs.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	75	20		5
Amphibole, brown	n/a	60	n/a	n/a
Amphibole, colorless	10			40
Amphibole, green		30		
Chlorite				60
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 85 Domain name: Olivine bearing gabbro

Microstructure: submagmatic Observer: MJC

Detailed description

Essentially undeformed felsic vein, >2cm wide cross cutting previously deformed coarse grained olivine bearing moderately foliated (cp) gabbro. Contacts are relatively sharp, with minor associated deformation of the host gabbro. Plagioclase at the margin is simply overgrown, The pyroxene margin is serreate in detail and has brown amphibole growing syntaxially from it. Hence the vein is a brittle, late stage feature The moderately deformed olivine bearing gabbro shows typical deformation. The large cpx's showi only very minor undulose extinction and limited recrystallisation at grain boundaries (associated with the foliation in the plagioclase rich parts of the rock). There is one example of rcrystallisation within a cpx along a fracture. Plagioclase shows typical deformation. Large porphyroclasts show undulose extinction, kinking and deformation twinning. Neoblasts show deformation twinning and a range of grain sizes with the smallest being associated with thin shear zones.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	N/A	
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	none preserved
Plagioclase:	Large plagioclase porphyroblasts show undulose extinction and deformation twinning.and minor fracturing and kinking. Neoblast development is extensive, often forming a foliation around porphyroclasts. Neoblast grainsize is variable from 1mm to <30 microns. Neoblasts tend to be equant, but their margins vary from sereate for the larger grains to polygonal for the smaller grains. the finest grain size tends to occur along grain (cpx) boundaries. The neoblasts commonly show deformation twinning and undulose extinction.
Clinopyroxene:	Large cpx porphyroblasts show only a little undulose extinction and rare subgrains at grain margins. There are two examples of recrystallisation and neoblast formation within a cluster of smaller cpx, along cpx grain boundaries. Neoblasts are 30-100 microns and have serreate grain boundaries. Both of these are related to the foliation developed in the pplagioclase rich areas. There's a single example of recrystallisation along a fracture/kink within a cpx grain. Here neoblasts are 30 microns in diameter and equant.

Interval domain no: 2 Domain rel. abundance (%): 15 Domain name: Felsic vein

Microstructure: magmatic Observer: MJC

Feature type	Observation	Intensity rank
Recrystallization grain size:	N/A	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	N/A	n/a
CPF dynamic recrystallization:	N/A	n/a
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	absent	n/a

Type	Comment
Plagioclase:	Minor undulose extinction seen in large plagiuoclase (albite?) Minir undulose extinction in part of the plagioclase/quartz graphic intergrowth crystals.
Vein:	Essentially sharp sided, with syntaxial growth of brown amphibiole from cpx on the margins of the vein

THIN SECTION LABEL ID: **360-U1473A-43R-2-W 42/46-TSB-TS_144** Piece no.: #01 TS no.: 144

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is strongly recrystallized and displays undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Total static alteration intensity is slight; minerals indicate amphibolite to subgreenschist facies alteration.
Structure:	Foliated/porphyroclastic olivine gabbro with extensively recrystallised and deformation twinned plagioclase defining the crystal plastic foliation and recrystallised and kink banded olivine, Clinopyroxene exhibits some recrystallisation.

Plane-polarized

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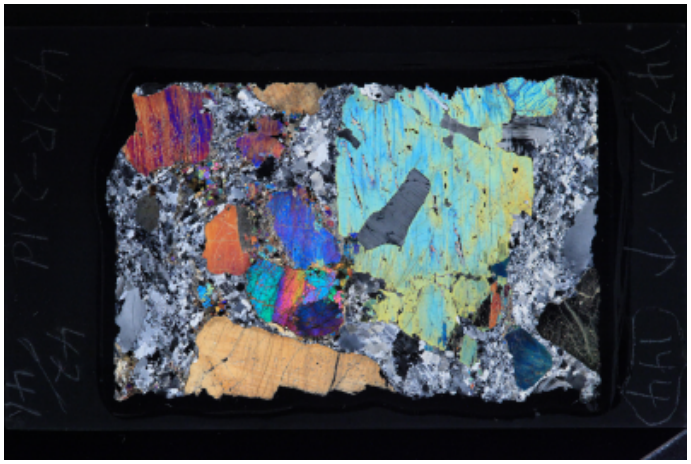
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is subhedral and commonly rimmed by orthopyroxene. Plagioclase is strongly recrystallized and displays undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture. It is rimmed by brown amphibole. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			4	subhedral	subequant	rimmed by orthopyroxene
Plagioclase	30		5	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	55		15	12	anhedral	poikilitic	
Amphibole	0.2		0.8	0.1	anhedral	interstitial	
Opaques	0.3						
Ilmenite	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 8 Observer(s): TN

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5	10	5
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless		10	70	20
Amphibole, green		10		
Chlorite				30
Clay minerals	45			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	3	3		n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Sulfide	2	2		n/a
Talc	50	n/a	30	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: MJC

Detailed description Foliated/porphyroclastic olivine gabbro with extensively recrystalised and deformation twinned plagioclase defining the crystal plastic foliation and recrystallised and kink banded olivine, Clinopyroxene exhibits some recrystallisation at the grain margins and one nice tail which gives a normal dextral sense of shear.

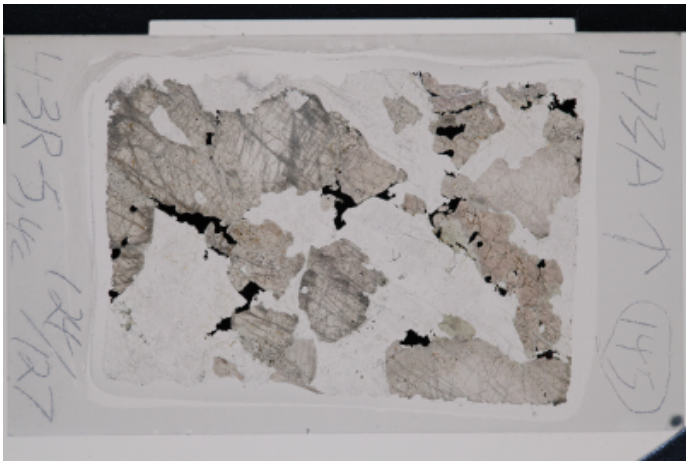
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Magmatic fabric intensity:	N/A	
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a
Fault sense of shear:	normal-dextral	n/a

Type	Comment
Olivine:	Olivine almost completely recrystallised. Large relict core of one grain shows undulose extinction and kink banding. Neoblasts, 0.6-0.03mm in diameter and equant. Altered proto-tails present.
Plagioclase:	Plagioclase is totally recrystallised, with likely no large porphyroclasts remaining. Two moderately large plagioclase porphyroclasts (~ 5mm diameter) show undulose extinction, deformation twinning and incipient sub-grain formation. These crystals are comparable in size to the slightly deformed chadacrysts in the cpx's (note even the chadacrysts show deformation twinning and slight undulose extinction). The rest of the plagioclase is extensively recrystallized. Smaller neoblasts (0.01mm) are equant polygonal with smooth grain boundaries, but larger ones maybe elongate and up to 1mm long. These grains often elp define the crystal plastic foliation defined by the fine scale plagioclase crystals he larger ones show undulose extinction and deformation twins are common throughout. There's one example of an elongate plagioclase that is beautifully kinked. Again, fine grained seams of plagioclase appear to nucleate on porphyroclast boundaries. Sometineslarger neoblasts are present in the strain shadows of cpx crystals.
Clinopyroxene:	Large porphyroclasts show very weak undulose extinction, but there are examples of rigid body rotation where fractured parts of the porphyroclasts have rotated with respect to each other. Spectacular recrystallised tail on one medium sized cpx crystal gives normal-dextral sense of shear. Neoblasts are small; 0.01mm dia. and equant Some recrystallisation is present on other grain boundaries, but is often associated with alteration.

THIN SECTION LABEL ID: **360-U1473A-43R-5-W 124/127-TSB-TS_145** Piece no.: #04 TS no.: 145

Group	Summary
Igneous petrology:	A disseminated oxide gabbro with a subophitic texture. Plagioclase shows magmatic twins and is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is substantial. Clay minerals were present in all the primary minerals.
Structure:	Deformed disseminated oxide olivine bearing gabbronorite. The gabbronorite exhibits the initial stage of crystal plastic deformation with extensive plagioclase recrystallisation and some pyroxene crystallisation along grain boundaries. There is no clearly developed plagioclase foliation, however steeply dipping foliation defined by the porphyroclasts.

Plane-polarized



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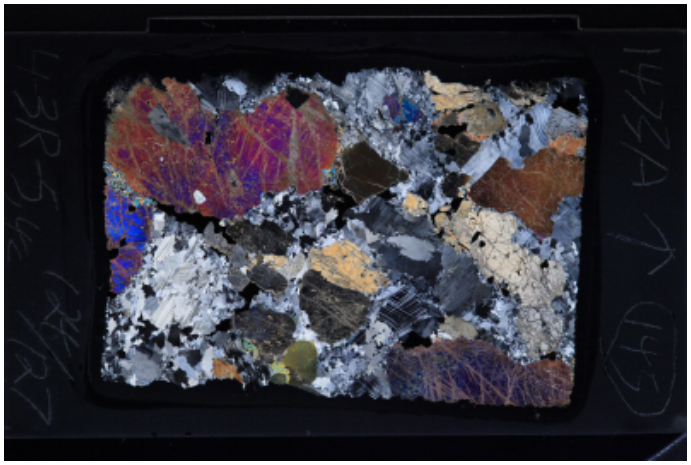
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **disseminated oxide gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A disseminated oxide gabbro with a subophitic texture. Plagioclase shows magmatic twins and is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and commonly replaced by green amphibole at the rim. It also contains brown amphibole. Opaque minerals commonly associate with clinopyroxene. They mainly consist of ilmenite and magnetite, with minor sulfides. Intergrowth between ilmenite and magnetite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	40		6.4	2.8	anhedral	subequant	undulose extinction
Clinopyroxene	59		14	8	anhedral	subequant	
Opaques	1						
Magnetite	0.1						
Ilmenite	0.9						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Cpx mainly altered in to pale color amphibole occurring in the cleavages. Secondary Cpx and brown amphibole replacing Cpx were observed. Talc pervasively occurred along the boundary and the cleavages of Opx. Minor pale color amphibole mixed in the talc rim. Pl were mostly replaced by secondary plagioclase with tiny pale color amphibole filling in the cleavages of Pl. Clay minerals were present in all the primary minerals.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		32	35	35
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		70	5	10
Clay minerals		10	15	5
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc		n/a	80	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: submagmatic Observer: MJC

Detailed description Deformed disseminated oxide olivine bearing gabbronorite. The gabbronorite exhibits the initial stage of crystal plastic deformation with extensive plagioclase recrystallisation and some pyroxene crystallisation along grain boundaries. There is no clearly developed plagioclase foliation, howver the thin section clearly suggests that there is a steeply dipping foliation defined by the porphyroclasts.

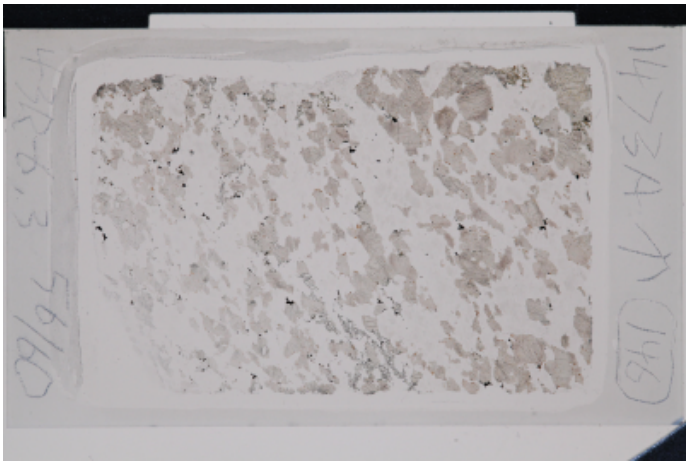
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Small patch of olivine, protected by pyroxene crystals (1mm diameter). Very SLIGHT undulose extinction.
Plagioclase:	Extensive plagioclase recrystallisation and deformation twin development, but possible remnant igneous texture is preserved in places. No very large plagioclase porhyroclasts are present, but all the moderate sized ones (~5mm diameter) that are present show extensive deformation twins and kinking, together with undulose extinction and some subgrain development, with on occasion ductile crack development. The near ubiquitous deformation twins developed in both porphyroclasts and neoblasts is conspicuous. As with other thin sections, the smallest neoblasts (0.02mm diameter) form trails/seams near porphyroclast boundaries. The smaller neoblasts tend towards being polygonal, the larger neoblasts (0.1-1mm dia) have more complicated grain boundaries. A few larger neoblasts show subgrains.
Clinopyroxene:	Clinopyroxene: Large porphyroclasts, minor undulose extinction. Narrow 1-2mm wide zones of semi- polygonal, neoblasts between two pyroxene crystals, grain size 0.3 to 0.05mm. Orthopyroxene: Large porphyroclasts, minor undulose extinction, but some kinking of grains at the margin of the slide. Relatively extensively fractured. Neoblasts found at margins of grains (0.1-0.05 mm), often when opx is in contact with cpx.
Oxide:	no deformation recorded

THIN SECTION LABEL ID: **360-U1473A-43R-6-W 56/60-TSB-TS_146** Piece no.: #03 TS no.: 146

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro with a granular texture. An igneous lamination is defined by the preferred orientation of plagioclase and clinopyroxene.
Metamorphic petrology:	Alteration minerals are less than 5 vol%, and indicate amphibolite to subgreenschist facies static alteration processes.
Structure:	this rock shows a weak orientation of cpx and olivine clasts. Locally, cpx clasts are kinked. Plagioclase is recrystallized and forms medium to fine grained aggregates.

Plane-polarized



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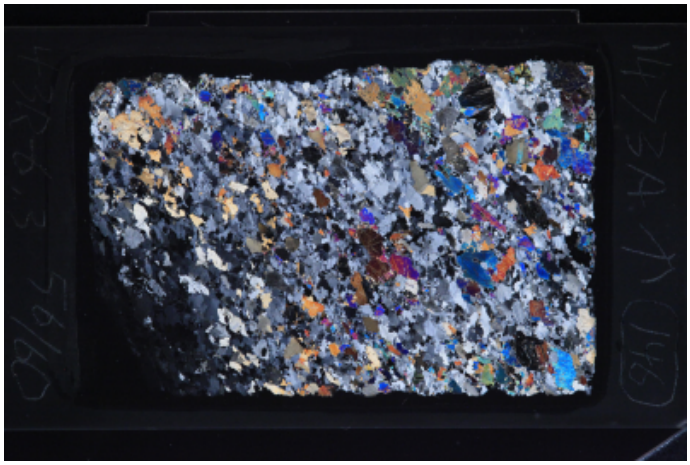
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine-bearing gabbro with a granular texture. An igneous lamination is defined by the preferred orientation of plagioclase and clinopyroxene. Olivine is elongated and partly altered. Plagioclase is in a tabular shape and is partly or fully enclosed within within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture and is rimmed by brown amphibole, sometimes together with opaque oxides. Opaque oxides are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			0.6	anhedral	elongate	partly altered and occasionally rimmed by orthopyroxene
Plagioclase	63		1.5	1.2	anhedral	tabular	undulose extinction
Clinopyroxene	34		3.2	1.2	anhedral	subequant	with a consertal texture
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): TN

Detailed description Olivine is replaced by talc pseudomorphically or at rims, and by clay along fractures; clinopyroxene is replaced by secondary clinopyroxene patches, by brown amphibole patches, blebs and fringes, and by green/colorless amphibole fringes. Plagioclase has fractures filled with chlorite, actinolite, zoisite and/or clay mineral, and has interstitial carbonate.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	5		2
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		10		10
Amphibole, green		15		
Chlorite				60
Clay minerals	45			10
Clinopyroxene, sec.	n/a	40	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	10
Oxide	3	3		n/a
Sulfide	2	2		n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description this rock shows a weak orientation of cpx and olivine clasts. Locally, cpx clasts are kinked. Plagioclase is recrystallized and forms medium to fine grained aggregates.

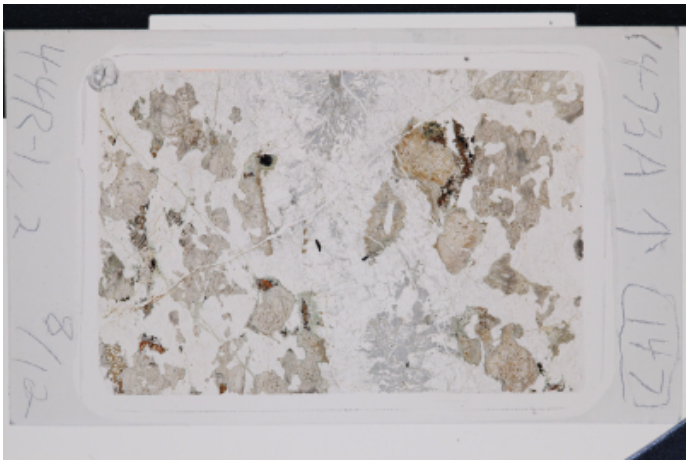
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular texture: partially recrystallized and altered medium to fine grains.
Plagioclase:	size: medium to fine shape: anhedral boundaries: curved twinning: tapered undulose extinction: irregular subgrains: cruved boundaries texture: fine recrystallized aggregates.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: clasts weakly oriented defining the foliation, fine recrystallized grains.

THIN SECTION LABEL ID: **360-U1473A-44R-1-W 8/12-TSB-TS_147** Piece no.: #02 TS no.: 147

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro intruded by a trondhjemite vein. The gabbro displays a subophitic texture and the trondhjemite displays a granular texture.
Metamorphic petrology:	Both host rock and trondhjemite vein are extensively altered. Common alteration minerals are brown amphibole, tremolite-actinolite and reddish clays, representing a wide range of alteration process. Carbonate, chlorite and clay veins were also observed.
Structure:	This rock displays a submagmatic fabric defined by recrystallization of plagioclase into medium- to fine aggregates, while olivine and cpx show minor deformation features

Plane-polarized



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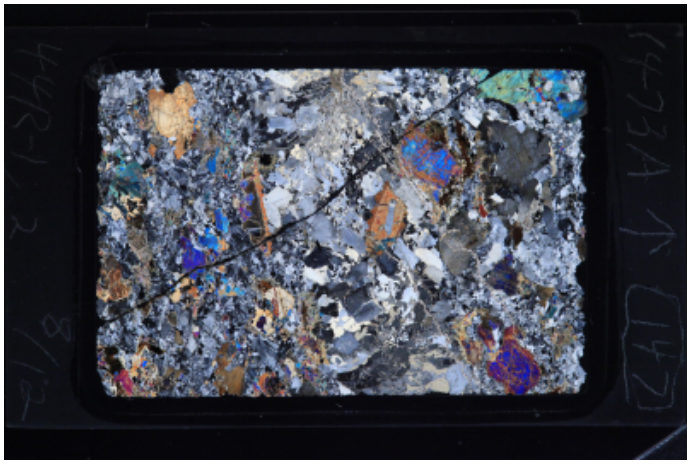
Cross-polarized



33073651

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: This domain is an olivine gabbro with a subophitic texture. Olivine is elongated and strongly altered. Plagioclase is in a subequant shape and weakly deformed. Occasionally, it is partly enclosed within clinopyroxene. Clinopyroxene displays a consertal texture and is altered to green amphibole. Along the boundary, clinopyroxene is heavily replaced by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2.4	anhedral	elongate	strongly altered
Plagioclase	60		2	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	34.1		5.2	2.8	anhedral	subequant	partly replaced by secondary clinopyroxene and brown amphibole
Orthopyroxene	0.9						

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a trondhjemite vein with a granular texture. Plagioclase displays a micrographic texture with quartz. Small zircons are present in the vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		2	2	subhedral	subequant	
Quartz	30		1	0.6	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name:

Total rock alteration estimate (%): 60 Observer(s): JL

Detailed description This is an extensively altered host rock. Several stages of veining was observed. A felsic vein containing quartz and plagioclase cross cuts the host rock. Clinopyroxene, especially the xenocrysts in the felsic vein, are rimmed by brown amphibole. Pale amphibole (likely tremolite) is common in the host rock. In some cases, it seems that the brown amphibole rims are partially replaced by needle-like crystals, likely actinolite. Olivine is replaced by clay (usually at the center), talc + oxide (inner rim) and tremolite (outer rim). Plagioclase is replaced by chlorite and yellowish clay. Chlorite, reddish clay and carbonate vein were observed in the host rock.

Comment type	Comment
Vein 1 minerals:	Carbonate vein that cross-cuts the trondjhemite vein also crosccuts the host rock
Vein 2 minerals:	Chlorite veins were also observed cutting grains in the host rock. They are branching and likely caused greenschist alteration in many grains.
Vein 3 minerals:	A small reddish clay vein was also observed

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	70		40
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	30	40		
Chlorite				60
Clay minerals	35	20		40
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	10			n/a
Talc	25	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name:

Total rock alteration estimate (%): 70 Observer(s): JL

Detailed description The felsic vein (or trondjhemite) has a granophyric texture of quartz and plagioclase. Plagioclase around quartz are heavily altered into clay. Also common in the vein are aggregates of crystals with needle-like habit (likely actinolite). Actinolite could be replacing some mafic phenocrysts or vein brown amphibole. These crystals seems to be even replacing quartz. It is hard to discern if these crystals could be a product of leter stage precipitation.

Comment type	Comment
Vein 1 minerals:	Trondhjemite vein is cross cut by carbonate veins. Heavy alteration is associated with minerals proximal to the vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				70
Clay minerals				60
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description This rock displays a submagmatic fabric defined by recrystallization of plagioclase into medium- to fine aggregates, while olivine and cpx show minor deformation features - bent tapered twins and fractures. The vein intruding the rock is composed of coarse plagioclase grains that are weakly deformed and show some degree of alteration.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved texture: highly altered clasts
Plagioclase:	size: medium to fine shape: anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: curved to straight boundaries texture: bent twins, recrystallized and partially altered.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: medium altered grains and fine recrystallized crystals, both altered.
Vein:	there is a felsic vein intruding the rock. The vein is mostly composed of coarse grained plagioclase that exhibits straight to curved contacts, tapered twins and fractures. Alteration is also observed.

THIN SECTION LABEL ID: **360-U1473A-44R-1-W 85/89-TSB-TS_148** Piece no.: #05 TS no.: 148

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. It is weakly foliated, as both plagioclase and clinopyroxene show preferred orientation.
Metamorphic petrology:	The rock shows to have experienced dynamic recrystallization. Pl is substantially recrystallized into nearly polygonal aggregates. Ol and Cpx are locally recrystallized, with the neoblastic Cpx commonly associated with red-brown Amp. Static alteration is slight and essentially confined to Ol. In particular, Ol is replaced by talc and minor oxide phases, and is rimmed by chlorite against Pl.
Structure:	Strongly deformed with plagioclase completely recrystallized and neoblast define the foliation. Olivine and clinopyroxene are partially recrystallized. Clinopyroxene is not or weakly deformed.

Plane-polarized

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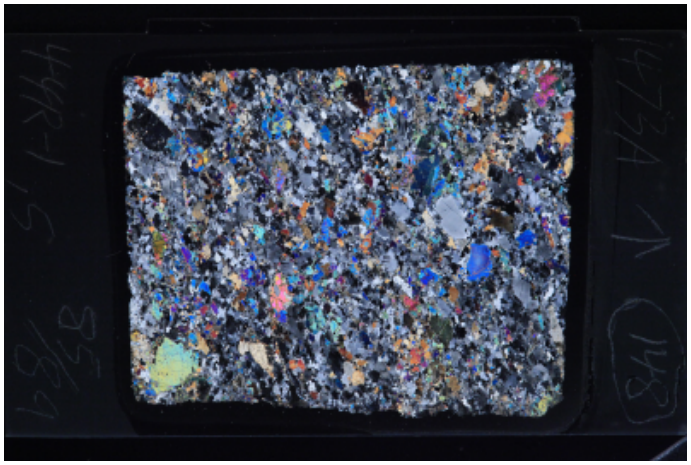
Cross-polarized



33073611

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a granular texture. It is weakly foliated, as both plagioclase and clinopyroxene show preferred orientation. Plagioclase occasionally occurs as inclusion within clinopyroxene. Olivine is elongated along the foliation and is rimmed by orthopyroxene. Clinopyroxene displays a consertal intergrowth texture and is rimmed by brown amphibole. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.2	anhedral	subequant	moderately altered
Plagioclase	55		3.2	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	40		3.6	1.2	anhedral	subequant	
Amphibole	0.1		0.2	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): RT

Detailed description Pl is substantially recrystallized into nearly polygonal aggregates. Ol and Cpx are locally recrystallized, with the neoblastic Cpx commonly associated with red-brown Amp. Static alteration is slight and essentially confined to Ol. In particular, Ol is altered into talc and minor oxide phases, and is rimmed by chlorite against Pl.

Comment type	Comment
Alteration general comments:	Static alteration is slight and essentially confined to Ol.
Mylonite comments:	Pl is substantially recrystallized into nearly polygonal aggregates. Ol and Cpx are locally recrystallized, with the neoblastic Cpx commonly associated with red-brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	35	3		3
Amphibole, colorless		50		
Amphibole, green		50		
Chlorite	20			100
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: porphyroclastic partially recrystallized
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved to straight Twinning: tapered Undulose extinction: irregular Texture: mainly recrystallized in elongated neoblasts that define the foliation
Clinopyroxene:	Grain size: coarse porphyroclast and medium recrystallized Grain shape: anhedral Grain boundary: curved Texture: undeformed porphyroclasts partially recrystallized, neoblast may associated to ol in aggregates

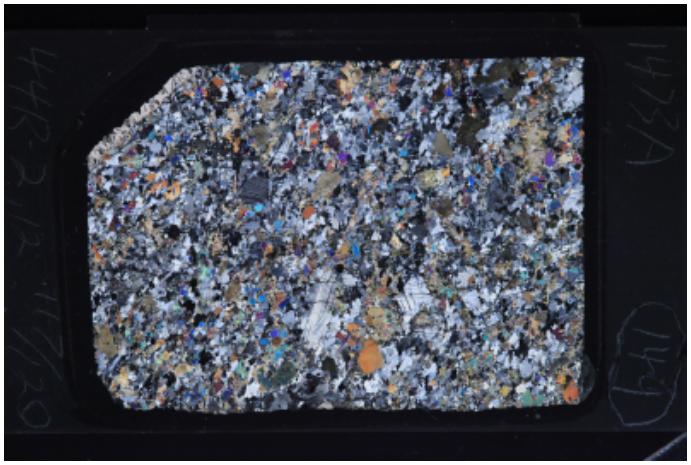
THIN SECTION LABEL ID: **360-U1473A-44R-2-W 117/120-TSB-TS_149** Piece no.: #12 TS no.: 149

Group	Summary
Igneous petrology:	A medium-grained gabbro with a granular texture. Plagioclase is strongly recrystallized and weakly foliated. It displays undulose extinction. Clinopyroxene is heavily altered and occasionally displays a consertal texture. Very few brown amphibole and opaque minerals are present.
Metamorphic petrology:	Sample is extensively replaced by greenschist assemblages. Olivine is completely replaced by tremolite and talc. Plagioclase grains are replaced by chlorite, minor epidote and tremolite. Cpx is altered into mostly green amphibole and tremolite. Chlorite veins are abundant and one carbonate vein was observed.
Structure:	Weakly foliated olivine gabbro with extensively recrystallized plagioclase grains. Subparallel veins are observed throughout as well as carbonate precipitation at a fracture surface.

Plane-polarized

33073551

Cross-polarized



33073571

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with a granular texture. Plagioclase is strongly recrystallized and weakly foliated. It displays undulose extinction. Clinopyroxene is heavily altered and occasionally displays a consertal texture. Very few brown amphibole and opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	65		5.6	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	35		2.4	1	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): JL

Detailed description The sample is mostly replaced by an assemblage of greenschist minerals. Olivine is totally altered into talc and tremolite. Tremolite crystals are conspicuous in the center of the olivine pseudomorph. This assemblage is rimmed by chlorite. Cpx is replaced by green and pale green amphibole. Some larger grains show 2nd plagioclase replacement. Brown amphibole blebs are common within the grain and at the grain edge. Most plagioclase grains are only moderately altered. Some, however, are extensively to completely replaced by chlorite and minor epidote, and rimmed by tremolite. Two types of chlorite were observed replacing plagioclase. Magnesian chlorite are characterized by yellowish birefringence in XPL and fibrous habit. Ferroan chlorite have an anomalous blue birefringence in XPL. Numerous veins of chlorite with anomalous blue birefringence were observed. One calcite vein was also observed and cross-cuts some of the chlorite vein.

Comment type	Comment
Vein 1 minerals:	Numerous veinlets of chlorite, characterized by anomalous blue birefringence in XPL, were observed. The veins are often branching into several smaller veins and cross-cuts several grains.
Vein 2 minerals:	A mm-scale carbonate vein was observed. This vein cross cuts smaller chlorite vein suggesting that the carbonate veining is a later stage process.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	60		40
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless	40	50		10
Amphibole, green		20		
Chlorite	10			60
Clay minerals	5	5		
Clinopyroxene, sec.	n/a	10	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	5
Plagioclase, sec.	n/a	n/a	n/a	25
Talc	45	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: coarse-to medium-grained; Grain shape: anhedral; Grain boundary: altered; Texture: completely altered olivine grains
Plagioclase:	Grain size: coarse-grained porphyroclasts, medium-grained neoblasts; Grain shape: subhedral to anhedral porphyroclasts, anhedral neoblasts; Grain boundary: straight to curved (porphyroclasts), straight, curved to polygonal neoblasts; Twinning: tapered; Undulose extinction: regular to irregular Texture: porphyroclasts encompassed by neoblasts
Clinopyroxene:	Grain size: coarse-grained porphyroclasts, medium-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Texture: altered and fractured clinopyroxene porphyroclasts and neoblasts; plagioclase inclusion in porphyroclasts
Oxide:	rare oxide associated to olivine and pyroxene alteration
Vein:	Sub-parallel chlorite vein networks cross-cutting entire thin section. Chlorite veins have clear-cut associations to the wall rock and exhibit orientated crystal growth within the vein as well as crack-seal type structures in some areas. Orientated carbonate growth has been observed at the edge of the thin section associated to a fracture wall.

THIN SECTION LABEL ID: **360-U1473A-44R-4-W 65/69-TSB-TS_150** Piece no.: #08 TS no.: 150

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	This is a fresh Ol-gabbro recording crystal-plastic deformation. Pl and Ol are substantially recrystallized into nearly polygonal aggregates; Cpx is also frequently partially recrystallized and the neoblastic Cpx is typically associated with minor amounts of brown Amp.
Structure:	Porphyroclastic olivine gabbro with thin ultramylonite.

Plane-polarized

33073511

Cross-polarized

33073531

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is elongated and rimmed by orthopyroxene. Plagioclase displays undulose extinction and is weakly foliated. Subhedral tabular plagioclase is partly enclosed within clinopyroxene. Clinopyroxene displays a consertal texture and is partly recrystallized. The neoblasts show a granoblastic texture with the plagioclase neoblasts. Small amount of sulfides are present, whereas ilmenite is very few. It is intruded by a very fine-grained vein, in which an euhedral zircon is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.3	anhedral	subequant	commonly rimmed by orthopyroxene
Plagioclase	55		4	0.5	anhedral	elongate	undulose extinction
Clinopyroxene	40		5.6	2	anhedral	subequant	with a consertal texture
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description Pl and Ol from this rock are substantially recrystallized into nearly polygonal aggregates. Cpx is also frequently partially recrystallized and the neoblastic Cpx is typically associated with minor amounts of brown Amp. The thin section also includes: (i) a thin ultra-mylonitic band mostly consisting of fine-grained Pl and oxide phases, and (ii) a thin mylonitic band presumably mostly made up of orthopyroxene, which cuts across a large Ol grain. The rock is fresh.

Comment type	Comment
Alteration general comments:	The rock is fresh.
Mylonite comments:	Pl and Ol from this rock are substantially recrystallized into nearly polygonal aggregates. Cpx is also frequently partially recrystallized and the neoblastic Cpx is typically associated with minor amounts of brown Amp. The thin section also includes: (i) a thin ultra-mylonitic band mostly consisting of fine-grained Pl and oxide phases, and (ii) a thin mylonitic band presumably mostly made up of orthopyroxene that cuts across a large Ol grain.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		
Amphibole, brown	n/a	20	n/a	n/a
Clinopyroxene, sec.	n/a	80	n/a	n/a
Oxide	30			n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 98 Domain name: microfabric

Microstructure: crystal-plastic

Plagioclase and olivine are substantially recrystallized into nearly polygonal aggregates. Olivine commonly forms elongated aggregates parallel to foliation. Clinopyroxene is partly recrystallized and form elongated aggregates with plagioclase neoblasts.

Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5

Type	Comment
Olivine:	Grain size: coarse-grained porphyroclasts; medium- to fine-grained neoblasts; Grain shape: anhedral porphyroclasts and neoblasts; Grain boundary: straight to curved; Undulose extinction: regular, complete; Subgrains: curved; Texture: few porphyroclasts, medium-sized neoblast aggregates
Plagioclase:	Grain size: coarse-grained porphyroclasts; medium-grained neoblasts; Grain shape: anhedral; Grain boundary: curved to irregular porphyroclasts, elongated, curved to irregular neoblasts, some neoblasts are nearly polygonal; Twinning: tapered; Undulose extinction: irregular Texture: few plagioclase porphyroclasts, otherwise substantially recrystallized into weakly foliated neoblasts
Clinopyroxene:	Grain size: coarse-grained porphyroclasts, medium to fine-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved porphyroclasts and neoblasts; Undulose extinction: regular if present; Fractures: cross-cutting grains, associated to alteration; Texture: Partly recrystallized clinopyroxene porphyroclasts and medium-grained neoblasts aggregated together with plagioclase
Oxide:	oxides associated to clinopyroxene

Interval domain no: 2 Domain rel. abundance (%): 2 Domain name: microfabric

Microstructure: crystal-plastic

Thin ultramylonite zone cross-cutting the short axis of the thin section. The ultramylonite is mainly composed of ultra-fine grained (5-20 micron) recrystallized plagioclase grains. Oxide grains form seams at the shear zone-wall rock contact, however, in some areas the oxide grains fill the entire shear zone.

Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	ultramylonitic [CPF_fabric]	5

Type	Comment
Plagioclase:	Grain size: fine-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: ultra-fine grained recrystallized plagioclase
Oxide:	fine-grained oxide grains parallel to shear zone-wall rock contact

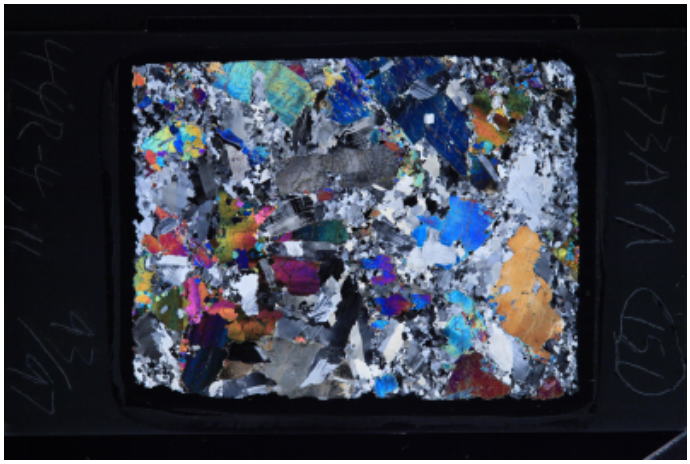
THIN SECTION LABEL ID: **360-U1473A-44R-4-W 93/97-TSB-TS_151** Piece no.: #11 TS no.: 151

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Olivine is occasionally rimmed by orthopyroxene. Plagioclase is recrystallized and also occurs as chadacryst within clinopyroxene. Clinopyroxene displays a poikilitic texture and is partly replaced by secondary clinopyroxene. Opaque minerals are dominated by ilmenite, with minor sulfides.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Weakly crystal plastically deformed medium grain size ophitic olivine gabbro. Plagioclase and olivine show significant recrystallisation, but strain is relatively limited, hence there is no development of a foliation. Large (1cm dia) ophitic/skeletal, recrystallised, olivine encloses only slightly deformed plagioclase chadacrysts.

Plane-polarized

33073471

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is in a subequant shape and occasionally rimmed by orthopyroxene. Plagioclase is deformed and partly recrystallized. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture. Very few brown amphibole are present and the opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	25			3	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	50		4.8	2.1	anhedral	tabular	undulose extinction
Clinopyroxene	25		10	8	anhedral	poikilitic	partly recrystallized
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol developed typical mesh texture. The mensh core were fresh Ol and the mesh rim were a mixture of talc, clay minerals and serpentine. Pyrite were also obsereved occurring at the boundary and fracture of Ol. Cpx altered into pale color amphibole, secondary Cpx and caly minerals. Pl were mainly replaced by secondary Pl with minor pale color amphibole and clay occurring in the cleavages of Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		20
Amphibole, colorless		40		5
Clay minerals	45	25		5
Clinopyroxene, sec.	n/a	35	n/a	n/a
Oxide	12			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Sulfide	3			n/a
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: MJC

Detailed description Weakly crystal plastically deformed medium grain size ophitic olivine gabbro. Plagioclase and olivine show significant recrystallisation, but strain is relativelyy limited, hence there is no development of a foliation (and the finest plagioclase grainsizes), Kinking and deformation twins in the plagioclase crystals outside of the oikocrysts and kinking of the cpx show that this sample has undergone some strain. Some sparsely recrystallised areas rich in plagioclase may show a relict magmatic texture. Large (1cm dia) ophitic/skeletal olivine encloses only slightly deformed plagioclase chadacrysts. the olivine is strained showing subgrains, kink bands and recrystallised neoblasts (0.1-1mm). Despite recrystallisation, the olivines show little strain, hence the largely undeformed chadacrysts.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	N/A	
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a
Fault rock intensity:	undeformed	0

Type	Comment
Olivine:	Large (1cm dia) ophitic/skeletal olivine encloses only slightly deformed plagioclase chadacrysts. the olivine is strained showing subgrains, kink bands and recrystallised neoblasts (0.1-1mm). Despite recrystallisation, the olivines show little strain, hence the largely undeformed chadacrysts. Neoblasts are often polygonal.
Plagioclase:	Plagioclase shows significant recrystallisation, but strain is relatively limited, hence there is no development of a foliation (and the finest plagioclase grainsizes), Kinking and deformation twins in the plagioclase crystals outside of the oikocrysts show that this sample has undergone some strain. Subgrains and undulose extinction are also present. Some sparsely recrystallised areas rich in plagioclase may show a relict magmatic texture. The smaller neoblasts display deformation twins and undulose extinction and are typically polygonal and 0.1mm in diameter.
Clinopyroxene:	Larger cpx porphyroclasts show kink banding and bending and some undulose extinction. Some subgrain and neoblast formation where grain is strained. Neoblasts 0.3mm in diameter, and equant.

THIN SECTION LABEL ID: **360-U1473A-44R-5-W 6/12-TSB-TS_152** Piece no.: #01 TS no.: 152

Group	Summary
Igneous petrology:	There are two domains in the thin section. The major domain is a coarse-grained olivine gabbro with a subophitic texture. The minor domain is a medium-grained plagioclase-rich gabbro with a granular texture.
Metamorphic petrology:	The gabbro is nearly fresh showing only a few percent of alteration intensity. Olivine is replaced by serpentine, oxide, green amphibole and clay; cpx is altered to brown and green amphibole plus oxide; plag is altered to secondary plagioclase and green amphibole.
Structure:	Weakly porphyroclastic olivine gabbro with a weakly deformed plagioclase-rich zone.

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 90 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Olivine is partly rimmed by orthopyroxene. Tabular plagioclase is partly enclosed within clinopyroxene. It is partly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and shows a consertal texture. Small amount of opaque minerals are present, which are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	25			5	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	50		7	5	anhedral	tabular	undulose extinction
Clinopyroxene	25		8	4	anhedral	subequant	with a consertal texture
Opaques	0.2						
Ilmenite	0.2						

Interval domain no: **2** Domain rel. abundance (%): 10 Domain name: lithology domain 2 minor

Lithology: **plagioclase-rich patch** Observer: CL

Texture: granular Ave. grain size: fine grained [345]

Detailed description: This domain is a medium-grained plagioclase-rich gabbro with a granular texture. This domain is mostly composed of plagioclase, with very few interstitial olivine and clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			0.4	anhedral	interstitial	
Plagioclase	95		3.2	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	2		0.4	0.2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): JK

Detailed description The gabbro is nearly fresh showing only a few percent of alteration intensity. Olivine is replaced by serpentine, oxide, green amphibole and clay; cpx is altered to brown and green amphibole plus oxide; plag is altered to secondary plagioclase and green amphibole.

Comment type	Comment
Alteration general comments:	The gabbro is nearly fresh showing only a few percent of alteration intensity. Olivine is replaced by serpentine, oxide, green amphibole and clay; cpx is altered to brown and green amphibole plus oxide; plag is altered to secondary plagioclase and green amphibole.
Vein 1 minerals:	green amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		2
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	15			50
Amphibole, green		50		
Clay minerals	15			
Oxide	50	20		n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 85 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Weakly porphyroclastic olivine gabbro with a weakly deformed plagioclase-rich zone. The olivine gabbro has olivine with undulose extinction and plagioclase with irregular boundaries and limited neoblasts. The irregular plagioclase boundaries indicate subgrain boundary migration recrystallization.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	Grain size: porphyroclasts: 1.5-8 mm. neoblasts: ~0.25 mm. Grain shape: subhedral to euhedral. Grain boundary: straight to curved. Undulose extinction: rectilinear, complete. Texture: aggregates of porphyroclasts and neoblasts.
Plagioclase:	Grain size: porphyroclasts: 1-3 mm. neoblasts: ~0.3 mm. Grain shape: porphyroclasts are elongate, neoblasts are equigranular. Grain boundary: straight to serrate. Twinning: tapered, better developed in larger crystals. Undulose extinction: patchy. Subgrain boundaries: curved. Texture: Equigranular texture with irregular boundaries indicating subgrain boundary migration recrystallization.
Clinopyroxene:	Grain size: porphyroclasts: 1-5 mm. neoblasts: ~0.25 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: porphyroclasts with very limited recrystallization.

Interval domain no: 2 Domain rel. abundance (%): 15 Domain name: microfabric

Microstructure: submagmatic Observer: JD

Detailed description Weakly porphyroclastic olivine gabbro with a weakly deformed plagioclase-rich zone. The olivine gabbro has olivine with undulose extinction and plagioclase with irregular boundaries and limited neoblasts. The irregular plagioclase boundaries indicate subgrain boundary migration recrystallization.

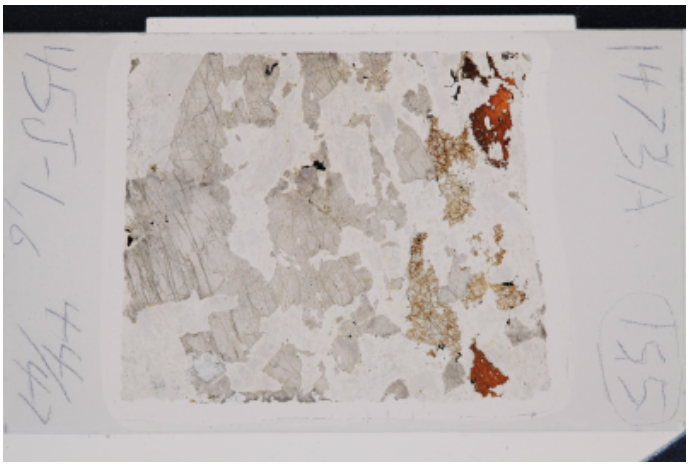
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Plagioclase:	Grain size: 0.4-3 mm. Grain shape: subhedral. Grain boundary: straight to curved. Twinning: igneous to tapered. Undulose extinction: patchy. Subgrain boundaries: curved. Texture: equigranular with a weak crystal plastic overprint.
Clinopyroxene:	Absent.

THIN SECTION LABEL ID: **360-U1473A-45M-1-W 44/47-TSB-TS_155** Piece no.: #06 TS no.: 155

Group	Summary
Igneous petrology:	An orthopyroxene-bearing olivine gabbro. Primary magmatic texture is not preserved but is very likely to be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is only slightly altered except for a few olivine grains completely replaced by reddish clays.
Structure:	Moderately recrystallized olivine gabbro with porphyroclastic plagioclase and olivine.

Plane-polarized



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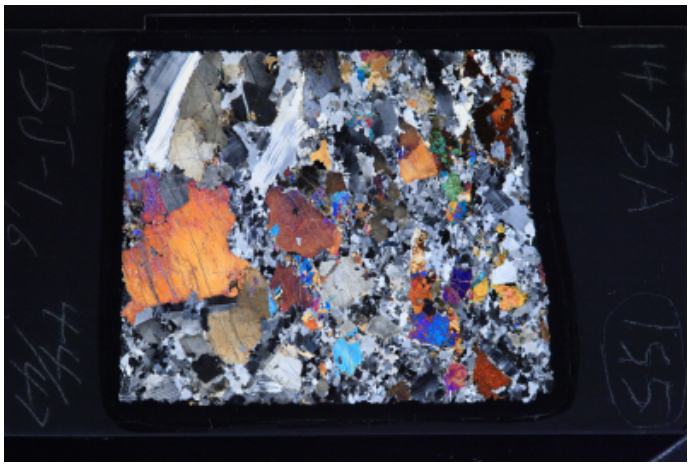
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An orthopyroxene-bearing olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved but is very likely to be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is recrystallized and commonly displays undulose extinction. Magmatic twin can be seen in some plagioclase neoblasts and deformation twins are shown by some porphyroclasts. Olivine is rimmed by orthopyroxene, which rarely shows a sympletitic texture with oxides. Clinopyroxene is partly recrystallized and the porphyroclasts commonly display a consertal intergrowth texture. Presence of orthopyroxene is possible, it shows tight exsolution lamallae and is occasionally rimmed by thin selvages of other pyroxene. Opaque minerals are predominated by ilmenite, which commonly shows an intergrowth texture with magnetite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		8	1.2	anhedral	elongate	undulose extinction and deformation twins
Clinopyroxene	33		8	6	anhedral	subequant	showing a consertal texture
Orthopyroxene	2		4	4	anhedral	elongate	
Opaques	0.5						
Magnetite	0.1						
Ilmenite	0.4						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description The sample is only slightly altered. Most conspicuous replacement is that of olivine where some grains are completely replaced by reddish clays. The rest of the olivine grains are slightly to moderately replaced by clays. Cpx and Plagioclase are only slightly altered.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	10		5
Amphibole, brown	n/a	5	n/a	n/a
Clay minerals	100	30		50
Clinopyroxene, sec.	n/a	65	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Moderately recrystallized olivine gabbro with porphyroclastic plagioclase and olivine. The plagioclase has aggregates of neoblasts and larger kinked porpyroclasts with undulose extinction. The olivine is in aggregates of porphyroclasts and neoblasts. The pyroxene is subhedral and may have undulose extinction.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Olivine:	Grain size: porphyroclasts: 1-2.5 mm. neoblasts: ~0.15 mm. Grain shape: anhedral. Grain boundary: curved. Undulose extinction: complete, rectilinear. Texture: porphyroclasts that are isolated to surrounded by neoblasts.
Plagioclase:	Grain size: porphyroclasts: 1.5-6 mm. neoblasts: 0.15-0.5 mm. Grain shape: polygonal. Grain boundary: straight to curved. Twinning: tapered. Subgrains: present as curved to straight boundaries. Undulose extinction: complete. Texture: coarse grained porphyroclasts, especially near pyroxene porphyroclasts. Aggregates of plagioclase neoblasts.
Clinopyroxene:	Grain size: porphyroclasts: 1-6 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular. Texture: porphyroclastic.

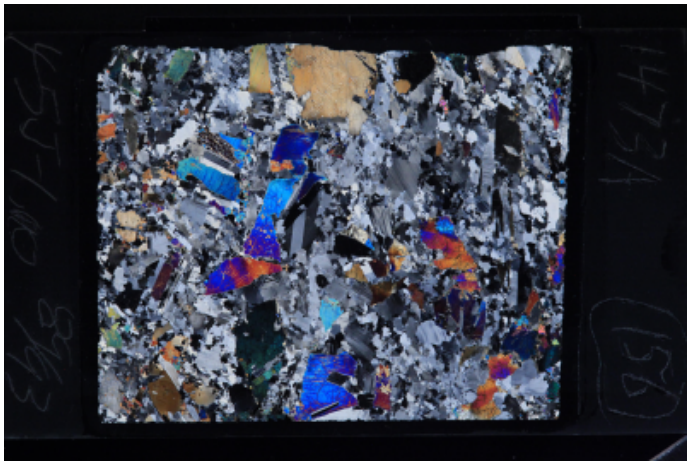
THIN SECTION LABEL ID: **360-U1473A-45M-1-W 89/93-TSB-TS_156** Piece no.: #09 TS no.: 156

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. Primary magmatic texture is not preserved, but could be subophitic, as tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	Sample is rather fresh and only slightly altered. Dominant secondary mineral is 2nd Cpx replacing primary Cpx.
Structure:	Weakly foliated with strongly recrystalized plagioclase. Olivine and clinopyroxene are mainly porphyroclasts.

Plane-polarized

33105061

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: poprhyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved, but could be subophitic, as tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Plagioclase commonly displays undulose extinction and occasionally has deformation twins. Olivine is rimmed by orthopyroxene. A part of the clinopyroxene is elongated, whereas the subequant clinopyroxene commonly displays a consertal intergrowth texture and contains brown amphibole blebs. Very few ilmenite is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			2.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	70		4.4	2	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	23		6	4	anhedral	elongate	showing a consertal texture
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description The sample is only slightly altered. Olivine is slightly replaced by serpentine and magnetite in mesh rims. Cpx is replaced mostly by 2nd Cpx and minor brown amphibole. Plagioclase are rather fresh, but substantially recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	10	0	3
Amphibole, brown	n/a	5	n/a	n/a
Clinopyroxene, sec.	n/a	95	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Strongly recrystallized plagioclase and locally recrystallized olivine and clinopyroxene in aggregate at grain boundaries. Poikilitic clinopyroxene include plagioclase chadacrystics and shield them, preventing strong deformation.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Subgrains: straight Texture: fractured and partially slightly replaced by alteration material, slightly deformed porphyroclasts; neoblasts crystallize along grain boundaries of olivine porphyroclasts
Plagioclase:	Grain size: medium to coarse porphyroclasts and fine to medium recrystallized Grain shape: anhedral Grain boundary: curved Twinning: igneous and tapered Undulose extinction: regular Texture: porphyroclastic strongly recrystallized, may included in clinopyroxene as preserved (not recrystallized) chadacrysts
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral and poikilitik Grain boundary: straight to curved Undulose extinction: absent to slight Texture: mainly undeformed porphyroclastic locally and partially recrystallized; includes undeformed plagioclase

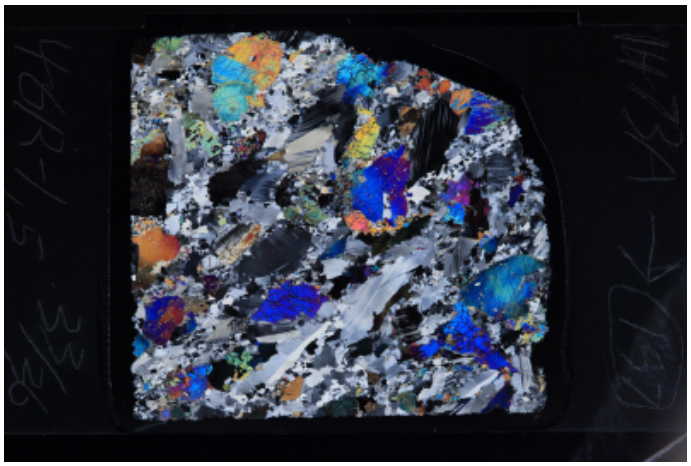
THIN SECTION LABEL ID: **360-U1473A-46R-1-W 33/36-TSB-TS_157** Piece no.: #05 TS no.: 157

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. A primary magmatic texture of subophitic is inferred by the tabular plagioclase, which is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	Strongly foliated with porphyroclasts parallel to the foliation. Plagioclase is strongly recrystallized.

Plane-polarized

33104981

Cross-polarized



33105021

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro. A primary magmatic texture of subophitic is inferred by the tabular plagioclase, which is partly or fully enclosed within clinopyroxene. The tabular plagioclase is partly recrystallized, and displays undulose extinction and deformation twins. Olivine is rimmed by orthopyroxene and sometimes oxides. Clinopyroxene is partly recrystallized and commonly shows a consertal intergrowth texture. It is occasionally overgrown by orthopyroxene. Small amount of ilmenite and sulfides are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			3.6	anhedral	elongate	rimmed by orthopyroxene
Plagioclase	65		8.8	3	anhedral	tabular	undulose extinction
Clinopyroxene	20		5.6	4.4	anhedral	subequant	showing a consertal texture
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 9 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Olivine developed typical mesh texture. Mesh cores were fresh olivine and mesh rims consisted of talc, serpentine, clay and minor oxide. Sulfide occurring in the mesh rim was observed. Clinopyroxene mainly altered into colorless amphibole occurring in the exsolution and the edge of clinopyroxene. Plagioclase were mostly replaced by secondary plagioclase with minor colorless amphibole and clay shown in the cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	7	6		12
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		90		2
Clay minerals	60			2
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	96
Sulfide	5			n/a
Talc	15	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation is defined by elongated recrystallized plagioclase and rare elongated aggregates of clinopyroxene and olivine.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Subgrains: straight Texture: fractured and partially slightly replaced by alteration material; deformed porphyroclasts locally recrystallized in neoblasts along grain boundaries of ol and cpx porphyroclasts
Plagioclase:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: tapered and rare banded igneous Undulose extinction: regular and common Subgrains: curved Texture: mainly recrystallized with elongated neoblats
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: rare Texture: porphyroclastic locally recrystallized; neoblasts in association with ol form elongated aggregates

THIN SECTION LABEL ID: **360-U1473A-46R-1-W 139/142-TSB-TS_158** Piece no.: #21 TS no.: 158

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture intruded by a fine-grained olivine gabbro. The fine-grained olivine gabbro is foliated and the primary texture is not preserved.
Metamorphic petrology:	The alteration intensity of this thin section is extensive. Clay minerals are pervasive in all the primary minerals.
Structure:	Coarse grained olivine gabbro intruded by a fine grained olivine gabbro then offset by calcite faults.

Plane-polarized

33105361

Cross-polarized

33105381

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro, displaying a subophitic texture. Olivine is completely altered. Tabular plagioclase shows undulose extinction. Occasionally, it is partly or fully enclosed within clinopyroxene, which displays a consertal intergrowth texture with orthopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			2			completely altered
Plagioclase	60		6.4	4	anhedral	tabular	undulose extinction
Clinopyroxene	33		8	4	anhedral	subequant	strongly altered

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro. It is highly foliated, as shown by the preferred orientation of plagioclase and clinopyroxene. Olivine is elongated along the foliation and completely altered. Both clinopyroxene and plagioclase are strongly recrystallized. It might contain small amount of orthopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.1	anhedral	elongate	completely altered
Plagioclase	55		0.4	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	40		0.4	0.2	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 65 Observer(s): QM

Detailed description The alteration intensity of this thin section is extensive. Ol mainly altered into dark red clay and clay pseudomorphs with talc and minor oxide formation. The replacement of Cpx consisted of clay and colorless amphibole. Pl was mostly replaced by secondary Pl with clay and chlorite occurring in the cleavages.

Comment type	Comment
Vein 1 minerals:	Several carbonate veins were observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	60		30
Amphibole, colorless		35		
Chlorite				10
Clay minerals	80	65		20
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	15	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: magmatic Observer: JD

Detailed description Coarse grained olivine gabbro intruded by a fine grained olivine gabbro then offset by calcite faults. The coarse grained gabbro has a very weak crystal plastic overprint. The fine grained gabbro has aggregates of elongate plagioclase defining the foliation. Calcite vein networks crosscut the sample with one forming a fault.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Patchy undulose extinction, some tapered twins.

Interval domain no: 2 Domain rel. abundance (%): 35 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: neoblasts: 0.05-0.15 mm. Grain shape: equigranular. Grain boundary: curved Undulose extinction: patchy, weak. Texture: elongate neoblasts of olivine. unclear if any porphyroclasts remain.
Plagioclase:	Grain size: porphyroclasts: ~0.5 mm. neoblasts: 0.05-1 mm. Grain shape: equigranular. Grain boundary: curved to straight. Twinning: mostly magmatic. Undulose extinction: patchy. Texture: elongate, equigranular aggregates of plagioclase.
Clinopyroxene:	Grain size: ~0.4 mm. Grain shape: elongate, anhedral. Grain boundary: curved. Texture: elongate isolated crystals of pyroxene.

Interval domain no: 3 Domain rel. abundance (%): 5 Domain name: microfabric

Microstructure: fault rock Observer: JD

Detailed description Calcite faults crosscut the fine grained-coarse grained contact. One fault has the most offset in 2D, even though the veins are branched. Offset cannot be determined since the up core direction is unconstrained.

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a
Clasts in fault rock (%)	10	n/a
Fault rock clast size:	0.5	n/a
Fault rock intensity:	well developed fault, breccia	4

Type	Comment
Vein:	Calcite fractures and faults.

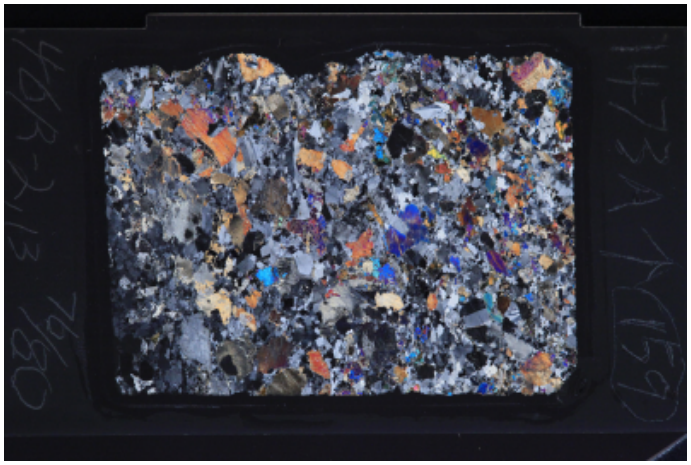
THIN SECTION LABEL ID: **360-U1473A-46R-2-W 76/80-TSB-TS_159** Piece no.: #13 TS no.: 159

Group	Summary
Igneous petrology:	A deformed medium-grained olivine gabbro. The primary magmatic texture is not preserved, but could be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is slightly altered. Most conspicuous secondary minerals are 2nd Cpx after primary Cpx and clay minerals after olivine. A green amphibole (likely tremolite) vein was observed.
Structure:	Olivine gabbro with recrystallized plagioclase and olivine. Clinopyroxene porphyroclasts enclose plagioclase grains and are only partly recrystallized.

Plane-polarized

33104941

Cross-polarized



33104961

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: deformed Ave. grain size: medium grained [345]

Detailed description: A deformed medium-grained olivine gabbro. The primary magmatic texture is not preserved, but could be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. The rim of olivine is commonly altered, but overgrowth of orthopyroxene is still locally preserved. Plagioclase displays undulose extinction and deformation twins. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene and is moderately altered. Small amount of sulfides are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			1.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		2.4	1.2	anhedral	subequant	undulose extinction
Clinopyroxene	33		4.4	2	anhedral	subequant	showing a consertal texture
Orthopyroxene	0.5		0.8	0.8	anhedral	interstitial	occurs as corona over olivine or patches on clinopyroxene

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): Observer(s): JL

Detailed description Sample is only slightly altered. Late stage clay overprint in olivine is noticeable. Cpx is moderately transformed to 2nd Cpx and associated brown amphibole. Pale green/colorless amphibole rims Cpx grains. Chlorite and minor plae green amphibole were observed in plagioclase microfractures and microveins. A green amphibole (likely tremolite) vein was observed.

Comment type	Comment
Mylonite comments:	Plagioclase grains are mostly recrystallized.
Vein 1 minerals:	Green amphibole vein, likely tremolite, was observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	20		5
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		30		10
Chlorite				60
Clay minerals	55	10		
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	30
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5

Type	Comment
Olivine:	Grain size: medium-grained porphyroclasts and neoblasts; Grain shape: anhedral; Grain boundary: altered; Undulose extinction: regular; Subgrains: straight; Texture: porphyroclasts with neoblasts at grain boundaries
Plagioclase:	Grain size: medium-grained porphyroclasts and neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Subgrains: straight to curved; Texture: porphyroclasts with neoblasts
Clinopyroxene:	Grain size: medium-grained porphyroclasts and neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Fractures: frequent; Texture: porphyroclasts with neoblasts, porphyroclasts enclose plagioclase grains
Oxide:	oxides associated to olivine and clinopyroxene alteration

THIN SECTION LABEL ID: **360-U1473A-46R-3-W 32/35-TSB-TS_160** Piece no.: #06 TS no.: 160

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro intruded by two trondhjemite veins. Primary magmatic texture of the olivine gabbro is not preserve, but could be subophitic, as tabular plagioclase is partly enclosed within clinopyroxene. The trondhjemite displays a granular texture.
Metamorphic petrology:	The gabbro intruded by the felsic vein is moderately altered; olivine adjacent to the felsic vein is totally altered and cpx overgrown by brown amphibole which is in turn replaced by green amphibole. Felsic vein: plagioclase is often recrystallized (so secondary) and intensely filled with tiny cloudy, dusty particles; mortar texture due to slight cataclasis; alteration phases: green amphibole, sec. plagioclase, clay. The sequence of alteration phase imply a hydrothermal veining history from the magmatic regime down to very low temperatures (clay minerals on grain boundaries).
Structure:	Porphyroclastic texture with foliation defined by recrystallized plagioclase and elongated aggregates of olivine and clinopyroxene.

Plane-polarized

33104901

Cross-polarized

33104921

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained [345]

Detailed description: This domain is an olivine gabbro. The primary magmatic texture is not preserve, but could be subophitic, as tabular plagioclase is partly enclosed within clinopyroxene. Olivine is strongly altered. Plagioclase is highly deformed and recrystallized. It commonly displays undulose extinction. Clinopyroxene is highly altered and replaced by green amphibole. A consertal intergrowth texture is still preserved.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			2.4	anhedral	subequant	strongly altered
Plagioclase	40		3.6	1	anhedral	elongate	undulose extinction
Clinopyroxene	50		8	6	anhedral	elongate	showing a consertal texture

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is the trondhjemite veins with a granular texture. It is composed of subequant plagioclase and quartz. Both of them display undulose extinction. Tiny zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Quartz	30		0.8	0.4	anhedral	subequant	undulose extinction

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 80 Domain name: olivine gabbro

Total rock alteration estimate (%): 20 Observer(s): JK

Detailed description The gabbro intruded by the felsic vein is moderately altered; olivine adjacent to the felsic vein is totally altered and cpx overgrown by brown amphibole which is in turn replaced by green amphibole. Felsic vein: plagioclase is often recrystallized (so secondary) and intensely filled with tiny cloudy, dusty particles; mortar texture due to slight cataclasis; alteration phases: green amphibole, sec. plagioclase, clay. The sequence of alteration phase imply a hydrothermal veining history from the magmatic regime down to very low temperatures (clay minerals on grain boundaries).

Comment type	Comment
Alteration general comments:	The gabbro intruded by the felsic vein is moderately altered
Vein 1 minerals:	green amphibole

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	80	50		20
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, green	20	50		30
Clay minerals	60			10
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10	10		n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Talc	10	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 20 Domain name: trondhjemite

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material, defects; mortar texture due to slight cataclasis; alteration phases: green amphibole, sec. plagioclase, clay. The sequence of alteration phase clearly imply a hzdrothermal veining history from the magmatic regime down to very low temperatures (clay minerals on grain boundaries)

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				50
Amphibole, green				10
Clay minerals				10
Plagioclase, sec.	n/a	n/a	n/a	80
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Strongly recrystallized plagioclase, and locally recrystallized aggregates of clinopyroxene and olivine.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Subgrains: straight Texture: fractures and partially to completely altered; neoblasts crystallize in association with cpx in aggregates.
Plagioclase:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: rare tapered in neoblasts Undulose extinction: regular and common Texture: mainly recrystallized, also in very fie grained bands between porphyroclasts
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and slight Texture: porphyroclastic partially and locally recrystallized along porphyroclasts grain boundaries

THIN SECTION LABEL ID: **360-U1473A-47R-1-W 21/26-TSB-TS_161** Piece no.: #04 TS no.: 161

Group	Summary
Igneous petrology:	This is a medium-grained oxide gbabronorite. The primary magmatic texture is not preserved, but could be subophitic, as plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is extensive. Clay minerals are pervasive in all the primary minerals.
Structure:	Porphyroclastic olivine gabbro crosscut by a discordant oxide vein all cut by calcite veins.

Plane-polarized

33105301

Cross-polarized

33105321

IGNEOUS PETROLOGY

Lithology: **oxide gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This is a medium-grained oxide gbabronorite. The primary magmatic texture is not preserved, but could be subophitic, as plagioclase is partly or fully enclosed within clinopyroxene. A weak foliation is shown by the preferred orientation of plagioclase and pyroxenes. Plagioclase is strongly recrystallized and displays undulose extinction. Magmatic twins can only seen in some plagioclase porphyroclasts. Clinopyroxene is pervasively altered. Primary orthopyroxene is in a tabular shape. Opaque oxides are concentrated in the clinopyroxene-rich area. They are composed of magnetite and ilmenite, with an intergrowth texture. Oxides are commonly surrounding the clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	50		4.8	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	35						
Orthopyroxene	5		7	2.4	anhedral	tabular	
Opaques	10						
Magnetite	4						
Ilmenite	6						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 70 Observer(s): QM

Detailed description The alteration intensity of this thin section is extensive. Ol altered into clay, talc and colorless amphibole.Cpx were almost altered by clay minerals.Opx mainly altered into clay with talc occurring along the edges and cleavages. Pl were mostly raplaced by secondary Pl with clay and minor chlorite present in the cleavages.

Comment type	Comment
Vein 1 minerals:	Several carbonate veins were observed.
Vein 2 minerals:	Oxide vein occurred at the boundary between medium-grained gabbronorite and fine-grained gabbronorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	70	80	35	40
Amphibole, colorless	10	20		
Chlorite				5
Clay minerals	60	80	80	15
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	30	n/a	20	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Porphyroclastic olivine gabbro crosscut by a discordant oxide vein all cut by calcite veins. The porphyroclastic olivine gabbro is defined by strongly recrystallized plagioclase and limited recrystallization in pyroxene and olivine. The oxide vein is discordant to the foliation and surrounds porphyroclastic pyroxene and plagioclase, individual neoblasts of plagioclase, and aggregates of recrystallized plagioclase. The sample was then crosscut by calcite veins which have inclusions of oxides within them.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~10 mm. neoblasts: ~0.25 mm Grain shape: anhedral. Grain boundary: curved. Undulose: weak to none. Texture: porphyroclastic olivine with limited recrystallization as isolated neoblasts within a plagioclase matrix.
Plagioclase:	Grain size: porphyroclasts: 0.5-2.5 mm. neoblasts: 0.1-0.5 mm. Grain shape: equigranular. Grain boundary: polygonal. Twinning: tapered. Subgrains: present as curved to straight. Texture: Polygonal aggregates of neoblasts with some irregular boundaries with subgrains with straight boundaries. The larger neoblasts and smaller porphyroclasts are elongate defining the foliation.
Clinopyroxene:	Grain size: porphyroclasts: 1.5-10 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: Porphyroclastic with some regions of recrystallization into aggregates of neoblasts surrounding porphyroclasts.
Oxide:	3.5 mm thick oxide vein which completely surrounds host rock clasts of pyrxoene, plagioclase, neoblasts of plagioclase, and aggregates of recrystallized plagioclase. The oxide vein is discordant with the host rock foliation, indicating the vein is younger. The oxide vein is crosscut by calcite filled fractures.
Vein:	Calcite vein fractures crosscut the olivine gabbro and the oxide vein. The carbonate veins have inclusions of oxides. The carbonate veins are very irregular in orientation and thickness.

THIN SECTION LABEL ID: **360-U1473A-47R-1-W 36/42-TSB-TS_162** Piece no.: #05 TS no.: 162

Group	Summary
Igneous petrology:	There two domains, a coarse-grained oxide-bearing gabbronorite and a fine-grained gabbronorite. The oxide-bearing gabbronorite displays a granular texture. The fine-grained gabbronorite is foliated and the primary texture is not preserved.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Fine grained, weakly foliated gabbronoriite intruding into a more coarse grained, porphyroroclastic oxide bearing gabbronoire. The fine grained gabbro shows a weak foliation defined by elongate plagioclase and pyroxenes. Foliation is parallel to the contact. It also likely contains a partially digested sample of the country rock. The more coarse grained olivine bearing gabbro shows more crystal plastic deformation than the finer grained gabbro. There are bands of re-crystallised plagioclase and the pyroxene shows significant bending and shearing and even kink-banding. Micro shear zones are present.

Plane-polarized

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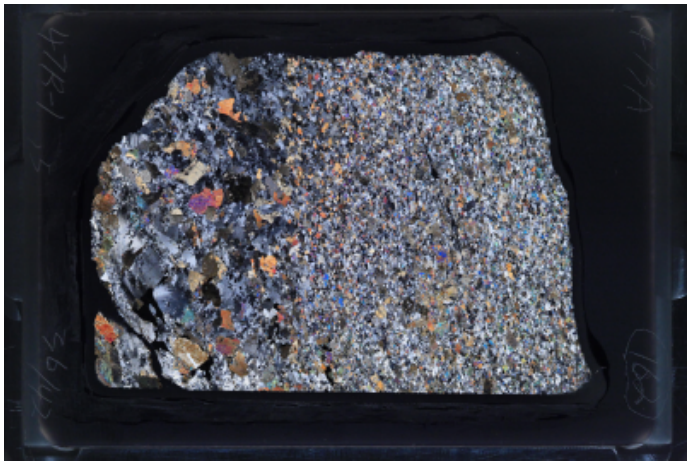
Cross-polarized



33105281

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): Domain name: lithology domain 1 major

Lithology: **gabbronorite** Observer: CL

Texture: foliated Ave. grain size: fine grained

Detailed description: This domain is a fine-grained gabbronorite. Primary magmatic texture is not preserved. A foliation is defined by the preferred orientation of plagioclase and pyroxenes. Plagioclase is completely recrystallized and displays undulose extinction. Clinopyroxene is moderately altered. Orthopyroxene is in a tabular shape and partly or fully enclose plagioclase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		2	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	30		2.8	1.6	anhedral	subequant	with a consertal texture
Orthopyroxene	10		3.2	2.4	anhedral	tabular	

Interval domain no: **2** Domain rel. abundance (%): Domain name: lithology domain 2 minor

Lithology: **oxide-bearing gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a coarse-grained oxide-bearing gabbronorite. Plagioclase is partly recrystallized and shows undulose extinction and deformation twins. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene. Primary orthopyroxene is in a tabular shape. Opaque oxides mainly consist of magnetite, with minor ilmenite. Intergrowth texture can be seen between both.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		8	6	anhedral	tabular	undulose extinction
Clinopyroxene	23		6	4	anhedral	subequant	with a consertal texture
Orthopyroxene	5		8.8	3.2	anhedral	tabular	with a consertal texture
Opaques	2						
Magnetite	1.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Cpx altered into clay and colorless amphibole. Opx altered into colorless amphibole, clay and talc. Pl were mostly replaced by secondary Pl with chlorite and clay occurring in the cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		30	15	25
Amphibole, colorless		20	10	
Chlorite				10
Clay minerals		80	65	20
Plagioclase, sec.	n/a	n/a	n/a	70
Talc		n/a	25	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: very fine grained weakly foliated gabbronorite

Microstructure: submagmatic Observer: mjc

Detailed description Fine grained, weakly foliated gabbronoriite appears to have intruded more coarse grained, porthphyroroclastic oxide bearing gabbronotote. the fine grained gabbro shows a weak foliation defined by elongate plagioclase and pyroxenes. Foliation is parallel to the contact. Clots of mafic minerals may be a xenolith from the county rock. plagioclase shows extensive undulose extinction and incipient subgrain formation. Some deformation twins.might be partly magmatic. The more coarse grained oxide bearing gabbro (still technically fine grained) shows more crystal plastic deformation. The are bands of re-crystallised plagioclase and the pyroxene shows significant bending and shearing and even kink-banding in one place. And some recrystallisation near the bands of deformed plagioclase. The obsrvation that the more coarse grained gabbro shows more crystal plastic deformation and the foliation of the fine grained gabbro is parallel to the contact suggests that the finer grained gabbro is intrusive into the more coarse grained gabbro.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	plag neoblasts approximately polygonal (0.05mm diameter). Mostly equant. but longer grains help define the foliation. common undulose extinction and subgrains. Deformation twinning less obvious. some areas rich in plagioclase, presumably reflecting the original microstructure. Intrusive into coarse grained material.
Clinopyroxene:	Small, anhedral grains, elongate in the direction of the foliation (<0.3mm diameter).. Weak undulose extinction. Larger grains show some recrystallisation (neoblasts= 0.01mm).

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: fine grained oxide bearing gabbronorite

Microstructure: crystal-plastic Observer: mjc

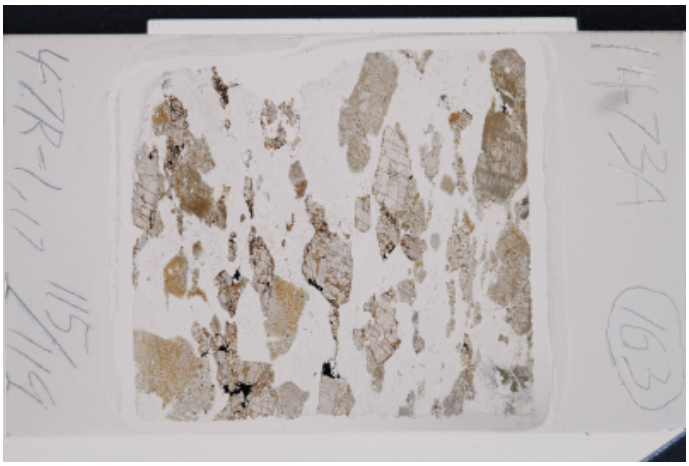
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Large plagioclase porphyroblasts show undulose extinction, and both incipient sub grains and true subgrains. A few are bent and sheared. Hint that porphyroclasts near the contact are more sheared: evidence that the finest grained material is intrusive? Neoblasts show a range of grain sizes down to 0.05mm diameter. Neoblasts are generally polygonal to anhedral, but equant. Finest grainsizes seem to correlate with micro shear zones. Largest grain sizes correlate with recrystallisation at the margins of the porphyroclasts. Deformation twinning is not common.
Clinopyroxene:	Contains both Cpx and Opx, Both can be highly sheared and fractured/bent, where micro--shear zones cross . Kink bands visible in some grains. Some re-crystallisation of margins of the pyroxenes (neoblasts, anhedral and 0.1mm diameter). Most porphyroclasts show weak undulose extinction
Oxide:	some oxide, streaked out, with a few floating porhyroclasts

THIN SECTION LABEL ID: **360-U1473A-47R-1-W 115/119-TSB-TS_163** Piece no.: #17 TS no.: 163

Group	Summary
Igneous petrology:	A medium-grained gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved but could be subophitic, as indicated by the plagioclase inclusions within clinopyroxene.
Metamorphic petrology:	Sample is moderately altered into mostly yellowish and reddish clays along grain cleavage planes and microfractures.
Structure:	Strongly deformed, mylonitic foliation with plagioclase completely recrystallized.

Plane-polarized



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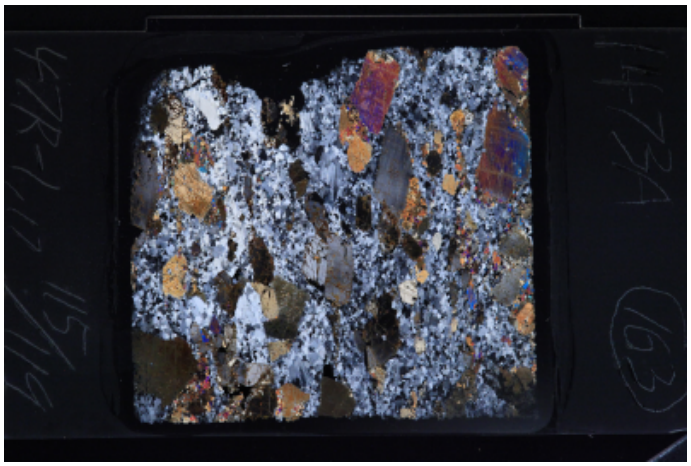
Cross-polarized



33104881

IGNEOUS PETROLOGY

Lithology: **gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved but could be subophitic, as indicated by the plagioclase inclusions within clinopyroxene. A strong foliation is defined by the preferred orientation of plagiolcase and pyroxene. Plagioclase is almost completely recrystallized and displays undulose extinction. The neoblasts also commonly display magmatic twins. Clinopyroxene is partly recrystallized and strongly altered. Orthopyroxene is in a tabular shape and displays tight exsolution lamallae. Opaque oxides are predominated by ilmenite, which occurs at the pressure shadow of pyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		3	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	25		6	4	anhedral	tabular	partly recrystallized
Orthopyroxene	20		6	5	anhedral	tabular	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): Observer(s): JL

Detailed description Sample is a moderately altered mylonitic gabbronorite. Common secondary mineral are clay minerals. Cpx is substantially replaced by yellowish clays while Opx is replaced by a more reddish clays. Clay replaced Cpx grains mostly along cleavage planes. In Opx grains, clays occur in microfractures. Most of these microfractures have random orientation, while some seem to exhibit parallel lines perpendicular to the crystal orientation/elongation.

Comment type	Comment
Mylonite comments:	Sample is mylonitic. Almost all plagioclase is recrystallized. Proximal to Cpx porphyroclasts are Cpx and minor brown amphibole neoblasts. Opx grains are deformed. Minor oxides are associated with Cpx neoblasts.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		30	20	5
Amphibole, brown	n/a	30	n/a	n/a
Clay minerals		70	100	100
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Strongly deformed with plagioclase completely recrystallized and porphyroclasts parallel to the foliation.

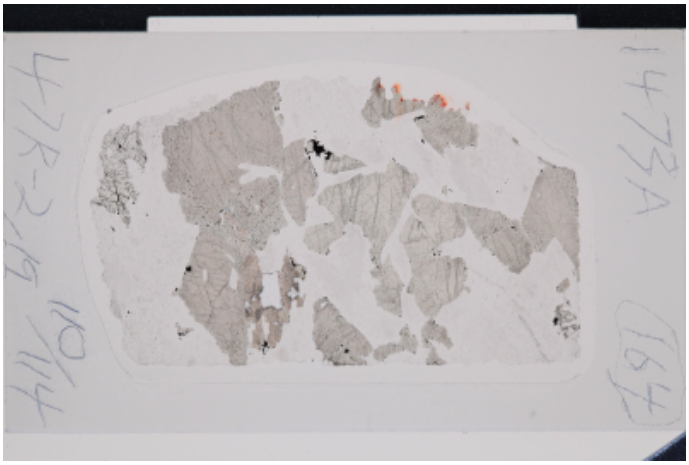
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Texture: fractured and partiallyaltered, slightly deformed porphyroclasts; neoblasts crystallize along grain boundaries of porphyroclasts and in aggregates with cpx
Plagioclase:	Grain size: fine to medium recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: tapered Undulose extinction: regular and common Texture: completely recrystallized
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: altered porphyroclastic partially recrystallized in neoblasts at porphyroclasts grain boundaries; neoblasts also form aggregates with ol.

THIN SECTION LABEL ID: **360-U1473A-47R-2-W 110/114-TSB-TS_164** Piece no.: #19 TS no.: 164

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing gabbronorite with a porphyroclastic texture. The primary magmatic texture is very likely to be subophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene and orthopyroxene.
Metamorphic petrology:	The sample shows negligible static alteration.
Structure:	Coarse-grained olivine gabbro with extensively recrystallized plagioclase. Clinopyroxene porphyroclasts show recrystallization on grain margins and one good example of necking and tail development.. Olivine is recrystallised. Sample shows incipient foliation development. Narrow bands of fine grained recrystallised plag and cpx define an incipient foliation.

Plane-polarized



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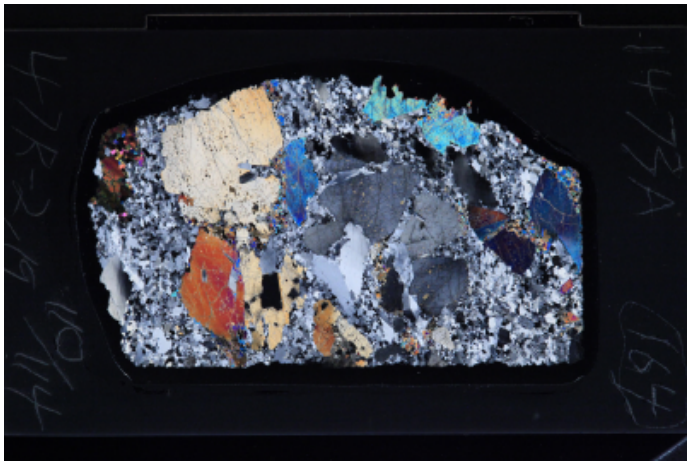
Cross-polarized



33104841

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine-bearing gabbronorite with a porphyroclastic texture. The primary magmatic texture is very likely to be subophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene and orthopyroxene. Olivine is commonly in a subequant shape and rimmed by orthopyroxene. Plagioclase is strongly recrystallized and commonly shows undulose extinction. Magmatic twins can be seen in the neoblasts. Clinopyroxene is commonly rimmed by the aggregates of recrystallized clinopyroxene neoblasts. Orthopyroxene shows tight exsolution lamallae and contain abundant brown amphibole blebs along the lamallae, sometimes together with ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			1.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		4.8	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	25		8	5	anhedral	subequant	partly recrysallized
Orthopyroxene	18		7	7	anhedral	subequant	with brown amphibole blebs
Amphibole	0.2		0.1	0.05	anhedral	interstitial	occurring as blebs in pyroxenes
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The sample is fresh.

Comment type	Comment
Alteration general comments:	The sample is fresh.
Mylonite comments:	Pl and Ol abundantly recrystallized into polygonal aggregates. Clinopyroxene neoblasts locally associated with minor brown Amp or Fe-Ti-oxide phase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10			2
Amphibole, colorless				50
Chlorite				50
Oxide	20			n/a
Subtotals replaced	100			100

MICROSTRUCTURES

Microstructure: crystal-plastic

Coarse-grained olivine gabbro with extensively recrystallized plagioclase. Clinopyroxene porphyroclasts show recrystallization on grain margins where incipient foliation is being developed and one good example of necking and tail development.. Olivine is recrystallised. Good examples of plagioclase neoblasts preferentially forming at clinopyroxene-plagioclase grain boundaries. Excellent sample to show incipient foliation development. Narrow bands of fine grained recrystallised plag and cpx define an incipient foliation. Interestingly, suggests foliation may initially develop at px-plag contacts.

Observer: mjc

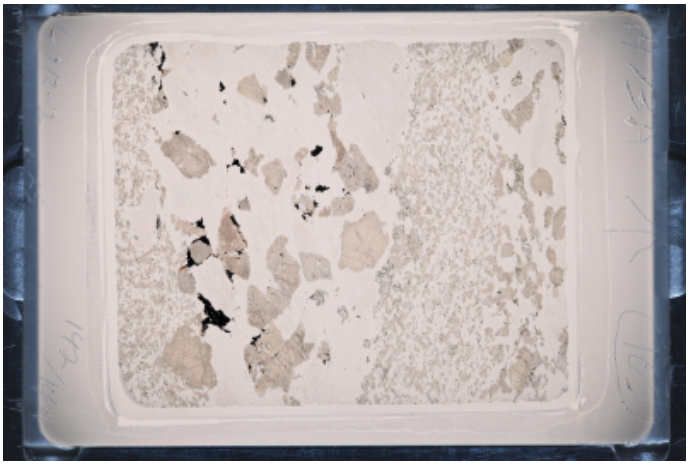
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	partial	n/a
Magmatic fabric intensity:	N/A	
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Only two to three olivine crystals in the thin section. Significantly recrystallised. Equant, sub-polygonal, neoblasts as small as 0.03mm. Undulose extinction, and sub grains in parent crystals. The cluster represented by the original and recrystallised grains is elongated parallel to foliation. The original grains show undulose extinction.
Plagioclase:	Large plagioclase porphyroclasts are preserved in the shadows of the clinopyroxenes. The plag porphyroclasts are heavily stained, showing deformation twins, undulose extinction and sub-grain development. Elsewhere the plagioclase is pervasively recrystallised, into polygonal neoblasts 0.3 to 0.03mm in diameter. The larger neoblasts show undulose extinction, incipient sub-grain formation and deformation twin development.
Clinopyroxene:	Large cpx porphyroclasts show weak undulose extinction and subgrain and nice neoblast development on edges of crystals where shear zones pass through. One end of a large cpx porphyroclast shows necking and incipient tail development. Neoblasts (0.1 to 0.05mm diameter), equant, anhedral.

THIN SECTION LABEL ID: **360-U1473A-47R-2-W 142/149-TSB-TS_165** Piece no.: #25 TS no.: 165

Group	Summary
Igneous petrology:	There are two domains. The coarse-grained oxide-bearing olivine gabbro displays a porphyroclastic texture and its primary magmatic texture is not preserved. The fine-grained olivine gabbro is highly foliated.
Metamorphic petrology:	The rocks has widespread Ol, Pl and Cpx neoblasts, the latter typically associated with minor oxide phases and brown Amp. The static alteration postdating the neoblast formation is negligible.
Structure:	coarse grained, undeformed olivine gabbro with a submagmatic texture. Local defomation microstructures are observed in tapered twins and undulose extinction in plagioclase

Plane-polarized



33144631

Cross-polarized

33144651

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 65 Domain name: lithology domain 1

Lithology: **oxide-bearing olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a coarse-grained oxide-bearing olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Plagioclase is partly recrystallized and display undulose extinction. The plagioclase porphyroclasts are highly elongated. Olivine is elongated and partly recrystallized. Occasionally, it is fully enclosed within plagioclase. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture. Tiny brown amphiboles are interstitial between the clinopyroxene neoblasts. Opaque minerals are predominated by ilmenite, with very little sulfides. They are surrounding clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.2	anhedral	subequant	
Plagioclase	70		12	8	anhedral	elongate	undulose extinction
Clinopyroxene	23		8	6	anhedral	subequant	with a consertal texture
Opaques	2						
Ilmenite	2						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 35 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro. It is strongly foliated, as shown by the preferred orientation of both olivine and plagioclase. Olivine is strongly elongated. Plagioclase is completely recrystallized and displays undulose extinction. Clinopyroxene displays a consertal texture and occasionally contains olivine inclusions.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			0.8	anhedral	elongate	
Plagioclase	56		1.6	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	36		1.6	0.8	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): RT

Detailed description Ol, Pl and Cpx neoblasts, the latter typically associated with minor oxide phases and brown Amp. The static alteration postdating the neoblast formation is negligible.

Comment type	Comment
Alteration general comments:	The static alteration postdating the neoblast formation is negligible.
Mylonite comments:	Ol, Pl and Cpx neoblasts, the latter typically associated with minor oxide phases and brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		1
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		20		50
Clay minerals		10		50
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

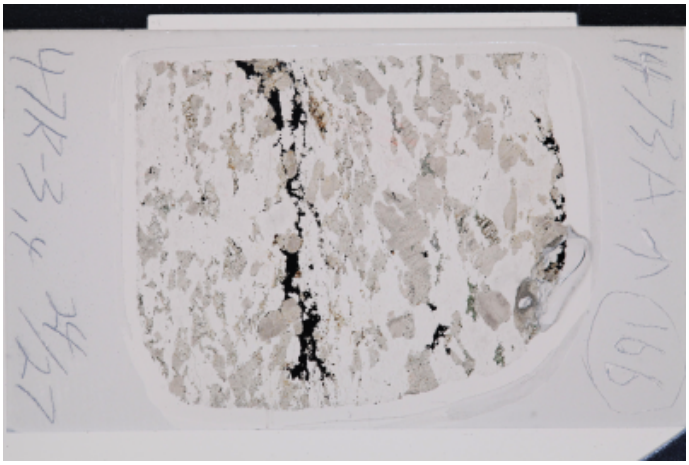
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	coarse-grained, granular to anhedral, weakly deformed with straight, regular subgrain boundaries. Fractured and partially altered.
Plagioclase:	coarse grained, subhedral to anhedral, igneous and tapered twins, regular undulose extinction and curved subgrain boundaries.
Clinopyroxene:	coarse grained, undeformed, fractured. Locally including euhedral plag

THIN SECTION LABEL ID: **360-U1473A-47R-3-W 24/27-TSB-TS_166** Piece no.: #04 TS no.: 166

Group	Summary
Igneous petrology:	A medium-grained orthopyroxene-bearing oxide olivine gabbro. The primary magmatic texture is not preserved.
Metamorphic petrology:	Mylonite characterized by Ol and Cpx recrystallization and overprinted by a slight static alteration.
Structure:	Mylonitic texture with completely recrystallized plagioclase and olivine. Clinopyroxene is undeformed and partially recrystallized.

Plane-polarized



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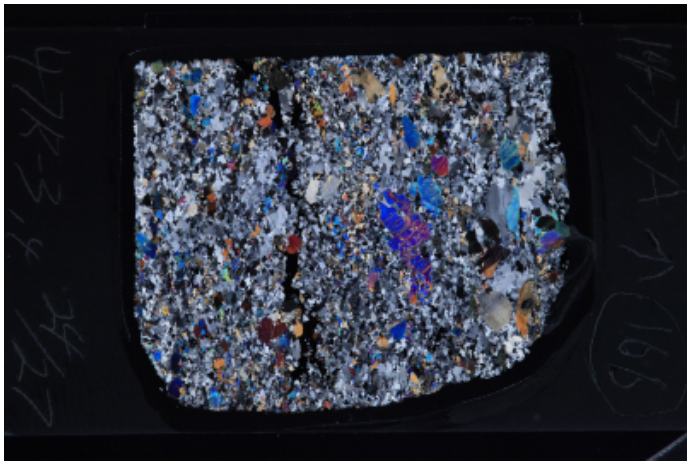
Cross-polarized



33104801

IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing oxide olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained orthopyroxene-bearing oxide olivine gabbro. The primary magmatic texture is not preserved. Plagioclase is strongly recrystallized and displays undulose extinction. Plagioclase neoblasts commonly show magmatic twins. A weak foliation is defined by the preferred orientation of plagioclase, olivine and clinopyroxene. Olivine is commonly recrystallized and rimmed by orthopyroxene. Clinopyroxene is elongated and displays a consertal intergrowth texture with orthopyroxene. Opaque oxides are distributed along the foliation and predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		4.4	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	33		6.4	2	anhedral	subequant	showing a consertal texture
Orthopyroxene	2		1.6	1.2	anhedral	subequant	
Opaques	5						
Ilmenite	5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description Mylonite retaining clinopyroxene porphyroclasts and exhibiting a slight static alteration.

Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	Mylonite retaining clinopyroxene porphyroclasts.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		2
Chlorite	50	50		50
Clay minerals	50	50		50
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Strongly recrystallized, with aggregates of olivine and clinopyroxene that define the foliation. Oxides crystallize in a band sub-parallel to the foliation.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4

Type	Comment
Olivine:	Grain size: fine to medium Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: completely recrystallized, often neoblast in association with cpx in elongated aggregates
Plagioclase:	Grain size: fine to medium Grain shape: anhedral Grain boundary: curved Twinnings: tapered Undulose extinction: irregular Texture: completely recrystallized
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: undeformed porphyroclasts recrystallized; neoblasts are often observed in aggregates with ol
Oxide:	bands parallel to foliation, and elongated pods that include fine neoblasts of clinopyroxene

THIN SECTION LABEL ID: **360-U1473A-47R-3-W 65/70-TSB-TS_167** Piece no.: #11 TS no.: 167

Group	Summary
Igneous petrology:	There are two domains, a medium-grained olivine gabbro with a porphyroclastic texture and a fine-grained olivine gabbro with a mylonitic texture.
Metamorphic petrology:	Fresh mylonite with foliation defined by Pl, Ol and Cpx; minor Fe-Ti-oxide phases and accessory brown Amp are also present.
Structure:	Mylonitised fine grained and very fine grained olivine gabbro layers sheared into sub-parallellism during deformation. Both layers show a clear foliation defined by plag rich ribbons and olivine and cpx rich ribbons,

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 45 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Olivine is elongated and rimmed by orthopyroxene. Plagioclase is strongly recrystallized and displays undulose extinction and deformation twins. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	elongate	rimmed by orthopyroxene
Plagioclase	65		3.6	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	30		8	4	anhedral	subequant	with a consertal texture

Interval domain no: **2** Domain rel. abundance (%): 55 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro with a mylonitic texture. All minerals are highly recrystallized and foliated.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			0.8	anhedral	subequant	
Plagioclase	55		1	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	35		0.8	0.6	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description Mylonitic foliation defined by Pl, Ol and Cpx; minor Fe-Ti-oxide phases and accessory brown Amp are also present. The rock is fresh.

Comment type	Comment
Alteration general comments:	The rock is fresh.
Mylonite comments:	Mylonitic foliation defined by Pl, Ol and Cpx; minor Fe-Ti-oxide phases and accessory brown Amp are also present.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	3	2		
Amphibole, brown	n/a	30	n/a	n/a
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	30			n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 55 Domain name: Very fined grained olivine gabbro

Microstructure: crystal-plastic Observer: mjc

Detailed description Mylonitised fine grained and very fine grained olivine gabbro layers sheared into sub-parallellism during deformation? Both layers show a clear foliation defined by plag rich ribbons and olivine and cpx rich ribbons, however the more coarse grained gabbro is more heterogeneous with areas of pure plagioclase and large-ish mafic porphyroclasts. Relict ophitic textures preserved in the fine grainned gabbros. . Both large plagioclase grains and pyroxene grains seem to be more bent in the margins of the more coarse fine grained gabbro, hinting that the very fine grained gabbro might be intrusive into the more coarse grained gabbro.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	N/A	
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	olivine is found in foliation parallel, elongate ribbons. Individual (recrystallised) crystals are anhederal and slightly elongate in the foliation direction. 0.01-0.02 mm in diameter. occasionally occurs in bigger lumps and shows sub grain development and neoblast formation.. Some slight undulose extinction.
Plagioclase:	Occurs in foliation parallel ribbons, grain size 0.01mm. Subgrains, some deformation twins. Some undulose extinction, polygonal. Some grains very elongate (6:1), showing incipient sub-grains.
Clinopyroxene:	Cpx occurs in association with olivine in the elongate ribbons parallel to the foliation. Anhedral, grain size = 0.1-0.2mm.

Interval domain no: 2 Domain rel. abundance (%): 45 Domain name: Fine grained olivine gabbro

Microstructure: crystal-plastic Observer: mjc

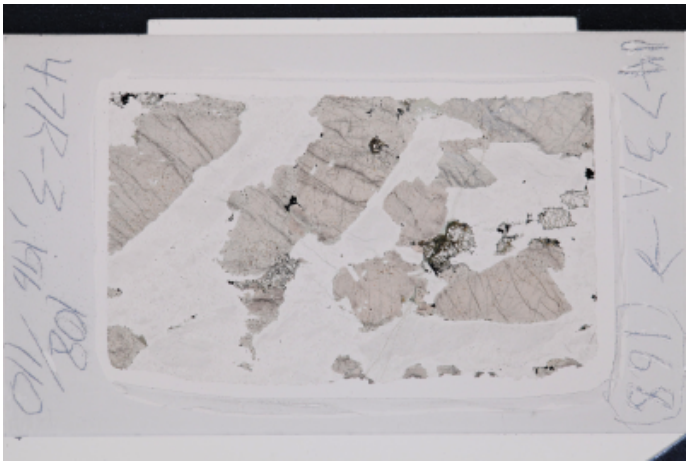
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	N/A	
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Olivine recrystallised into elongated ribbons. Some of the grains within the ribbons are elongate, more equant. Grain size = 0.3mm. In other places, larger olivines simply re-crystallise into smaller neoblasts. Large grains show undulose extinction and imminent king banding.
Plagioclase:	Variable grain size, some large relict porphyroclasts which show deformation twins, undulose extinction and subgrain development. Large grains are 0.5mm in diameter. Smaller recrystallised grains are approximately polygonal, show sub grains, undulose extinction and deformation twins. They are similar in size (0.01mm) to those in the very find grained gabbro.
Clinopyroxene:	large cpx's (5mm long) are "fish" shaped and may show bending and recrystallisation at grain margins.. some show weak undulose extinction. Recrystallisation seems very irregular: occasional grains are completely recrystallised (due to variable stain localization?), other are not at all. Smaller recrystallised grains are similar to those in the very fine grained gabbro (0.01-02mm dia.) The most "bent" ones occur near the margin with the finer grained olivine gabbro suggesting that the finer grained gabbro may be intrusive.

THIN SECTION LABEL ID: **360-U1473A-47R-3-W 108/110-TSB-TS_168** Piece no.: #19 TS no.: 168

Group	Summary
Igneous petrology:	An olivine gabbro with a porphyroclastic texture. The primary magmatic texture could be subophitic, as suhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock exhibits a slight alteration that is confined to olivine and cinopyroxene.
Structure:	Coarse-grained olivine gabbro with partly recrystallized plagioclase and large, weakly recrystallized clinopyroxene porphyroclasts.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An olivine gabbro with a porphyroclastic texture. The primary magmatic texture could be subophitic, as suhedral plagioclase is partly or fully enclosed within clinopyroxene. Plagioclase is elongated and recrystallized. Both porphyroclasts neoblasts display undulose extinction. Olivine is partly altered and rimmed by orthopyroxene. Clinopyroxene is partly recrystallized and the neoblasts are aggregated at the margin of the porphyroclasts. The clinopyroxene porphyroclasts contain abundant brown amphibole blebs.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		14	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	40		10	10	anhedral	subequant	with a consertal texture
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): RT

Detailed description The rock exhibits a slight alteration that is confined to olivine and cinopyroxene.

Comment type	Comment
Alteration general comments:	The rock is slightly altered.
Mylonite comments:	Pl is moslty recrystallized into nearly polygonal aggregates. Ol and Cpx are only partly recrystallized. The Cpx neoblasts are associated with minor brown Amo and/or opaque phases.
Vein 1 minerals:	The thin section is crosscut by a micro-vein filled with chlorite and pale-green amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	10		2
Amphibole, colorless		80		20
Chlorite		20		60
Clay minerals	40			20
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic

Coarse-grained olivine gabbro with partly recrystallized plagioclase. Large clinopyroxene porphyroclasts show only weak signs of recrystallization. Good examples of plagioclase neoblasts preferentially forming along clinopyroxene-plagioclase grain boundaries.

Observer: OP

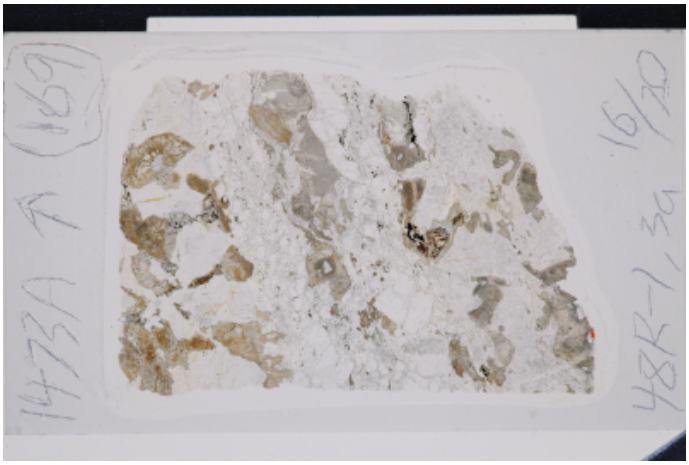
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: coarse-grained porphyroclasts,medium-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved, sometimes altered Undulose extinction: regular Subgrains: straight Texture: partly fractured and altered olivine porphyroclasts, few neoblasts rimming porphyroclasts
Plagioclase:	Grain size: coarse-grained porphyroclasts, medium-grained neoblasts; Grain shape: anhedral porphyroclasts, close to polygonal neoblasts; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Subgrains: curved; Texture: large porphyroclasts encompassed by neoblasts. neoblast-containing fractures penetrating porphyroclasts.
Clinopyroxene:	Grain size: coarse-grained porphyroclasts, medium-grained neoblasts; Grain shape: anhedral porphyroclasts and neoblasts; Grain boundary: straight to curved; Undulose extinction: irregular; Texture: large porphyroclasts infrequently encompassed by neoblasts.
Oxide:	interstitial oxide associated to clinopyroxene and olivine

THIN SECTION LABEL ID: **360-U1473A-48R-1-W 16/20-TSB-TS_169** Piece no.: #03 TS no.: 169

Group	Summary
Igneous petrology:	A medium-grained olivine-bearing gabbro intruded by diorite veins. The primary magmatic texture of the gabbro is not preserved. The diorite vein displays a granular texture.
Metamorphic petrology:	The gabbro intruded by the felsic vein is strongly altered; olivine adjacent to the felsic vein is totally altered; cpx overgrown by brown amphibole replaced by green hornblende and needles of actinolite. Felsic vein: plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material. Mortar texture due to cataclasis; mortar consists of alteration phases which also overgrow the matrix: actinolite, colorless amphibole, chlorite, clay, oxide, tiny cloudy dirty masses.
Structure:	Magmatic breccia with clasts of plagioclase and pyroxene within a very fine matrix of plagioclase.

Plane-polarized



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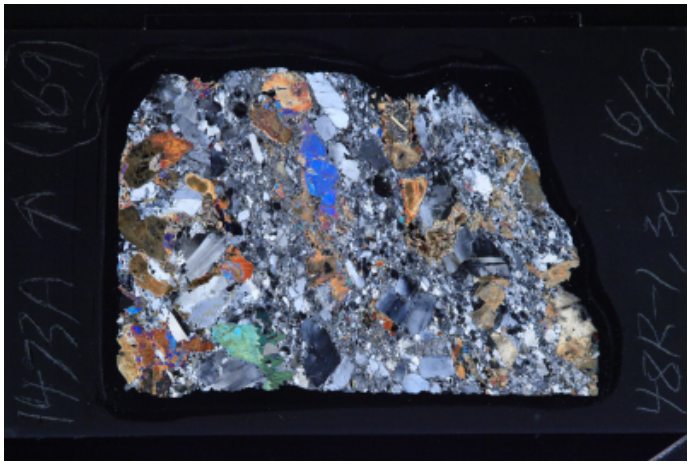
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a medium-grained olivine-bearing gabbro with a granular texture. Olivine is completely altered and original shape is not preserved. Plagioclase is partly recrystallized and displays undulose extinction. Clinopyroxene is highly altered and replaced by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3						completely altered and original shape is not preserved
Plagioclase	45		5	2.8	anhedral	subequant	undulose extinction
Clinopyroxene	52						

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is diorite veins with a granular texture. It is predominated by plagioclase, with minor subhedral amphibole. Plagioclase displays undulose extinction. Small zircons are present in the veins.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		3.6	0.8	anhedral	subequant	undulose extinction
Amphibole	10		0.8	0.4	subhedral	subequant	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: olivine gabbro

Total rock alteration estimate (%): 50 Observer(s): JK

Detailed description The gabbro intruded by the felsic vein is strongly altered; olivine adjacent to the felsic vein is totally altered; cpx overgrown by brown amphibole replaced by green hornblende and needles of actinolite. Felsic vein: plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material. Mortar texture due to cataclasis; mortar consists of alteration phases which also overgrow the matrix: actinolite, colorless amphibole, chlorite, clay, oxide, tiny cloudy dirty masses.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the felsic vein is strongly altered
Vein 1 minerals:	chlorite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	70		30
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless	10			
Amphibole, green	20	40		30
Clay minerals	50			10
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10	15		n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Talc	10	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: leucodiorite

Total rock alteration estimate (%): Observer(s): JK

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary); intensely filled with cloudy, dusty material; mortar texture due to cataclasis; mortar consists of alteration phases which also overgrow the matrix: actinolite, colorless amphibole, chlorite, clay, oxide, cloudy dirty masses.
Cataclasite comments:	matrix is deformed by cataclasis: mortar texture
Vein 1 minerals:	actinolite
Vein 2 minerals:	clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				50
Amphibole, colorless				10
Amphibole, green				10
Chlorite				10
Clay minerals				20
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced				100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: submagmatic Observer: JD

Detailed description Magmatic breccia with clasts of plagioclase and pyroxene intruded in gabbro. Plagioclase clasts are fractured and surrounded by very fine grained plagioclase. The clinopyroxene is elongate parallel to the plagioclase and is altered.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a
Clasts in fault rock (%)	40	n/a
Fault rock clast size:	1.5	n/a
Fault rock intensity:	well developed fault, breccia	4

Type	Comment
Plagioclase:	Grain size: matrix: 0.01-0.15 mm clasts: 1-3.5 mm. Grain shape: elongate,subhedral. Grain boundary: irregular. Twinning: not well developed or preserved, if present it is tapered. Subgrains: limited development. Undulose extinction: patchy to complete. Texture: Larger clasts within a matrix of very fine grained crystals. The larger clasts are fragmented indicated by a space separating two clasts but they have the same extinction angle.
Clinopyroxene:	Grain size: ~2 mm. Grain shape: elongate, subhedral. Grain boundary: irregular. Texture: Clast of pyroxene within a matrix of fine grained plagioclase.

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: magmatic Observer: JD

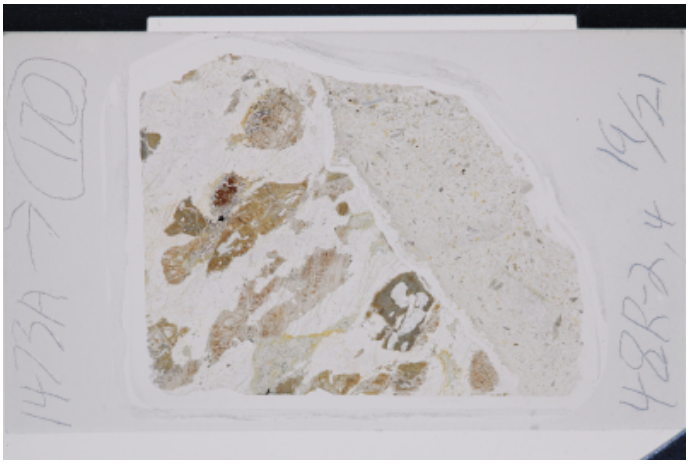
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	serrate	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Plagioclase:	Grain size: porphyroclasts: 0.5-3 mm. neoblasts: ~0.15 mm. Grain shape: elongate, anhedral. Grain boundary: irregular. Twinning: albite to tapered. Subgrains: minimal, curved. Undulose extinction: patchy. Texture: Primary magmatic texture with limited recrystallization.
Clinopyroxene:	Grain size: ~2 mm. Grain shape: subhedral. Grain boundary: straight to curved. Texture: magmatic.

THIN SECTION LABEL ID: **360-U1473A-48R-2-W 19/21-TSB-TS_170** Piece no.: #04 TS no.: 170

Group	Summary
Igneous petrology:	A medium-grained gabbro with porphyroclasitc texture, crosscut by carbonate veins. The primary texture could be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene porphyroclasts.
Metamorphic petrology:	Static alteration intensity of olivine gabbro is substantial. Minerals indicate amphibolite to subgreenschist facies alteration.
Structure:	Hydrothermal, carbonate breccia with dominantly plagioclase, amphibole and clinopyroxene clasts adjacent to olivine gabbro. Breccia cuts the olivine gabbro foliation in a high angle.

Plane-polarized



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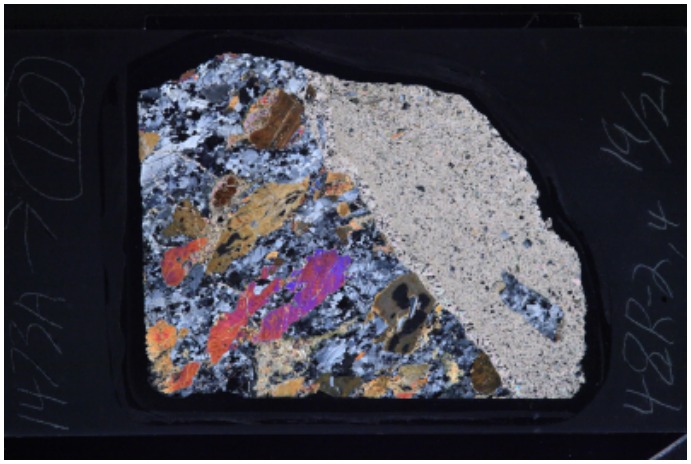
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: A medium-grained gabbro with porphyroclasitc texture, crosscut by carbonate veins. The primary texture could be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene porphyroclasts. Plagioclase is highly recrystallized and commonly displays undulose extinction. Clinopyroxene is elongated along the foliation and strongly altered.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		3.6	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	40		9	8	anhedral	elongate	strongly altered

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: Ol gabbro

Total rock alteration estimate (%): 30 Observer(s): TN

Detailed description Olivine is replaced pseudomorphically by talc + actinolite and by brown clay; clinopyroxene is replaced by amphiboles at rims and by brownish clay along cleavage surfaces; plagioclase is replaceed by coronitic chlorite around pesudomorphs after olivine, and has fracture-filling or along-grain boundary chlorite, actinolite and carbonate.

Comment type	Comment
Mylonite comments:	Cpx, Pl, and Ol (altered) neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		5
Amphibole, colorless	30	15		5
Amphibole, green		5		
Chlorite	5			85
Clay minerals	30	60		5
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	4			n/a
Sulfide	1			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: Breccia and carbonate matrix

Total rock alteration estimate (%): Observer(s): TN

Comment type	Comment
Cataclasite comments:	felsic rock, Pl, Cpx, Amp, Chl clasts

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: straight to curved, altered; Texture: altered olivine
Plagioclase:	Grain size: medium-grained neoblasts; Grain shape: anhedral to nearly polygonal; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Texture: strongly recrystallized plagioclase neoblasts with very few porphyroclasts
Clinopyroxene:	Grain size: coarse-grained porphyroclasts, medium-grained neoblasts; Grain shape: elongated, anhedral porphyroclasts, anhedral neoblasts; Grain boundary: straight to regular; Texture: porphyroclasts with neoblasts
Oxide:	rare interstitial oxide
Vein:	sub-parallel vein networks

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: microfabric

Microstructure: hydrothermal breccia

Hydrothermal carbonate breccia with plagioclase, amphibole and clinopyroxene clasts adjacent to olivine gabbro. Olivine gabbro fracture surface has been coated by blocky carbonate grains showing growth competition in growth direction away from the wall-rock. Microstructures suggest that the hydrothermal breccia material was injected subsequent to the formation of the blocky carbonate grains. The hydrothermal breccia itself has been coated by blocky carbonate crystals showing growth competition in direction away from the breccia suggesting renewed fracture opening and carbonate precipitation.

Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Fault rock intensity:	well developed fault, breccia	4

Type	Comment
Plagioclase:	recrystallized medium-grained plagioclase clasts within hydrothermal breccia

THIN SECTION LABEL ID: **360-U1473A-48R-3-W 79/82-TSB-TS_171** Piece no.: #14 TS no.: 171

Group	Summary
Igneous petrology:	A deformed coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	Sample is only slightly altered.
Structure:	Deformed under submagmatic regime, with weak overprint of crystal-plastic deformation.

Plane-polarized

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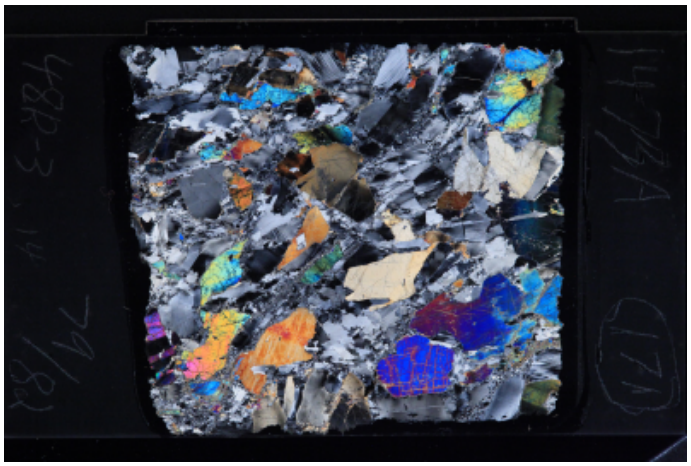
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A deformed coarse-grained olivine gabbro with a subophitic texture. Plagioclase is deformed and partly recrystallized at the margin. It displays undulose extinction and deformation twins. Magmatic twins are rarely preserved. Tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is rimmed by orthopyroxene and clinopyroxene, and occasionally strongly elongated. Clinopyroxene is deformed and displays undulose extinction. It is partly recrystallized and the neoblasts are highly deformed. Opaque minerals are composed of ilmenite and sulfides, with an intergrowth texture. Exsolution of chalcopyrite from pyrite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			5	anhedral	subequant	rimmed by orthopyroxene and clinopyroxene
Plagioclase	61		5.6	5	anhedral	tabular	undulose zoning
Clinopyroxene	30		10	6	anhedral	poikilitic	partly recrystallized
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Sample is only slightly altered. Most of the grains are highly deformed. More deformed olivine grains are more altered into talc + magnetite.

Comment type	Comment
Mylonite comments:	Plagioclase are highly deformed and surrounded by tiny recrystallized grains. Some Cpx grains shows similar features.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		3
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, green		20		
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

Detailed description Submagmatic texture defined by deformation of primary minerals and thin levels of very fine grained plagioclase neoblasts sometimes in fractures. The weakly crystal-plastic overprint is observed as medium grained neoblasts of plagioclase.

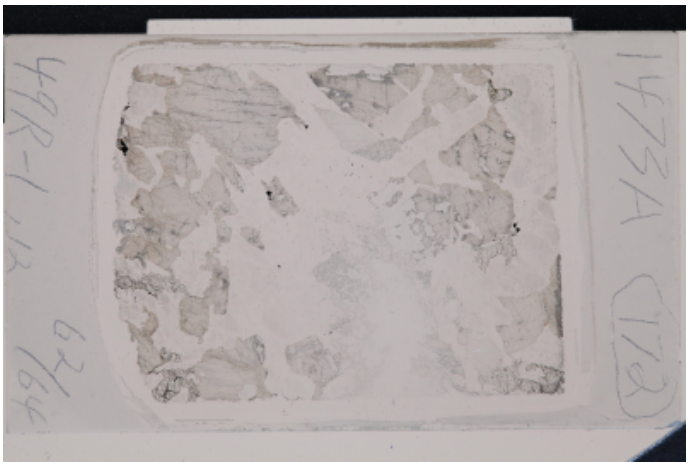
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Subgrains: straight and common Texture: locally weakly recrystallized at grain boundaries of porphyroclasts ol
Plagioclase:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: subhedral porphyroclast and anhedral recrystallized Grain boundary: curved Twinnings: tapered Undulose extinction: regular and common Subgrains: curved Texture: porphyroclastic partially recrystallized; neoblasts form along grain boundaries and in fractures within plagioclase. Medium neoblasts are observed
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: rare Texture: porphyroclasts weakly deformed, may include plg chadacrysts

THIN SECTION LABEL ID: **360-U1473A-49R-1-W 62/64-TSB-TS_172** Piece no.: #12 TS no.: 172

Group	Summary
Igneous petrology:	A deformed coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	Deformed under submagmatic regime with partially recrystallized plagioclase and locally olivine neoblasts.

Plane-polarized



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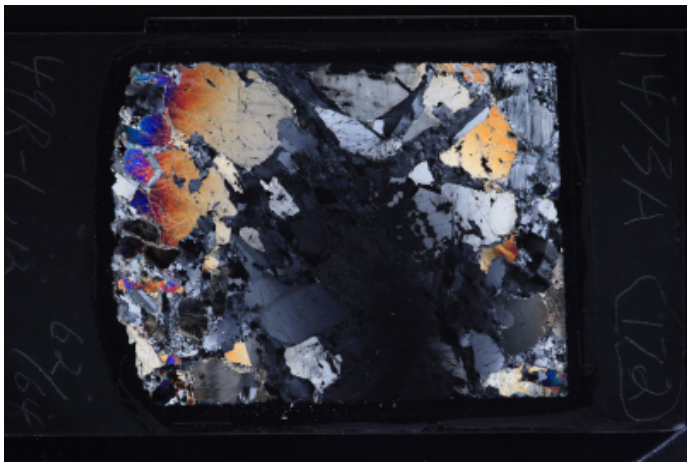
Cross-polarized



33144291

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A deformed coarse-grained olivine gabbro with a subophitic texture. Plagioclase is moderately deformed and partly recrystallized. It shows undulose extinction and deformation twins. Magmatic twins are still preserved in some plagioclase porphyroclasts. Tabular plagioclase is partly enclosed within clinopyroxene. Clinopyroxene is deformed and partly recrystallized. Olivine is rimmed by orthopyroxene. Very few brown amphibole are present. Small amount of ilmenite and sulfides is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	50		5	3	anhedral	subequant	undulose extinction
Clinopyroxene	45		8.4	6			

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 8 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol developed typical mesh textures with assemblage of talc, serpentine and oxide filling in the mesh rim. Cpx altered into tiny colorless amphibole occurring along the edges or in the cleavage of Cpx with presence of brown amphibole. Pl were mostly replaced by secondary Pl with minor chlorite occurring in the microfractures of Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	5		10
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless		85		
Chlorite				5
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

Detailed description Submagmatic regime defined by the presence of very fine grained level of plagioclase neoblasts between porphyroclasts

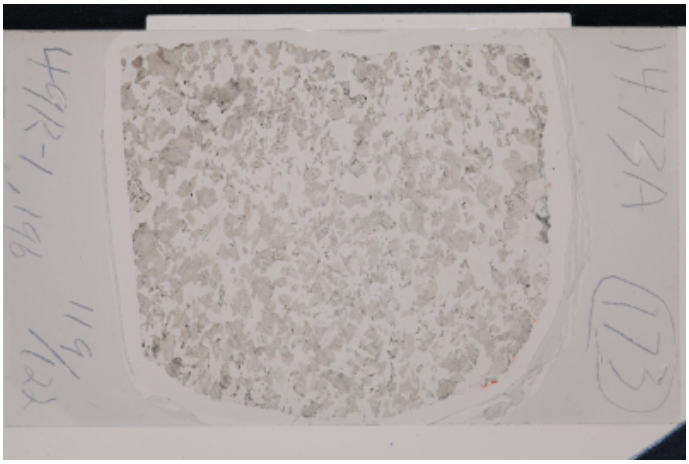
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight and common Texture: locally and weakly recrystallized at cpx porphyroclasts grain boundary
Plagioclase:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinnings: tapered Undulose extinction: regular Subgrains: straight to curved Texture: partially recrystallized in finer levels between grain boundaries and locally in medium grain neoblasts
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Undulose extinction: weak Texture: porphyroclasts may include plg chadacrysts often weakly deformed and not recrystallized

THIN SECTION LABEL ID: **360-U1473A-49R-1-W 119/122-TSB-TS_173** Piece no.: #19 TS no.: 173

Group	Summary
Igneous petrology:	A medium-grained orthopyroxene-bearing olivine gabbro with a granular texture.The primary magmatic texture is not preserved but is very like to be subophitic, as partly or fully enclosing of plagioclase is still preserved within some clinopyroxenes.
Metamorphic petrology:	Total static alteration mineral abundance is less than 3 vol.%. Small amounts of minerals indicate amphibolite facies alteration.
Structure:	Deformed and strongly foliated with recrystallized plagioclase, olivine and clinopyroxene. Porphyroclasts are weakly to strongly deformed

Plane-polarized



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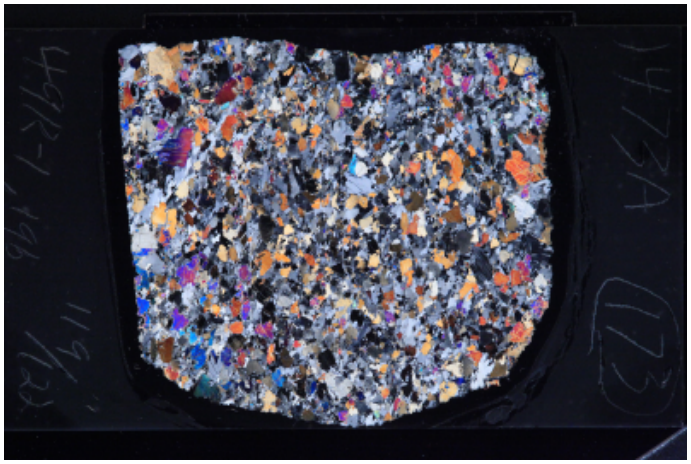
Cross-polarized



33144221

IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained orthopyroxene-bearing olivine gabbro with a granular texture. It is deformed and the primary magmatic texture is not preserved. It is very like to be subophitic, as partly or fully enclosing of plagioclase is still preserved within some clinopyroxenes. Plagioclase is elongated and displays undulose extinction. Olivine is recrystallized and is rimmed by orthopryoxene. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture with orthopyroxene. Tiny brown amphiboles are interstitial among clinopyroxene neoblasts. Orthopyroxene is in a subequant shape and partly replaced by clinopyroxene. Opaque minerals are mainly composed of sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			0.4	anhedral	elongate	recrystallized and rimmed by orthopyroxene
Plagioclase	45		2.4	1.2	anhedral	elongate	undulose extinction
Clinopyroxene	45		2.8	1.6	anhedral	subequant	displaying a consertal texture
Orthopyroxene	2		1.6	1.2	anhedral	subequant	
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): TN

Detailed description Olivine is replaced by small amounts of actinolite, talc and serpentine; clinopyroxene by amphibole at rim; plagioclase has fractures filled with chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	3		1
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	40	10		
Chlorite				100
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	4			n/a
Sulfide	1			n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation is defined by elongated laths of plagioclase neoblasts and elongated aggregates of olivine and clinopyroxene neoblasts.

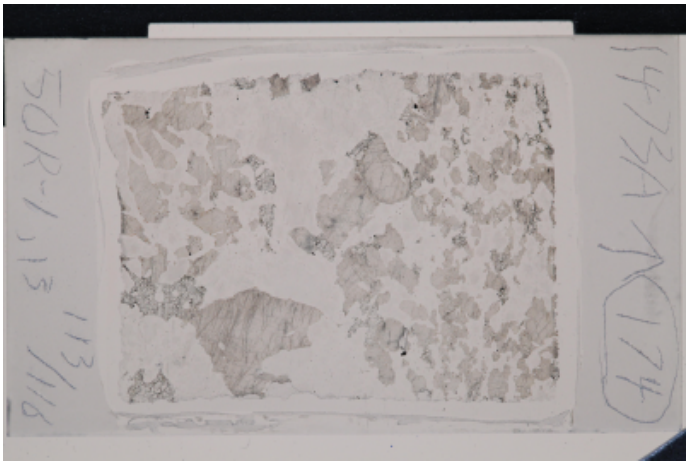
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Texture: rare porphyroclast and mainly recrystallized
Plagioclase:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: subhedral to anhedral Grain boundary: curved Twinning: tapered Undulose extinction: regular Texture: porphyroclastic partially recrystallized; elongated neoblasts define the foliation
Clinopyroxene:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: porphyroclastic partially recrystallized; elongated aggregates in associatoin with ol neoblasts define the foliation

THIN SECTION LABEL ID: **360-U1473A-50R-1-W 113/116-TSB-TS_174** Piece no.: #13 TS no.: 174

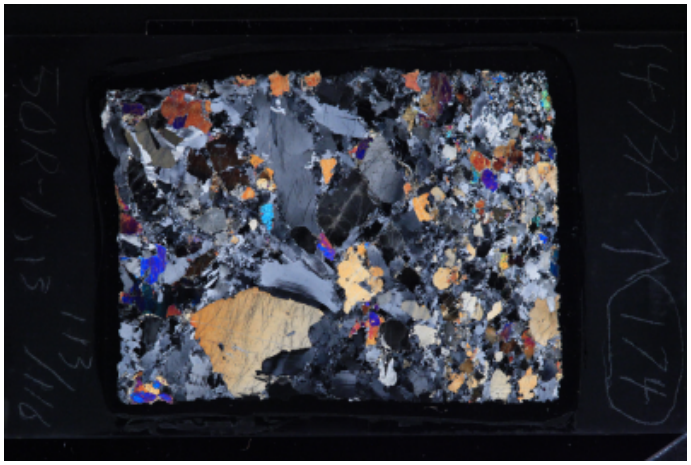
Group	Summary
Igneous petrology:	A medium-grained orthopyroxene-bearing olivine gabbro. The primary magmatic texture might be subophitic, as inferred from the partly or fully enclosing of plagioclase within clinopyroxene.
Metamorphic petrology:	Sample is only slightly altered. Most of the alteration is associated with olivine and clinopyroxene.
Structure:	Two domains are observed. One domain show coarse grained weakly deformed structure. The second domain i porphyroclastic medium grained

Plane-polarized



33144161

Cross-polarized



33144181

IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained orthopyroxene-bearing olivine gabbro. The primary magmatic texture might be subophitic, as inferred from the partly or fully enclosing of plagioclase within clinopyroxene. Plagioclase is partly recrystallized and displays undolose extinction and deformation twins. Olivine is rimmed by orthopyroxene. Clinopyroxene is partly recrystallized and shows a consertal intergrowth texture orthopyroxene. Small amount of primary orthopyroxene exist. Opaque minerals are dominated by sulfide, with few ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		10	1	anhedral	subequant	undulose extinction
Clinopyroxene	33		10	3.6	anhedral	poikilitic	showing a consertal texture
Orthopyroxene	2		2	2	anhedral	subequant	
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Sample is only slightly altered. Olivine grains show signs of incipient mesh textures filled with serpentine + magnetite. Cpx is replaced by mostly brown amphibole and 2nd Cpx. Plag is rather fresh.

Comment type	Comment
Mylonite comments:	Moderate amount of plagioclase has been recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		3
Amphibole, brown	n/a	70	n/a	n/a
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	20			n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Weakly deformed with plagioclase neoblasts observed along clinopyroxene grain boundary. This structure could represent deformation involving melt.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: deformed but not recrystallized
Plagioclase:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinnings: tapered Undulose extinction: irregular Texture: porphyroclastic partially and weakly recrystallized. Very fine grained neoblasts are observed along cpx porphyroclasts grain boundary
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: weak Texture: porphyroclasts weakly deformed and not recrystallized

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Porphyroclastic with foliation defined by clinopyroxene porphyroclasts and elongated aggregates of olivine and clinopyroxene neoblasts.

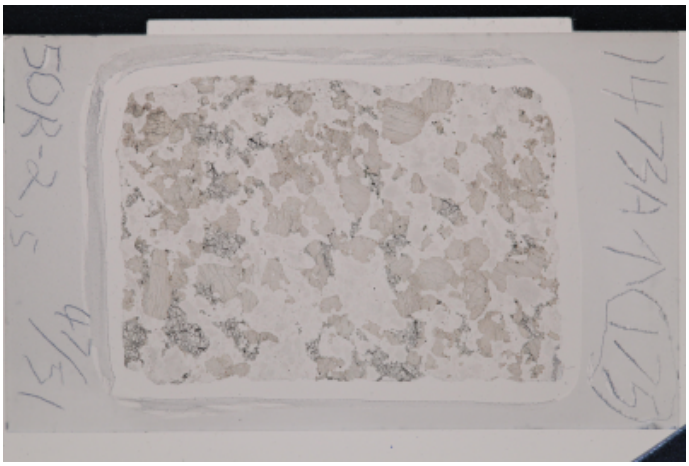
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: completely recrystallized
Plagioclase:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinnings: tapered Undulose extinction: irregular Texture: porphyroclastic partially recrystallized. With clinopyroxene, porphyroclasts define the foliation
Clinopyroxene:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: weak Texture: porphyroclasts weakly deformed and partially recrystallized, neoblasts may form aggregates in association with ol

THIN SECTION LABEL ID: **360-U1473A-50R-2-W 47/51-TSB-TS_175** Piece no.: #05 TS no.: 175

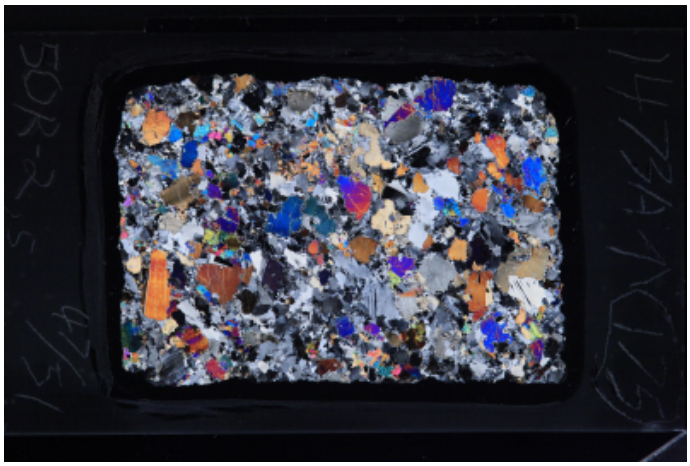
Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. A subophitic magmatic texture can be inferred from the partly or fully enclosing of plagioclase within clinopyroxene.
Metamorphic petrology:	Fresh rock locally showing recrystallization of plagioclase, olivine and clinopyroxene. Clinopyroxene neoblasts are associated with minor brown amphibole and opaque phases.
Structure:	medium grained olivine gabbro with localized solid-state recrystallization.

Plane-polarized



33144121

Cross-polarized



33144141

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: A medium-grained olivine gabbro. A subophitic magmatic texture can be inferred from the partly or fully enclosing of plagioclase within clinopyroxene. Plagioclase is partly recrystallized and displays undulose extinction. Olivine is in a subequant or elongated shape and rimmed by clinopyroxene and orthopyroxene. Clinopyroxene is partly recrystallized and displays a consertal texture. The clinopyroxene neoblasts commonly associate with brown amphibole and opaque minerals, which are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1.2	anhedral	elongate	rimmed by clinopyroxene and orthopyroxene
Plagioclase	55		3.6	1.6	anhedral	subequant	undulose extinction
Clinopyroxene	37		4.8	2.4	anhedral	subequant	showing a consertal texture
Amphibole	0.1						associates with clinopyroxene neoblasts
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description Fresh mylonite showing local recrystallization of plagioclase, olivine and clinopyroxene. Clinopyroxene neoblasts are associated with minor brown amphibole and opaque phases.

Comment type	Comment
Mylonite comments:	Local recrystallization of plagioclase, olivine and clinopyroxene. Clinopyroxene neoblasts associated with minor brown amphibole and opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		
Amphibole, brown	n/a	50	n/a	n/a
Chlorite	20			
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description medium grained olivine gabbro with localized solid-state recrystallization. Olivine clasts are fractured and recrystallized to fine-grained aggregates at the contacts with other phases. Plagioclase clasts show tapered twins and fine-grained aggregates can be observed. Cpx is fractured and locally recrystallized.

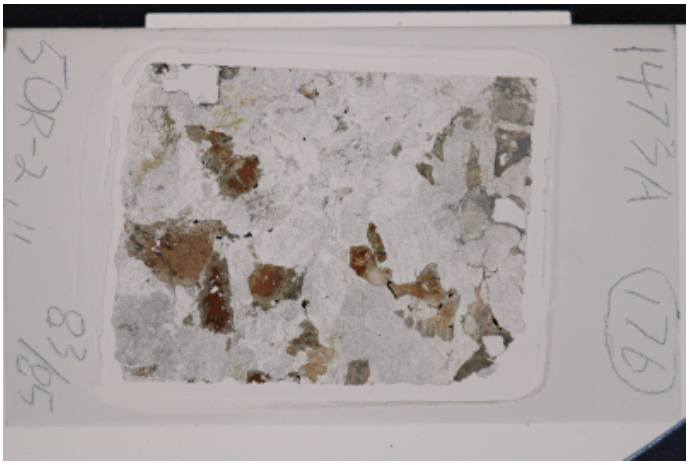
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: cruved undulose extinction: irregular subgrains: rare texture: fractured and partially recrystallized clasts.
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse porphyroclasts and partially recrystalliZed fine grains
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse porphyroclasts and local recrystallized fine grains.

THIN SECTION LABEL ID: **360-U1473A-50R-2-W 83/85-TSB-TS_176** Piece no.: #11 TS no.: 176

Group	Summary
Igneous petrology:	A coarse-grained gabbro intruded by a medium-grained diorite. The primary magmatic texture of gabbro is not preserved. The diorite displays a granular texture.
Metamorphic petrology:	Gabbro and intruded leucodiorite show extensive greenschist facies to low temperature alteration, including substantial development of calcite. Cpx from gabbro retains a brown Amp corona.
Structure:	undeformed, highly altered coarse grained gabbro. Localized strain is observed in mechanical twins at the edges of plagioclase crystals.

Plane-polarized



33144081

Cross-polarized

33144101

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: This domains is a coarse-grained gabbro, which is highly altered. The primary magmatic texture is not preserved. Plagioclase displays undulose extinction. Clinopyroxene is highly altered and close to the gabbro-diorite boundary is pervasively replaced by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		11	5	anhedral	subequant	undulose extinction
Clinopyroxene	45		6	3.6	anhedral	subequant	pervasively replaced by brown amphibole

Interval domain no: **2** Domain rel. abundance (%): Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a diorite vein with a granular texture. It mainly consists of plagioclase, with minor subhedral amphibole. Plagioclase is moderately altered displays a oscillatory zoning. Small amount of zircons and titanites are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		4.8	4	subhedral	subequant	highly altered
Amphibole	10		2.4	2.4	subhedral	subequant	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: host gabbro

Total rock alteration estimate (%): 75 Observer(s): RT

Detailed description The thin section shows a gabbro intruded by a leucodiorite. Both rocks exhibit extensive greenschist facies to low temperature alteration, including substantial development of calcite. Cpx from gabbro retains a brown Amp corona. Brown Amp from diorite is rimmed by green Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		70		80
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		30		20
Chlorite		10		10
Clay minerals		30		
Other		20		
Subtotals replaced		100		100

Interval domain no: 2 Domain rel. abundance (%): 70 Domain name: diorite

Total rock alteration estimate (%): Observer(s): RT

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				80
Amphibole, colorless				20
Chlorite				10
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: magmatic Observer: GV

Detailed description undeformed, highly altered coarse grained gabbro. Localized strain is observed in mechanical twins at the edges of plagioclase crystals.

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	size: coarse shape: subhedral boundaries: straight to curved undulose extinction: irregular twinning: tapered texture: coarse grains highly altered
Clinopyroxene:	size: coarse shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse, altered grains.
Oxide:	geometry: thin pods at the boundaries of cpx

THIN SECTION LABEL ID: **360-U1473A-51R-1-W 47/50-TSB-TS_177** Piece no.: #03 TS no.: 177

Group	Summary
Igneous petrology:	An coarse-grained olivine gabbro with a granular texture. Olivine is rimmed by orthopyroxene and clinopyroxene. Tabular plagioclase show magmatic twins and undulose extinction. Clinopyroxene displays a consertal texture.
Metamorphic petrology:	The rock shows localized recrystallization of Ol, Pl and Cpx. The Cpx neoblasts are associated with minor brown Amp and opaque phases. The subsequent static alteration is slight.
Structure:	coarse grained olivine gabbro with a submagmatic texture mainly observed in the local recrystallization of plagioclase coarse grains into fine polygonal aggregates.

Plane-polarized

33144021

Cross-polarized

33144051

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: An coarse-grained olivine gabbro with a granular texture. Olivine is partly altered and recrystallized. It is rimmed by orthopyroxene and clinopyroxene. Plagioclase commonly displays magmatic twins, although deformation twins can also be occasionally seen. It is partly recrystallized and the neoblasts display undulose extinction. Clinopyroxene is partly recrystallized and shows a consertal intergrowth texture. Aggregates of olivine and clinopyroxene neoblasts, together with tiny brown amphiboles, occur at the margin of clinopyroxene. Clinopyroxene is also rimmed by brown amphibole, which occasionally associates with opaque minerals.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			12	anhedral	subequant	rimmed by orthopyroxene and clinopyroxene
Plagioclase	70		30	25	anhedral	tabular	undulose extinction
Clinopyroxene	18		12	9	anhedral	subequant	showing a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description The rock shows localized recrystallization of Ol, Pl and Cpx. The Cpx neoblasts are associated with minor brown Amp and opaque phases. The subsequent static alteration is slight.

Comment type	Comment
Alteration general comments:	The rock shows a slight static alteration.
Mylonite comments:	Local recrystallization to Ol, Pl and Cpx. Cpx neoblasts associated with minor brown Amp and opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		2
Amphibole, colorless		10		30
Chlorite		20		70
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: OP

Detailed description coarse grained olivine gabbro with a submagmatic texture mainly observed in the local recrystallization of plagioclase coarse grains into fine polygonal aggregates.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: coarse, elongated grains and fine grained recrystallized aggregates in contact with plagioclase and cpx.
Plagioclase:	size: coarse to fine shape: euhedral to anhedral boundaries: straight twinning: tapered undulose extinction: irregular subgrains: curved boundaries texture: large coarse grains with tapered twins and fine-grained recrystallized polygonal aggregates.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains in curved contact with plagioclase and olivine.

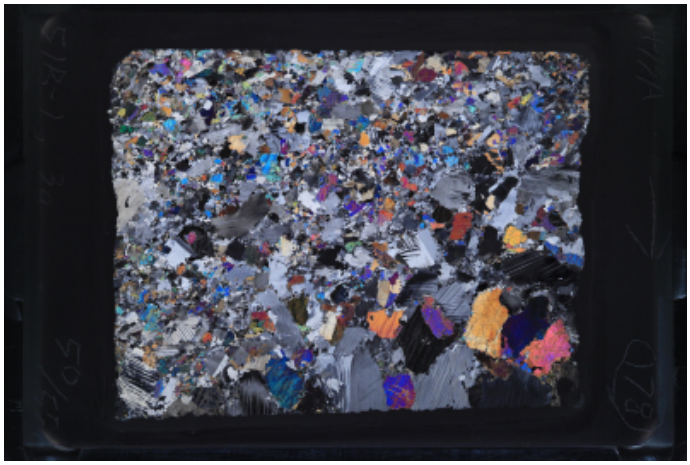
THIN SECTION LABEL ID: **360-U1473A-51R-1-W 50/55-TSB-TS_178** Piece no.: #03 TS no.: 178

Group	Summary
Igneous petrology:	There are two domains of olivine gabbros with different grain sizes. The coarse-grained olivine gabbro shows a subophitic texture, and the medium-grained olivine gabbro displays a granular texture.
Metamorphic petrology:	Ol, Pl and Cpx are locally recrystallized and the Cpx neoblasts are typically associated with minor brown Amp and Fe-Ti-oxide phases. The static alteration is slight.
Structure:	Thin section devided in two domains. First domanin is porphyroclastic medium grained, and the second domain is igneous structure overprinted by deformatoin under th submagmatic regime.

Plane-polarized

33163391

Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 80 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro, with a granular texture. Plagioclase is partly recrysallized and displays undulose extinction and deformation twins. Olivine is rimmed by orthopyroxene, but the rim is commonly altered. Clinopyroxene is partly recrystallized and displays a consertal intergrowth texture. Tiny brown amphibole is interstitial between clinopyroxene neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			2.4	anhedral	interstitial	rimmed by orthopyroxene
Plagioclase	45		6.4	4	anhedral	tabular	undulose extinction
Clinopyroxene	48		3.2	2.4	anhedral	subequant	with a consertal texture
Amphibole	0.2		0.1	0.1	anhedral	interstitial	

Interval domain no: **2** Domain rel. abundance (%): 20 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase shows undulose extinction and deformation twins. It is partly or fully enclosed within clinopyroxene. A few recrystallized plagioclase neoblasts occur at the margin of big plagioclase grains. Olivine is rimmed by orthopyroxene. Clinopyroxene is weakly recrystallized and is rimmed by brown amphibole. It displays a consertal intergrowth texture with orthopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	23			7	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		9	8	anhedral	tabular	undulose extinction
Clinopyroxene	22		6	5	anhedral	poikilitic	with a consertal texture
Amphibole	0.1		0.1	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description Ol, Pl and Cpx are locally recrystallized and the Cpx neoblasts are typically associated with minor brown Amp and Fe-Ti-oxide phases. The static alteration is slight.

Comment type	Comment
Alteration general comments:	Static alteration is slight.
Mylonite comments:	Local recrystallization of Ol, Pl and Cpx. Clinopyroxene neoblasts associated with minor brown Amp abd Fe-Ti-oxide phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		2
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	10	10		50
Chlorite	10			50
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Porphyroclastic medium grain domain in contact with coarser and less deformed domain. The contact is sharp and planar.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrain: straight Texture: porphyroclastic partially recrystallized
Plagioclase:	Grain size: coarse to medium porphyroclasts and fine recrystallized Grain shape: subhedral porphyroclast and anhedral recrystallized Grain boundary: curved Twinnings: tapered Undulose extinction: regular Subgrain: straight Texture: porphyroclastic partially recrystallized; deformed porphyroclasts are parallel to foliation
Clinopyroxene:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Texture: weakly deformed porphyroclastic partially recrystallized; porphyroclasts are parallel to foliation

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: submagmatic Observer: CF

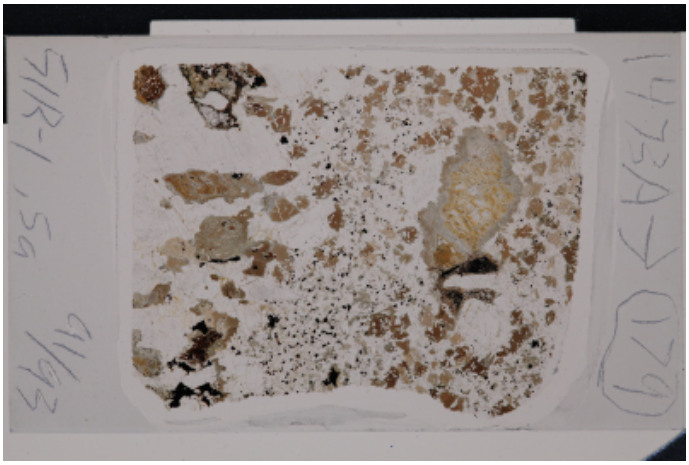
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrain: straight Texture: porphyroclastic partially and locally recrystallized between grain boundaries
Plagioclase:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Twinning: tapered Undulose extinction: regular Subgrain: straight Texture: porphyroclastic partially and locally recrystallized between grain boundaries
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Texture: undeformed porphyroclasts

THIN SECTION LABEL ID: **360-U1473A-51R-1-W 91/93-TSB-TS_179** Piece no.: #05 TS no.: 179

Group	Summary
Igneous petrology:	A coarse-grained oxide-bearing olivine gabbro intruded by a diorite vein. The primary texture of the gabbro has been destroyed by the intensive reaction with the diorite. The diorite displays a subophitic texture, in which euhedral plagioclase is partly or fully enclosed within amphibole.
Metamorphic petrology:	The gabbro intruded by the quartz dioritic melt is strongly altered; olivine is totally altered and cpx overgrown by brown amphibole replaced by green hornblende and needles of actinolite. In the quartz diorite, the plagioclase is often recrystallized , intensely filled with cloudy, dusty material. A mortar texture is present with alteration minerals on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite. Veins are mostly filled with clay, green amphibole and carbonate.
Structure:	this is an oxide-rich gabbro with deformation restricted to recrystallization of plagioclase into fine-grained aggregates.

Plane-polarized



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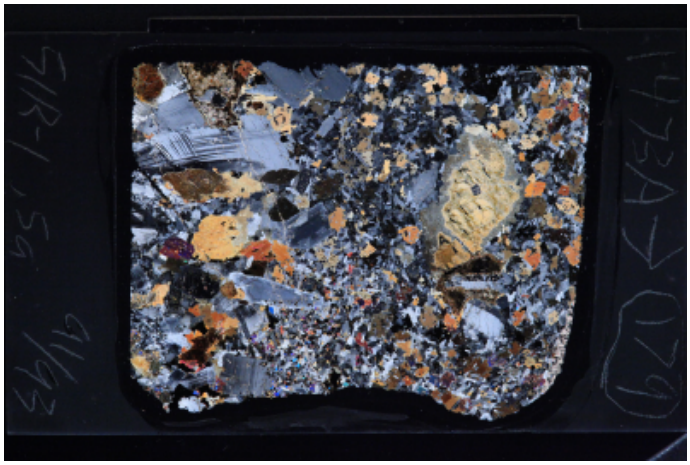
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 30 Domain name: lithology

Lithology: **disseminated oxide olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a coarse-grained oxide-bearing olivine gabbro. The primary texture of the gabbro has been destroyed by the intensive reaction with the diorite. Olivine is completely altered. Tabular plagioclase shows undulose extinction. Clinopyroxene is overgrown by brown amphibole and occasionally contains plagioclase inclusion. Opaque minerals are predominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10						completely altered
Plagioclase	62		10	7	anhedral	tabular	undulose extinction
Clinopyroxene	25		10	7	anhedral	subequant	with a consertal texture
Opaques	3						
Ilmenite	3						

Interval domain no: **2** Domain rel. abundance (%): 70 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a diorite with a subophitic texture. Plagioclase is euhedral to subhedral and in a subequant shape. It displays an oscillatory zoning and is partly or fully enclosed within amphibole. Amphibole is commonly in a subequant shape. Opaque oxides are in subequant shape and exclusively consist of ilmenite. Quartz is interstitial between plagioclase. Both biotite and titanite are locally present with amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		2	0.8	subhedral	subequant	
Amphibole	30		2	1.2	anhedral	poikilitic	
Opaques	5						
Ilmenite	5						
Quartz	5		0.8	0.4	subhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: olivine gabbro

Total rock alteration estimate (%): 40 Observer(s):

Detailed description The gabbro intruded by the quartz dioritic melt is strongly altered; olivine is totally altered and cpx overgrown by brown amphibole replaced by green hornblende and needles of actinolite. In the quartz diorite, the plagioclase is often recrystallized , intensely filled with cloudy, dusty material. A mortar texture is present with alteration minerals on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite. Veins are mostly filled with clay, green amphibole and carbonate.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the felsic vein is strongly altered
Vein 1 minerals:	amphibole
Vein 2 minerals:	clay
Vein 3 minerals:	calcite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	80		30
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, green	10	50		20
Carbonate	15	n/a	n/a	n/a
Clay minerals	65	30		20
Clinopyroxene, sec.	n/a	15	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: quartz diorite

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary), intensely filled with cloudy, dusty material; mortar texture with alteration masses on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite; they are also overgrown by biotite which is subsequently altered to clay.
Vein 1 minerals:	clay
Vein 2 minerals:	green amphibole
Vein 3 minerals:	late carbonate

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				50
Plagioclase, sec.	n/a	n/a	n/a	80
Subtotals replaced				80

MICROSTRUCTURES

Microstructure: metamorphic Observer: GV

Detailed description this is an oxide-rich gabbro with deformation restricted to recrystallization of plagioclase into fine-grained aggregates.

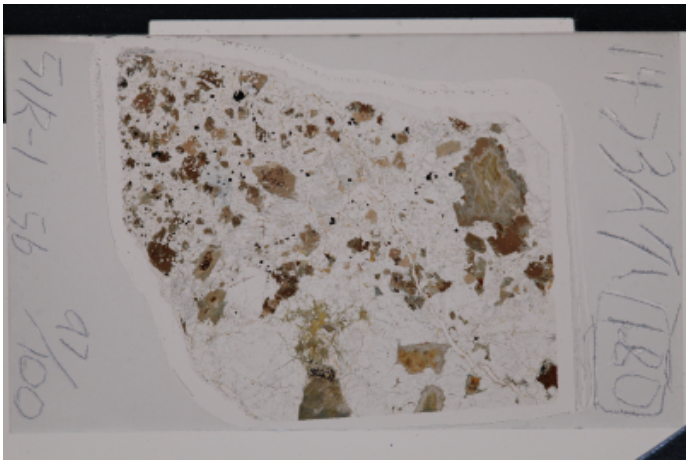
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved texture: highly altered coarse grains
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: curved texture: coarse grains with tapered twins and medium to fine laths with little or no preferred orientation
Clinopyroxene:	size: medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse fractured grains and fine crystals associated with oxides and alteration.
Oxide:	geometry: several thin patches of subspherical shape mixed with cpx and plagioclase.

THIN SECTION LABEL ID: **360-U1473A-51R-1-W 97/100-TSB-TS_180** Piece no.: #05 TS no.: 180

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro intruded by a trondhjemite vein. Both domains display granular texture.
Metamorphic petrology:	The gabbro intruded by the tonalitic melt is strongly altered; olivine is totally altered and cpx overgrown by brown amphibole replaced by green hornblende and needles of actinolite. In the tonalite, the plagioclase is often recrystallized , intensely filled with cloudy, dusty material. A mortar texture is present with alteration minerals on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite. Veins are mostly filled with clay, green amphibole and carbonate.
Structure:	Olivine gabbro is undeformed and the felsic vein is policrystalline and patchy. These domains are cross-cut by an inclined fracture filled.

Plane-polarized



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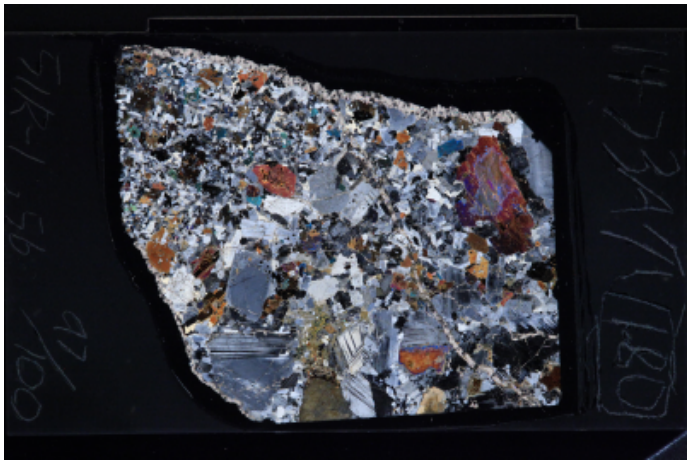
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 40 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium grained olivine gabbro with a granular texture. Olivine is completely altered and original shape is not preserved. Plagioclase is in a subequant shape and displays magmatic twins and undulose extinction. Clinopyroxene is pervasively replaced by brown amphibole and occasionally by biotite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5						completely altered and original shape is not preserved
Plagioclase	70		5	4	anhedral	subequant	magmatic twins
Clinopyroxene	25		18	4			

Interval domain no: **2** Domain rel. abundance (%): 60 Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a trondhjemite with a granular texture. Plagioclase is euhedral to subhedral and commonly displays an oscillatory zoning. Amphibole shows a poikilitic texture and partly or fully enclose plagioclase and opaque oxides. Quartz are interstitial between plagioclase. Opaque oxides are predominated by ilmenite, which are in equant shape. Small amount of titanite and zircon are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	75		3.2	0.8	euhedral	tabular	
Amphibole	18		3.2	1.2	anhedral	poikilitic	with incluisons of euhedral plagioclase
Opaques	2						
Ilmenite	2						
Quartz	5		0.6	0.4	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: olivine gabbro

Total rock alteration estimate (%): 40 Observer(s):

Detailed description The gabbro intruded by the tonalitic melt is strongly altered; olivine is totally altered and cpx overgrown by brown amphibole replaced by green hornblende and needles of actinolite. In the tonalite, the plagioclase is often recrystallized , intensely filled with cloudy, dusty material. A mortar texture is present with alteration minerals on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite. Veins are mostly filled with clay, green amphibole and carbonate.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the felsic vein is strongly altered
Vein 1 minerals:	amphibole
Vein 2 minerals:	clay
Vein 3 minerals:	calcite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	80		
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, green	10	50		
Carbonate	15	n/a	n/a	n/a
Clay minerals	65	30		
Clinopyroxene, sec.	n/a	15	n/a	n/a
Oxide	10			n/a
Subtotals replaced	100	100		

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: tonalite

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary), intensely filled with cloudy, dusty material; mortar texture with alteration masses on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite; they are also overgrown by biotite which is subsequently altered to clay.
Vein 1 minerals:	clay
Vein 2 minerals:	green amphibole
Vein 3 minerals:	late carbonate

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: subhedral Grain boundary: straight Twinning: tapered
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight Texture: altered

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic patchy vein Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: medium Grain shape: euhedral Grain boundary: straight Twinning: igneous Texture: common zonation, random orientation
Vein:	policrystalline felsic vein and later fracture filled with carbonate

THIN SECTION LABEL ID: **360-U1473A-51R-1-W 100/106-TSB-TS_181** Piece no.: #05 TS no.: 181

Group	Summary
Igneous petrology:	There are three domains in the thin section, a subophitic coarse-grained olivine gabbro, a granular diorite and a granoblastic amphibolite.
Metamorphic petrology:	The gabbro intruded by the former basalt associated with a tonalitic melt at the contact is moderately altered. Except for some relic magmatic plagioclase phenocrysts, the former basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene (rare) and oxide. At the rim, the metamorphic granoblastic texture changes to a magmatic poikilitic texture, which still bears relics of the granoblastic texture. In the tonalite, the plagioclase is often recrystallized , intensely filled with cloudy, dusty material. A mortar texture is present with alteration minerals on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite; they are also overgrown by biotite which is subsequently altered to clay.
Structure:	Very weakly deformed olivine gabbro intruded by amphibolite dike. The contact is marked by the parallel intrusion of felsic vein. The structure is cross-cut by late stage carbonate veins.

Plane-polarized

33144501

Cross-polarized

33144591

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Olivine is completely altered. Tabular plagioclase displays undulose extinction and deformation twins. It is partly or fully enclosed within clinopyroxene. Clinopyroxene is pervasively altered and a consertal texture is locally preserved.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5						completely altered
Plagioclase	55		10	8	anhedral	tabular	undulose extinction
Clinopyroxene	40		8	8	anhedral	subequant	highly altered

Interval domain no: **2** Domain rel. abundance (%): Domain name: vein type 1

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a granular diorite, which mainly consists of plagioclase and amphibole. Small amount of quartz are present. Plagioclase is in a tabular shape and commonly displays an oscillatory zoning. Occasionally, it is partly or fully enclosed within subequant amphibole. Quartz is interstitial among plagioclase. Big zircons and titanite occur along the boundary between diorite and gabbro.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	78		2	0.8	euhedral	tabular	
Amphibole	15		3.2	2.4	subhedral	poikilitic	
Quartz	7		1.6	0.8	anhedral	interstitial	

Interval domain no: **3** Domain rel. abundance (%): Domain name: vein type 2

Lithology: **amphibolite** Observer: CL

Texture: granoblastic Ave. grain size: fine grained

Detailed description: This domain is a granoblastic amphibolite. Small amount olivine are present, but completely altered. Plagioclase also occurs as phenocrysts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			0.6			completely altered
Plagioclase	33		0.8	0.2			
Amphibole	65		0.4	0.2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: olivine gabbro

Total rock alteration estimate (%): 20 Observer(s): JK

Detailed description The gabbro intruded by the former basalt associated with a tonalitic melt at the contact is moderately altered. Except for some relic magmatic plagioclase phenocrysts, the former basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene (rare) and oxide. At the rim, the metamorphic granoblastic texture changes to a magmatic poikilitic texture, which still bear relics of the granoblastic texture. In the tonalite, the plagioclase is often recrystallized , intensely filled with cloudy, dusty material. A mortar texture is present with alteration minerals on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite; they are also overgrown by biotite which is subsequently altered to clay.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the former basalt associated with a tonalitic melt at the contact is moderateley altered
Vein 1 minerals:	calcite
Vein 2 minerals:	clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	40		10
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, green	20	10		20
Clay minerals	60	50		20
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	10	10		n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Talc	10	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: granoblastic basalt

Total rock alteration estimate (%):

Observer(s): JK

Comment type	Comment
Alteration general comments:	Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary clinopyroxene (rare) and oxide. At the rim, the metamorphic granoblastic texture changes to a magmatic poikilitic texture
Vein 1 minerals:	calcite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	100		98
Amphibole, brown	n/a	80	n/a	n/a
Amphibole, green		10		
Clay minerals	80			
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced	100	100		100

Interval domain no: 3 Domain rel. abundance (%): 40 Domain name: tonalite

Total rock alteration estimate (%):

Observer(s): JK

Comment type	Comment
Alteration general comments:	plagioclase is often recrystallized (so secondary), intensely filled with cloudy, dusty material; mortar texture with alteration masses on grain boundaries consisting of actinolite, colorless amphibole, clay, oxide, cloudy dirty masses. Amphiboles show a continuous evolution from poikilitic magmatic brown amphibole, via green hornblende to actinolite; they are also overgrown by biotite which is subsequently altered to clay.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				50
Amphibole, green				10
Clay minerals				10
Plagioclase, sec.	n/a	n/a	n/a	80
Subtotals replaced				100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: medium phenocrysts and fine matrix Grain shape: euhedral to subhedral Grain boundary: straight to curved Twinning: igneous

Interval domain no: 2 Domain rel. abundance (%): 45 Domain name: microfabric

Microstructure: submagmatic Observer: CF

Detailed description Parallel fractures cross-cut the different structures and arew filled with carbonate.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Olivine:	altered crystals
Plagioclase:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: subhedral and anhedral recrystallized Grain boundary: straight to curved Twinning: tapered Undulose extinction: regular Texture: coarse preserved igneous texture deformed with rare neoblasts at grain boundaries
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight Texture: altered undeformed with very rare neoblasts at grain boundaries
Vein:	parallel fractures filled with carbonate

Interval domain no: 3 Domain rel. abundance (%): 35 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Felsic vein intruded along the contact of intruded dike. The top part of the section is characterized by the same felsic vein that become patchy within the olivine gabbro.

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: medium Grain shape: euhedral Grain boundary: straight Twinning: igneous Texture: zoned crystals, may included in piokilitic amphibole
Oxide:	subhedral to anhedral fine grained single crystals
Vein:	felsic vein is policrystalline and is parallel to the contact, top part of the section is patchy. Parallel fractures filled with carbonate

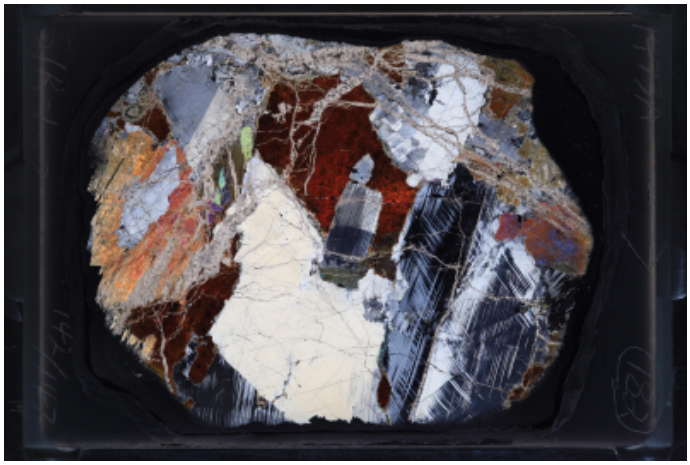
THIN SECTION LABEL ID: **360-U1473A-51R-1-W 142/147-TSB-TS_182** Piece no.: #07 TS no.: 182

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is completely altered. Tabular plagioclase shows magmatic twins and occasionally undulose extinction. It is weakly recrystallized at the margin. Clinopyroxene is pervasively altered.
Metamorphic petrology:	Sample is substantially altered into mostly reddish clay minerals and carbonate. Carbonate and minor chlorite veins were observed.
Structure:	Highly fractured and altered

Plane-polarized

33144441

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is completely altered. Tabular plagioclase shows magmatic twins and occasionally undulose extinction. It is weakly recrystallized at the margin. Clinopyroxene is pervasively altered.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			16			completely altered
Plagioclase	75		30	26	anhedral	tabular	undulose extinction
Clinopyroxene	10		16	10	anhedral	poikilitic	highly altered
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 60 Observer(s): JL

Detailed description Sample is substantially altered. Remnants of high temperature alteration (2nd Cpx) as well as greenschist assemblages (talc, chlorite, tremolite) are still discernable. Most of the alteration is associated by the extensive replacement of olivine by red clay and late stage carbonate veining. Carbonate mostly replaces primary Cpx implying that olivine has been altered into reddish clays during the carbonate intrusion event. Carbonate and clayonly replaces primary Cpx and not 2nd Cpx suggesting that the latter is more stable.

Comment type	Comment
Vein 1 minerals:	Carbonate veins. Branching structure, mostly composed of medium grained calcite crystals. Some veins are composed of fine grained crystals. Cuts through mineral grains.
Vein 2 minerals:	Small chlorite vein was observed to be partially overprinted by the calcite vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	80		40
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless				10
Carbonate	10	n/a	n/a	n/a
Chlorite				40
Clay minerals	75	25		20
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	10
Talc	10	n/a		n/a
Other		40		
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

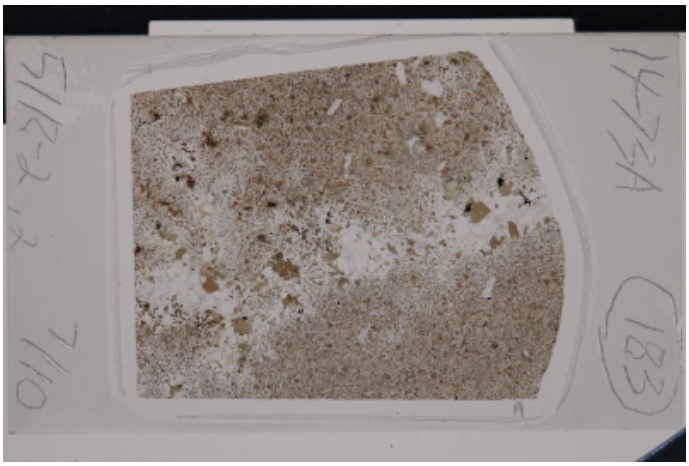
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: euhedral to subhedral Grain boundary: straight Twinning: tapered Texture: igneous preserved
Clinopyroxene:	Grain size: coarse Grain shape: anhedral to poikilitic Grain boundary: straight Texture: igneous preserved and altered
Vein:	fracture filled with alteration material

THIN SECTION LABEL ID: **360-U1473A-51R-2-W 7/10-TSB-TS_183** Piece no.: #02 TS no.: 183

Group	Summary
Igneous petrology:	A fine-grained amphibolite intruded by a diorite vein. The amphibolite displays a granoblastic texture and the diorite shows a granular texture.
Metamorphic petrology:	Sample consist of two domains: an altered diorite intrusion and an amphibolite. Most conspicuous replacement more is that by carbonate replacing quartz and plagioclase.
Structure:	The policrystalline diorite vein shows irregular contact with the host amphibolite.

Plane-polarized



33143881

Cross-polarized

33143901

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 90 Domain name: lithology

Lithology: **granoblastic amphibolite** Observer: CL

Texture: granoblastic Ave. grain size: fine grained [345]

Detailed description: This domain is a fine-grained amphibolite with a granoblastic texture. Some plagioclase phenocrysts and small amount of ilmenite are present. Small amount of olivine occur as phenocryst, but are completely altered. A big zircon occurs.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1						occurs as phenocryst but completely altered
Plagioclase	39		1.2	0.2	anhedral	tabular	also occurring as phenocryst
Amphibole	59		0.4	0.2	anhedral	interstitial	
Opaques	1						
Ilmenite	1						

Interval domain no: **2** Domain rel. abundance (%): 10 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained [345]

Detailed description: This domain is a diorite with a granular texture. It is predominated by subhedral plagioclase, with minor amphibole and quartz. Plagioclase commonly displays an oscillatory zoning and amphibole is in a subequant shape. Small amount of titanite is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	85		2.8	2	subhedral	tabular	
Amphibole	10		1.6	1.6	subhedral	subequant	
Opaques	0.2						
Ilmenite	0.2						
Quartz	5		1	0.6	anhedral	interstitial	

METAMORPHIC PETROLOGY

Interval domain no: 2 Domain rel. abundance (%): Domain name:

Total rock alteration estimate (%): 25 Observer(s): JL

Detailed description Sample is an amphibolite composed of brown and brown green amphibole. Pseudomorphic grains of what seems to be olivine is completely replaced by clays and carbonates. Plagioclase is moderately altered at the grain centers.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	100		25
Amphibole, brown	n/a	90	n/a	n/a
Amphibole, green		10		
Carbonate	20	n/a	n/a	n/a
Clay minerals	80			
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced	100	100		100

Interval domain no: 1 Domain rel. abundance (%): Domain name:

Total rock alteration estimate (%): 40 Observer(s): JL

Detailed description Diorite intrusion is substantially altered, mostly by calcite replacing quartz and plagioclase. Plagioclase is mostly altered at the grain center, usually by calcite and 2nd plagioclase. Some brown and brown-green amphibole are partially replaced by minor tremolite.

Comment type	Comment
Vein 1 minerals:	much of the minerals in the diorite intrusion is replaced by calcite, liekyl implying that there was a calcite vein nearby.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				40
Plagioclase, sec.	n/a	n/a	n/a	30
Subtotals replaced				100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: medium phenocrysts and fine matrix Grain shape: euhedral phenocrysts and anhedral matrix Grain boundary: straight to curved Twinning: igneous Undulose extinction: weak Texture: phenocrysts in granular matrix

Interval domain no: 2 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: medium Grain shape: euhedral to subhedral Grain boundary: straight Twinning: igneous Texture: zoned and undeformed
Vein:	Magmatic vein polycrystalline, with irregular contact with the host amphibolite.

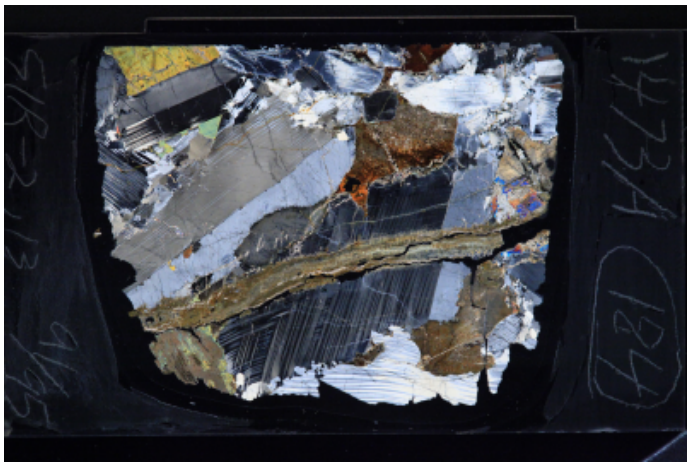
THIN SECTION LABEL ID: **360-U1473A-51R-2-W 91/95-TSB-TS_184** Piece no.: #13 TS no.: 184

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a granular texture. Tabular plagioclase commonly displays magmatic twins. It is partly recrystallized and shows deformation twins and undulose extinction.
Metamorphic petrology:	Olivine and clinopyroxene are intensely altered, whereas plagioclase alteration is slight.
Structure:	coarse-grained, nearly undeformed olivine gabbro with large carbonate vein

Plane-polarized

33143841

Cross-polarized



33143861

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a granular texture. Olivine is completely altered and original shape is not preserved. Tabular plagioclase commonly displays magmatic twins. It is partly recrystallized and shows deformation twins and undulose extinction. Recrystallized neoblasts occur at the margin of big plagioclase grains. Clinopyroxene is pervasively altered and preserve consertal texture. Small amount of ilmenite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5						completely altered and original shape is not preserved
Plagioclase	77		15	15	anhedral	tabular	undulose extinction
Clinopyroxene	18		7	5	anhedral	subequant	showing a consertal texture
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): TN

Detailed description Olivine is psudomorphically replaced by talc, amphibole, clay and carbonate; clinopyroxene by secondary clinopyroxene patches, brown amphibole blebs, green amphibole rims and clay along cleavage surfaces; plagioclase has fractures filled with chlorite, amphibole, clay, carbonate and secondary plagioclase.

Comment type	Comment
Vein 1 minerals:	carbonate + chlorite + clay

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		5
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	5			
Amphibole, green	5	10		10
Carbonate	30	n/a	n/a	n/a
Chlorite				60
Clay minerals	50	45		10
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	10
Sulfide	1	1		n/a
Talc	5	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Observer: OP

Detailed description coarse-grained, nearly undeformed olivine gabbro with large carbonate vein

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: coarse-grained phenocryst; Grain shape: andhedral; Grain boundary: curved, altered; Texture: fully altered olivine
Plagioclase:	Grain size: coarse-grained phenocryst with minor medium-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Twinning: tapered and magmatic; Undulose extinction: irregular; Texture: coarse-grained phenocryst with minor neoblasts at grain boundaries
Clinopyroxene:	Grain size: coarse-grained phenocryst, partly rerystallized to medium-grained crystals; Grain shape: anhedral Grain boundary: curved, altered; Texture: partly to full altered clinopyroxene phenocryst with minimal recrystallization
Oxide:	minor interstitial oxide
Vein:	large carbonate vein crosscutting entire thin section; local penetration of small veins into the wall-rock away from primary vein; vein texture suggests several fracturing and crystallization events

THIN SECTION LABEL ID: **360-U1473A-51R-3-W 144/147-TSB-TS_185** Piece no.: #12 TS no.: 185

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a granular texture. Tabular plagioclase commonly displays magmatic twins, but deformation twins are also shown by some grains.
Metamorphic petrology:	The alteration intensity of this thin section is substantial.
Structure:	Undeformed, coarse-grained olivine gabbro with minor amount of plagioclase neoblasts.

Plane-polarized

33143781

Cross-polarized

33143821

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbro with a granular texture. Olivine is completely altered and the orthopyroxene overgrowth is still preserved. Plagioclase inclusions can be seen within the altered olivine. Tabular plagioclase commonly displays magmatic twins, but deformation twins are also shown by some grains. Clinopyroxene is moderately altered and displays a consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	25			7			completely altered
Plagioclase	55		12	10	subhedral	tabular	
Clinopyroxene	20		10	6	anhedral	subequant	showing a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Ol developed typical mesh textures and pseudomorph texture. The mesh core consisted of yellow, red and dark red clay, and assemblage of serpentine, talc and minor oxide occurred in mesh rims. Cpx mainly altered into colorless amphibole with brown amphibole and clay. Pl were mostly replaced by secondary plagioclase with minor chlorite and clay occurring in the cleavages of Pl.

Comment type	Comment
Vein 1 minerals:	Several carbonate veins were observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		35
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless		65		
Chlorite				10
Clay minerals	70	20		5
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc	15	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

Detailed description undeformed, coarse-grained olivine gabbro with minor amount of plagioclase neoblasts

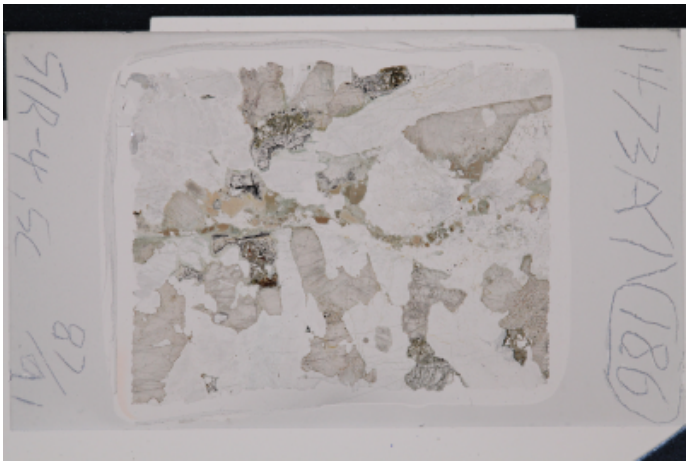
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse-grained phenocryst; Grain shape: anhedral; Grain boundary: straight to curved; Texture: altered olivine phenocrysts
Plagioclase:	Grain size: coarse-grained phenocryst, medium-grained neoblasts; Grain shape: tabular; Grain boundary: straight to curved; Twinning: magmatic and tapered; Undulose extinction: irregular; Texture: coarse-grained phenocryst with few neoblasts at grain boundaries
Clinopyroxene:	Grain size: coarse-grained phenocryst; Grain shape: anhedral; Grain boundary: straight to curved; Texture: altered clinopyroxene phenocrysts
Oxide:	rare interstitial oxide

THIN SECTION LABEL ID: **360-U1473A-51R-4-W 87/91-TSB-TS_186** Piece no.: #05 TS no.: 186

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro intruded by a diorite vein. The gabbro displays a subophitic texture and the diorite shows a granular texture.
Metamorphic petrology:	The rock includes a felsic vein mostly composed of plagiocalse and minor brown Amp. Near the felsic vein, Cpx and Ol from host gabbro are rimmed by brown Amp. Background alteration of host gabbro is overall moderate and mostly confined to Ol.
Structure:	Undeformed, coarse-grained olivine gabbro with felsic vein.

Plane-polarized



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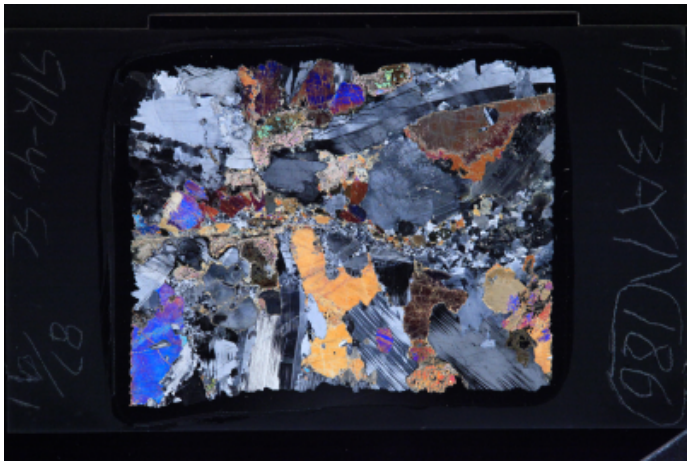
Cross-polarized



33143761

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 90 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Olivine is strongly altered, in which tiny ilmenite and sulfide are present. Tabular plagioclase displays magmatic twins and also undulose twins. It is partly or fully enclosed within clinopyroxene. At the boundary with the diorite vein, plagioclase is partly recrystallized. Clinopyroxene is commonly overgrown by subhedral amphibole. It also displays a consertal intergrowth texture, in which tiny brown amphiboles associate with the secondary clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			3.2	anhedral	subequant	strongly altered
Plagioclase	65		16	7	anhedral	tabular	undulose extinction
Clinopyroxene	25		10	6	anhedral	subequant	with a consertal texture and containing brown amphibole blebs
Amphibole	2		1.6	0.8	subhedral	subequant	
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

Interval domain no: **2** Domain rel. abundance (%): 10 Domain name: Vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a diorite vein with a granular texture. It mainly consists of plagioclase, with minor subhedral amphibole. Plagioclase occasionally displays an oscillatory zoning.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		4	1	subhedral	subequant	
Amphibole	10		1	0.4	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): RT

Detailed description The rock includes a felsic vein mostly composed of plagiocalse and minor brown Amp. Near the felsic vein, Cpx and Ol from host gabbro are rimmed by brown Amp. Background alteration of host gabbro is moderate and mostly confined to Ol.

Comment type	Comment
Alteration general comments:	Static alteration of host gabbro is moderate and mostly confined to Ol.
Vein 1 minerals:	The rock includes a felsic vein mostly composed of plagiocalse and minor brown Amp. Near the felsic vein, Cpx and Ol from host gabbro are rimmed by brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	10		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	10	20		10
Chlorite				20
Clay minerals	10			10
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

Total rock alteration estimate (%): Observer(s): RT

Comment type	Comment
Vein 1 minerals:	The rock includes a felsic vein mostly made up of plagioclase and minor brown amphibole. Near this vein, Ol and Cpx from host gabbro show brown Amp coronas.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	10		
Amphibole, colorless	10			
Clay minerals	10			
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100			

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 90 Domain name: microfabric

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: regular; Subgrain: straight to curved; Fracture: network; Texture: partly to fully altered olivine grains;
Plagioclase:	Grain size: coarse-grained phenocrysts, medium-grained neoblasts; Grain shape: tabular subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: magmatic and tapered; Texture: tabular plagioclase phenocrysts, some plagioclase grains show networks of healed fractures
Clinopyroxene:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: regular; Texture: partly altered clinopyroxene grains with plagioclase inclusions

Interval domain no: 2 Domain rel. abundance (%): 10 Domain name: microfabric

Microstructure: magmatic Observer: OP

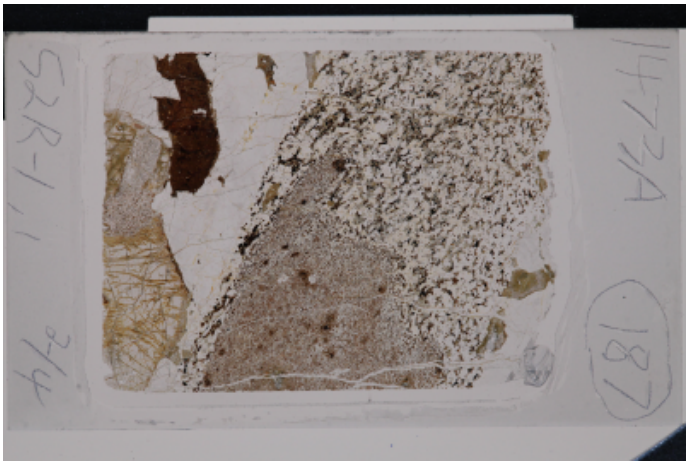
Feature type	Observation	Intensity rank
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	Grain size: medium-grained to fine-grained; Grain shape: subhedral to euhedral; Grain boundary: straight to curved; Twinning: magmatic Texture: plagioclase in magmatic vein
Vein:	felsic vein cross-cutting long-axis of thin section

THIN SECTION LABEL ID: **360-U1473A-52R-1-W 2/4-TSB-TS_187** Piece no.: #01 TS no.: 187

Group	Summary
Igneous petrology:	There are three domains in the thin section, a coarse-grained olivine with a subophitic texture, a granoblastic amphibolite and a halo. The halo between gabbro and amphibolite displays a granular texture.
Metamorphic petrology:	The gabbro intruded by the former basalt is moderately altered. At the contact zone to the granoblastic basalt, a zone of gabbronorite is developed with roundish cpx very untypical for a magmatic texture implying some relation to the granoblastic stage; alteration of the gabbronorite is moderate, with most opx is altered to brownish clay minerals. The former basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, secondary cpx, opx and oxide (so it is an amphibolite). Former microphenocrysts are identified: plag and ol: the latter is completely metamorphosed to opx.
Structure:	Amphibolite cutting olivine gabbro. Along the contact polycrystalline felsic material crystallizes.

Plane-polarized



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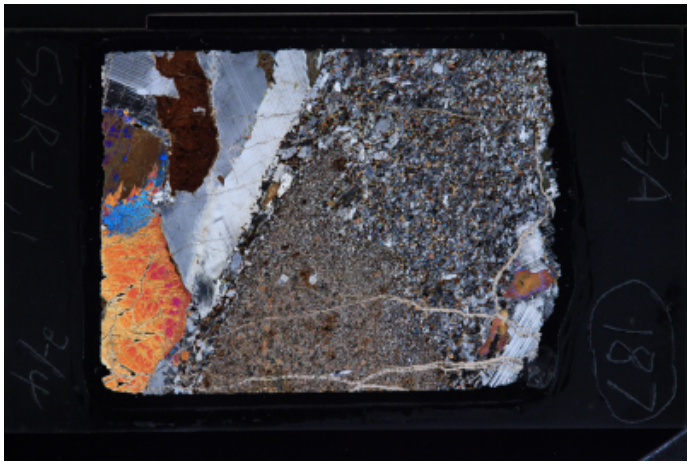
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 35 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Olivine is completely altered. Tabular plagioclase shows magmatic twins. Clinopyroxene is rimmed by brown amphibole. It displays a consertal intergrowth texture, in which abundant tiny brown amphibole associate with secondary clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	16			9			completely altered
Plagioclase	60		16	8	anhedral	tabular	
Clinopyroxene	24		12	12	anhedral	subequant	with a consertal texture

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **amphibolite** Observer: CL

Texture: granoblastic Ave. grain size: fine grained

Detailed description: This domain is a granoblastic amphibolite. Olivine is completely altered and small amount of ilmenite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.6			completely altered
Plagioclase	45		0.4	0.2	anhedral	tabular	
Clinopyroxene	20		0.2	0.1	anhedral	subequant	
Amphibole	29		0.4	0.2	anhedral	subequant	
Opaques	1						
Ilmenite	1						

Interval domain no: **3** Domain rel. abundance (%): 35 Domain name: halo

Lithology: **orthopyroxene-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a halo between the gabbro and the amphibolite. Small amount of orthopyroxene probably exist.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		1	0.8	subhedral	subequant	undulose extinction
Clinopyroxene	20		0.4	0.2	anhedral	subequant	
Orthopyroxene	5		1.2	0.1	anhedral	subequant	
Opaques	5						
Ilmenite	5						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 40 Domain name: olivine gabbro

Total rock alteration estimate (%): 20 Observer(s): JK

Comment type	Comment
Alteration general comments:	The gabbro intruded by the former basalt t is moderateley altered
Vein 1 minerals:	clay
Vein 2 minerals:	calcite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	40		10
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, green	5			
Clay minerals	85	10		50
Clinopyroxene, sec.	n/a	80	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Other	5			
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: granoblastic basalt

Total rock alteration estimate (%): 100 Observer(s): JK

Comment type	Comment
Alteration general comments:	Except some relic plagioclase phenocryst, the basalt is completely metamorphosed in the hornblende hornfels facies to a granoblastic assemblage of secondary plag, brown amphibole, cpx, opx, and oxide
Vein 1 minerals:	clay
Vein 2 minerals:	calcite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	100		98
Amphibole, brown	n/a	50	n/a	n/a
Clay minerals	90			
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Subtotals replaced	100	100		100

Interval domain no: 3 Domain rel. abundance (%): 40 Domain name: gabbronorite

Total rock alteration estimate (%): 20 Observer(s): JK

Comment type	Comment
Alteration general comments:	alteration of the gabbronorite is moderate, with most opx is altered to brownish clay minerals.
Vein 1 minerals:	clay
Vein 2 minerals:	calcite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		20	80	10
Clay minerals		90	100	100
Oxide		10		n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape; subhedral Grain boundary straight to curved Twinning: tapered Undulose extinction Texture: locally recrystallized at grain boundary
Clinopyroxene:	Grain size: coarse Grain shape; anhedral Grain boundary straight to curved Texture: locally recrystallized at grain boundary

Interval domain no: 2 Domain rel. abundance (%): 35 Domain name: microfabric

Microstructure: Observer: CF

Detailed description The contact with olivine gabbro is marked by a felsic vein.

Type	Comment
Plagioclase:	Grain size: fine Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinning: igneous Texture: phenocrysts in fine grained matrix
Oxide:	interstitial crystals

Interval domain no: 3 Domain rel. abundance (%): 35 Domain name: microfabric

Microstructure: Observer: CF

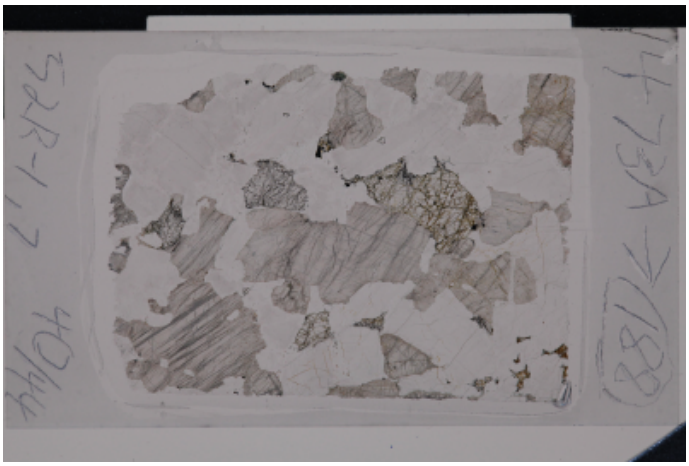
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	Grain size: medium Grain shape: euhedral, subhedral to anhedral Grain boundary: straight to curved Twinning: igneous Texture: Euhedral and subhedral grains at the contact between amphibolite and olivine gabbro
Oxide:	subhedral to interstitial crystals
Vein:	policrystalline felsic vein parallel to the contact with cross-cut relationship, and patchy in the rest of thin section.

THIN SECTION LABEL ID: **360-U1473A-52R-1-W 40/44-TSB-TS_188** Piece no.: #07 TS no.: 188

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbronorite with subophitic texture. Tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock shows a slight static background alteration that is confined to Ol and Cpx.
Structure:	Undeformed olivine gabbronorite without magmatic foliation.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbronorite** Observer: CL

Texture: subophitic Ave. grain size: coarse grained [345]

Detailed description: A coarse-grained olivine gabbronorite with subophitic texture. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Olivine is partly recrystallized and rimmed by orthopyroxene, but its rim is commonly altered. Plagioclase is partly recrystallized and commonly show undulose extinction. Both clinopyroxene and primary orthopyroxene display consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		10	8	anhedral	tabular	undulose extinction
Clinopyroxene	23		12	10	anhedral	subequant	showing a consertal texture
Orthopyroxene	5		4	3	anhedral	subequant	showing a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): RT

Detailed description The rock shows a slight static background alteration that is confined to Ol and Cpx.

Comment type	Comment
Alteration general comments:	The rock shows a slight static background alteration.
Mylonite comments:	Local recrystallization of Pl

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	10		1
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless				35
Chlorite	10			30
Clay minerals	10	10		35
Clinopyroxene, sec.	n/a	80	n/a	n/a
Oxide	10			n/a
Talc	50	n/a		n/a
Subtotals replaced	80	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

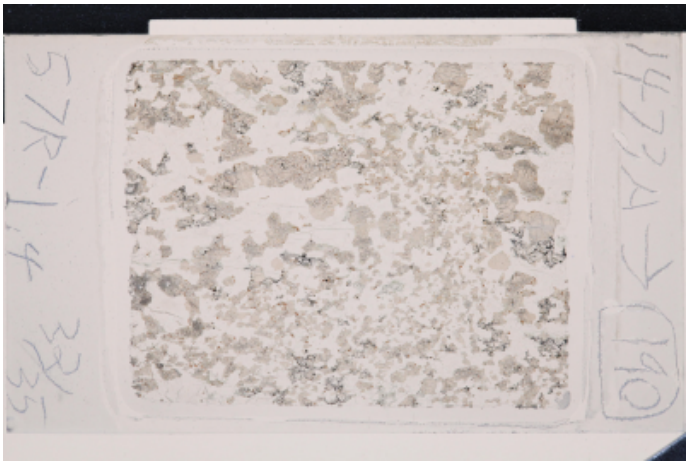
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse-grained phenocryst; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: regular; Texture: olivine phenocryst with plagioclase inclusions, some olivine grains exhibit fracturing and alteration
Plagioclase:	Grain size: coarse-grained phenocrysts, medium-grained neoblasts; Grain shape: tabular subhedral to anhedral; Grain boundary: straight to curved; Twinning: tapered; Undulose extinction: irregular; Subgrain: straight to curved; Texture: tabular phenocrysts with olivine inclusions and minor recrystallization
Clinopyroxene:	Grain size: coarse-grained phenocrysts; Grain shape: anhedral; Grain boundary: straight to curved; Texture: clinopyroxene phenocrysts surrounded by plagioclase
Oxide:	minor oxide related to olivine alteration

THIN SECTION LABEL ID: **360-U1473A-57R-1-W 32/35-TSB-TS_190** Piece no.: #04 TS no.: 190

Group	Summary
Igneous petrology:	A medium-grained orthopyroxene-bearing olivine gabbro. The primary magmatic texture is not preserved.
Metamorphic petrology:	The rock shows widespread recrystallization of Ol, Pl and Cpx. Cpx neoblasts are typically associated with minor brown Amp and accessory opaque phases. The static alteration is slight.
Structure:	Strongly recrystallized marked by olivine, clinopyroxene and plagioclase neoblasts that define the porphyroclastic foliation.

Plane-polarized



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Cross-polarized

33213111

IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained orthopyroxene-bearing olivine gabbro with a porphyroclastic texture. A foliation is shown by the preferred orientation of the elongated plagioclase and olivine. The primary magmatic texture is not preserved. Oliivne is elongated and its rim is commonly altered. Plagioclase is elongated and recrystallized. It displays undulose extinction. Clinopyroxene is highly recrystallized and commonly displays a consertal intergrowth texture with orthopyroxene. Primary orthopyroxene has not been found. Abundant tiny brown amphiboles are present. It occurs as blebs within clinopyroxene or interstitial between clinopyroxene neoblasts. It also occurs at the rim of clinopyroxene. Opaque minerals mainly consist of magnetite and sulfides. The magnetite commonly occurs at the altered olivine rim, whereas sulfides are associated with brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			1.2	anhedral	elongate	strongly altered
Plagioclase	55		3.6	2.4	anhedral	elongate	undulose extinction
Clinopyroxene	36		3.6	2	anhedral	subequant	showing a consertal intergrowth texture with orhtopyroxene
Orthopyroxene	2		1.6	0.8	anhedral	subequant	
Amphibole	0.3		0.2	0.1	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): RT

Detailed description The rock shows widespread recrystallization of Ol, Pl and Cpx. Cpx neoblasts are typically associated with minor brown Amp and accessory opaque phases. The static alteration is slight.

Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	Widespread recrystallization of Ol, Pl and Cpx, with Cpx neoblasts associated with minor brown Amp and accessory opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	10		5
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		20		60
Chlorite	20	10		40
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation defined by elongated aggregates of recrystallized olivine in associatoin with neoblasts of clinopyroxene. The grain size vary in this thin section: areas where plagioclase is completely recrystallized are finer-grained.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: not observed Texture: completely recrystallized with fractured neoblasts
Plagioclase:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: subhedral porphyroclasts and polygonal recrystallized Grain boundary: curved Twinning: igneous and tapered Undulose extinction: regular Texture: deformed porphyroclasts recrystallized
Clinopyroxene:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: very rare and weak Texture: fractured and altered porphyroclastic partially recrystallized in aggregates with ol; porphyroclasts may include euhedral undeformed plg

THIN SECTION LABEL ID: **360-U1473A-58R-2-W 12/16-TSB-TS_191** Piece no.: #01 TS no.: 191

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but it is very likely to be subophitic, as tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	The rock shows widespread recrystallization of Ol and Pl. Cpx is locally recrystallized and Cpx neoblasts are typically associated with brown Amp and Fe-Ti oxide phases. The static alteration is slight.
Structure:	Weakly foliated, porphyroclastic olivine gabbro with polygonal plagioclase neoblasts.

Plane-polarized

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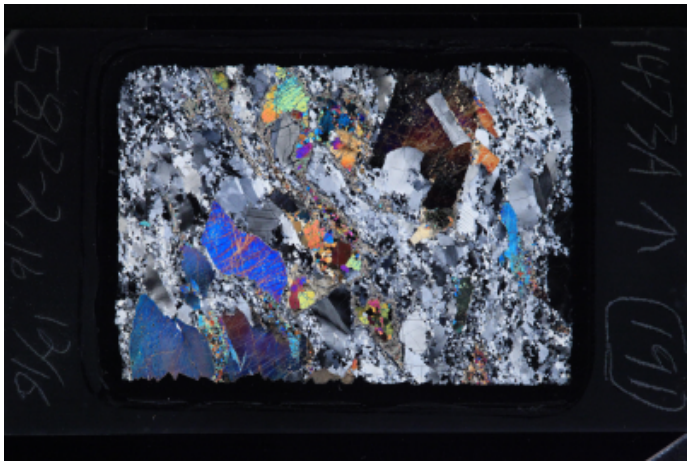
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but it is very likely to be subophitic, as tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is strongly recrystallized and the olivine neoblasts are subhedral with triple junctions. The olivine rim is commonly altered, but overgrowth of clinopyroxene can still be locally seen. Plagioclase is elongated and recrystallized. It displays undulose extinction and deformation twins. Clinopyroxene is commonly recrystallized and displays a consertal intergrowth texture with secondary clinopyroxene. Brown amphibole occurs as an interstitial phase between clinopyroxene and plagioclase or as blebs among clinopyroxene neoblasts. Opaque minerals solely consist of ilmenite, which commonly associates with olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			2.6	subhedral	subequant	recrystallized
Plagioclase	65		4.8	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	20		10	5	anhedral	subequant	with a consertal intergrowth texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): RT

Detailed description The rock shows widespread recrystallization of Ol and Pl. Cpx is locally recrystallized and Cpx neoblasts are typically associated with brown Amp and Fe-Ti oxide phases. The static alteration is slight.

Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	Widespread recrystallization of Ol and Pl. Cpx locally recrystallized and the Cpx neoblasts are typically associated with brown Amp and opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	10		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		40		30
Chlorite	20			70
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Weakly foliated olivine gabbro with recrystallized olivine and plagioclase. Plagioclase neoblasts are nearly polygonal and enclose coarse-grained clinopyroxene grains. Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium-grained porphyroclasts, fine-grained neoblasts; Grain shape: anhedral to polygonal; Grain boundary: straight to curved; Undulose extinction: irregular; Subgrain: straight; Texture: porphyroclasts encompassed by neoblasts, infrequently enclosing plagioclase
Plagioclase:	Grain size: medium-to coarse-grained porphyroclasts, fine-grained neoblasts; Grain shape: anhedral porphyroclasts, anhedral to polygonal neoblasts; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: porphyroclasts with nearly polygonal neoblasts making up the ground mass
Clinopyroxene:	Grain size: coarse-grained porphyroclasts, fine-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Texture: coarse-grained, kinked and fractured cpx porphyroclasts partly recrystallized, one clinopyroxene encloses a tabular plagioclase grain
Oxide:	oxides associated to olivine alteration

THIN SECTION LABEL ID: **360-U1473A-58R-2-W 95/102-TSB-TS_192** Piece no.: #05 TS no.: 192

Group	Summary
Igneous petrology:	There are two domains, an olivine gabbro and an olivine-bearing gabbro. The coarse-grained olivine gabbro displays a porphyroclastic texture. Its primary texture could be subophitic, as tabular plagioclase is partly enclosed within clinopyroxene. The fine-grained olivine-bearing gabbro is highly foliated and its primary texture is unknown.
Metamorphic petrology:	Sample is moderately altered. Green amphibole and chlorite veins were observed.
Structure:	The coarse grain olivine gabbro is porphyroclastic and weakly foliated, and the fine grained olivine-bearing gabbro is strongly foliated. The contact is relatively sharp and irregular.

Plane-polarized

33213211

Cross-polarized

33213231

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro. The primary magmatic texture is not preserve but could be subophitic, as tabular plagioclase is partly enclosed within clinopyroxene. Olivine is partly recrystallized and the porphyroclasts are rimmed by orthopyroxene. However, their rim is commonly altered. Plagioclase is partly recrystallized and displays undulose extinction. Clinopyroxene is partly recrystallized and altered. The porphyroclasts commonly show a consertal intergrowth texture with orthopyroxene. Tiny brown amphibole is interstitial among the clinopyroxene and olivine neoblasts, or occur at the rim of clinopyroxene porphyroclasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			1.6	anhedral	subequant	recrystallized and rimmed by orthopyroxene
Plagioclase	65		8	4	anhedral	tabular	undulose extinction
Clinopyroxene	25		10	8	anhedral	subequant	with a consertal texture

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: lithology domain 2 minor

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: foliated Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine-bearing gabbro, which is foliated. The foliation is defined by the preferred orientation of plagioclase and clinopyroxene. Olivine is completely recrystallized and the subhedral neoblasts display triple junctions. Plagioclase displays undulose extinction and deformation twins. Clinopyroxene is slightly elongated and commonly shows a consertal intergrowth texture. Tiny brown amphibole is interstitial among the clinopyroxene and olivine neoblasts,

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			0.2	subhedral	subequant	completely recrystallized
Plagioclase	55		2.4	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	43		1.6	0.8	anhedral	subequant	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): JL

Comment type	Comment
Mylonite comments:	Sample is mylonitized with substantial amount of neoblastic plagioclase
Vein 1 minerals:	Brown green amphibole vein is present
Vein 2 minerals:	Chlorite veins are also present

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	20		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	20	20		10
Amphibole, green		20		
Chlorite				60
Clay minerals		10		
Clinopyroxene, sec.	n/a	30	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	20
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	10
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Weak foliation is defined by elongated aggregates of clinopyroxene and olivine, and potphyroclasts.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: polygonal to anhedral Grain boundary: straight to curved Undulose extinction: regular and common Subgrains: straight in porphyroclasts Texture: fractured deformed porphyroclasts partially recrystallized; neoblasts form aggregates in association with cpx neoblasts
Plagioclase:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: subhedral porphyroclasts and polygonal to anhedral recrystallized Grain boundary: curved Twinning: igneous and tapered Undulose extinction: regular Texture: deformed porphyroclasts strongly recrystallized; some euhedral undeformed primary plg are chadacrysts included in cpx
Clinopyroxene:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: very rare and weak Texture: fractured porphyroclastic partially recrystallized in aggregates with ol; porphyroclasts may include euhedral undeformed plg

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation defined by recrystallized plagioclase and aggregates of neoblasts of olivine and clinopyroxene.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: not observed Texture: completely recrystallized with fractured neoblasts
Plagioclase:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: subhedral porphyroclasts and polygonal recrystallized Grain boundary: curved Twinning: igneous and tapered Undulose extinction: regular Texture: deformed porphyroclasts recrystallized
Clinopyroxene:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: very rare and weak Texture: fractured and altered porphyroclastic partially recrystallized in aggregates with ol; porphyroclasts may include euhedral undeformed plg

THIN SECTION LABEL ID: **360-U1473A-58R-3-W 101/104-TSB-TS_193** Piece no.: #05 TS no.: 193

Group	Summary
Igneous petrology:	A fine-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. Small amount of orthopyroxene are present either as overgrowth of olivine or intergrowth with clinopyroxene.
Metamorphic petrology:	Total static alteration intensity is moderate. Significant alteration occurs in proximity to chlorite + amphibole veins. Olivine and orthopyroxene are more intensely altered than clinopyroxene and plagioclase.
Structure:	Preserved moderate magmatic fabric weakly overprinted by crystal-plastic deformation with plagioclase locally recrystallized, and minor olivine and clinopyroxene.

Plane-polarized

33213011

Cross-polarized

33213031

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained

Detailed description: A fine-grained olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved. The strong foliation is indicated by the preferred orientation of elongated olivine and plagioclase. Olivine is strongly altered. Occasionally, the overgrowth of orthopyroxene can still be seen at the rim of the relict olivine. Plagioclase is highly recrstallized and displays undulose extinction. Clinopyroxene is partly altered and displays a consertal intergrowth texture, sometimes with orthopyroxene. Tiny brown amphibole is interstitial between olivine, clinopyroxene and plagioclase. Opaque minerals are predominated by sulfides, which commonly occur at the altered rim of olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			0.6	anhedral	elongate	strongly altered
Plagioclase	55		3	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	30		1.2	1	anhedral	subequant	with a consertal intergrowth texture
Amphibole	0.3		0.2	0.1	anhedral	interstitial	
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Olivine is replaced by talc and actinolite at rim or pseudomorphically, and by serpentine or clay at fractures; orthopyroxene by talc and actinolite pseudomorphically, clinopyroxene by amphiboles at rim; plagioclase has microcracks filled with chlorite and amphibole.

Comment type	Comment
Vein 1 minerals:	Chl + Amp

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	10	50	5
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	30	35	50	20
Amphibole, green		10		
Chlorite				60
Clay minerals	5			
Oxide	4	4	4	n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Sulfide	1	1	1	n/a
Talc	50	n/a	45	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Fabric defined by plagioclase and elongated olivine and clinopyroxene.

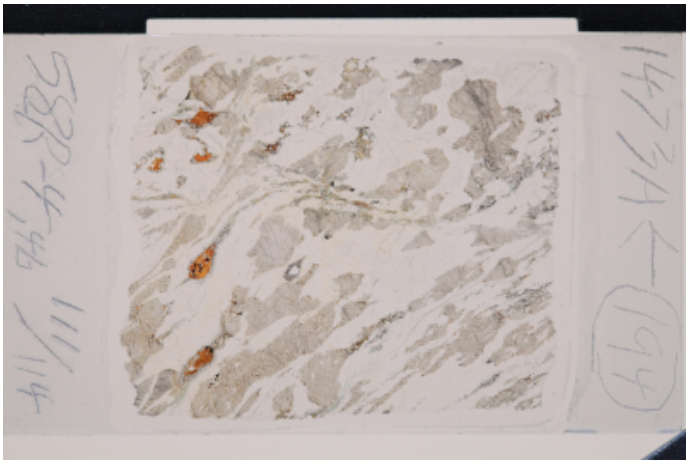
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	moderate	2
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: partially and locally recrystallized, neoblast form aggregates in association with cpx.Magmatic fabric preserved in elongated crystals that define the foliation.
Plagioclase:	Grain size: medium preserved and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Twinning: igneous and tapered Undulose extinction: irregular Subgrains: curved Texture: partially recrystallized; elongated crystals define the foliation.
Clinopyroxene:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Texture: very weakly and locally recrystallized; neoblasts form aggregates in association with ol

THIN SECTION LABEL ID: **360-U1473A-58R-4-W 111/114-TSB-TS_194** Piece no.: #04 TS no.: 194

Group	Summary
Igneous petrology:	An olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved any more, but could be subophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Neoblasts formed by dynamic recrystallization are olivine, clinopyroxene, orthopyroxene and plagioclase. Static alteration intensity is moderate, and minerals indicate amphibolite to subgreenschist facies conditions.
Structure:	Steeply dipping strongly recrystallized porphyroclastic fabric with a normal-sense of shear cross-cut by a sub-horizontal 2 mm thick normal-sense mylonite.

Plane-polarized



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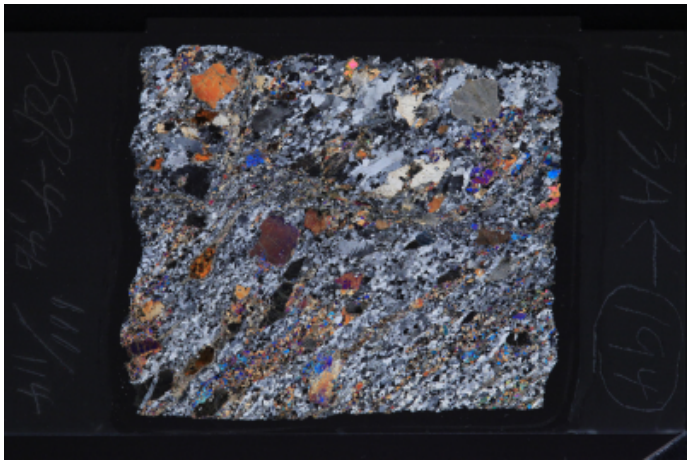
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: An olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved any more, but could be subophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene. The foliation is shown by the preferred orientation of olivine and plagioclase. Olivine is recrystallized and the subequant neoblasts show triple junctions. It is partly or fully altered. Plagioclase is recrystallized and sometimes elongated. It shows undulose extinction. Clinopyroxene is strongly recrystallized but the porphyroclasts display a consertal intergrowth texture with orthopyroxene. Abundant brown amphiboles are interstitial between the olivine and clinopyroxene neoblasts. Opaque minerals are dominated by ilmenite and very tiny magnetite commonly occur with the altered olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			0.6	anhedral	subequant	strongly altered
Plagioclase	59		3.6	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	34		4	2.8	anhedral	subequant	with a consertal texure
Orthopyroxene	0.02		1	0.6	anhedral	subequant	
Amphibole	0.8		0.2	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Dynamically recrystallized neoblasts are olivine, clinopyroxene, orthopyroxene and plagioclase. Olivine is replaced by talc at rim or pseudomorphically, by actinolite at rim and bt clay/serpentine along fractures or pseudomorphically; orthopyroxene by actinolite and talc pseudomorphically; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patcches, blebs and rims, and by clay along cleavage surfaces; and plagioclase by chlorite + actinolite and clay veins and secondary plagioclase patches.

Comment type	Comment
Mylonite comments:	cpx, opx, ol, pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	70	10	50	10
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	10	10	80	10
Amphibole, green		20		
Chlorite				40
Clay minerals	50	10		20
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	4			n/a
Plagioclase, sec.	n/a	n/a	n/a	30
Sulfide	1			n/a
Talc	30	n/a	20	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 95 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Steeply dipping strongly recrystallized porphyroclastic fabric with a normal-sense of shear cross-cut by a sub-horizontal 2 mm thick normal-sense mylonite. The mylonite is completely recrystallized and has amphibole. The porphyroclastic fabric is strongly recrystallized with few porphyroclasts of plagioclase. The pyroxene is relatively undeformed, however there is one large band of olivine and pyroxene neoblasts.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: 1.2-4 mm neoblasts: ~0.3 mm Grain shape: elongated to subhedral. Grain boundary: curved. Undulose extinction: patchy to incomplete. Texture: porphyroclasts decorated with neoblasts.
Plagioclase:	Grain size: porphyroclasts: 1.5-6 mm. neoblasts: 0.05-0.5 mm Grain shape: equigranular. Grain boundary: curved. Twinning: tapered. Subgrains: protrude into adjacent crystals. Undulose extinction: patchy to extinct. Texture: aggregates of neoblasts with few porphyroclasts.
Clinopyroxene:	Grain size: porphyroclasts: 1.5-6 mm. neoblasts: ~0.3 mm. Grain shape: subheral, equigranular. Grain boundary: irregular. Texture: Porphyroclasts with limited recrystallization.

Interval domain no: 2 Domain rel. abundance (%): 5 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	normal-dextral	n/a

Type	Comment
Olivine:	Grain size: neoblasts: ~0.15 mm. Grain shape: equigranular. Grain boundary: curved. Undulose extinction: absent to patchy. Texture: all recrystallized olivine.
Plagioclase:	Grain size: neoblasts: 0.01-0.3 mm. Grain shape: anhedral. Grain boundary: curved. Twinning: tapered to absent. Subgrains: present, curved. Undulose extinction: patchy. Texture: aggretate to elongated to equigranular neoblasts.
Clinopyroxene:	Grain size: ~0.5 mm. Grain shape: anhedral. Grain boundary: irregular. Texture: neoblasts.
Oxide:	Small pods of oxide near pyroxene.

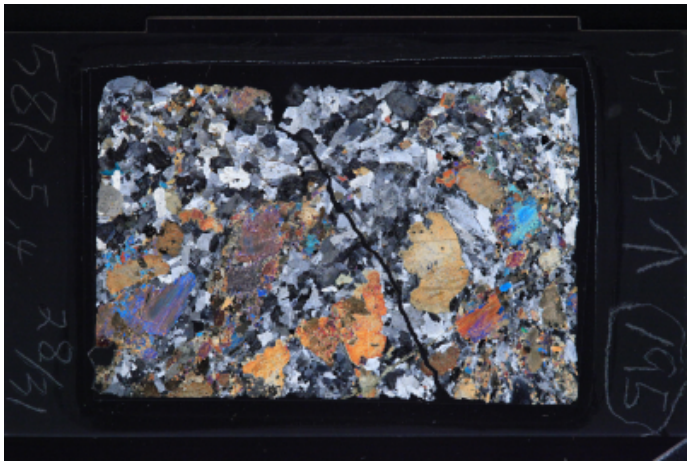
THIN SECTION LABEL ID: **360-U1473A-58R-5-W 28/31-TSB-TS_195** Piece no.: #04 TS no.: 195

Group	Summary
Igneous petrology:	There two domains, i.e., a granular gabbro intruded by a granular diorite. A halo exists between two domains, in which clinopyroxene is strongly replaced by amphibole.
Metamorphic petrology:	Total static alteration intensity is substantial. Clinopyroxene alteration to greenish amphibole is significant along amphibole + chlorite veins in gabbro domain. Plagioclase alteration to secondary plagioclase and epidote is conspicuous in dioritic domain.
Structure:	Fractured and veined. The veins shear the altered pyroxene crystals.

Plane-polarized

33212931

Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a gabbro with granular texture. The tabular plagioclase display magmatic twins and occasionally undulose extinction. Clinopyroxene is recrystallized and highly altered. The porphyroclasts preserve a consertal intergrowth texture and strongly overgrown by brown amphibole. Brown amphibole is also interstitial between the neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		1.8	1	anhedral	tabular	undulose extinction
Clinopyroxene	45		8	5	anhedral	subequant	strongly altered

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a diorite with a granular texture. Plagioclase is euhedral, in a subequant to tabular shape. It occasionally displays an oscillatory zoning. Subhedral amphibole and few magnetites are interstitial between plagioclase. Both zircons and titanite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		2.4	1.2	euhedral	subequant	
Amphibole	10		1.6	0.8	subhedral	subequant	

METAMORPHIC PETROLOGY

Interval domain no: Domain rel. abundance (%): 30 Domain name: diorite

Total rock alteration estimate (%): 60 Observer(s): TN

Detailed description Zoisite + secondary plagioclase patches are dominant at cores of primary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		70		60
Amphibole, green		90		
Chlorite				10
Clay minerals		10		10
Epidote/zoisite	n/a	n/a	n/a	40
Plagioclase, sec.	n/a	n/a	n/a	40
Subtotals replaced		100		100

Interval domain no: Domain rel. abundance (%): 70 Domain name: gabbro

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Green or brownish green amphibole form rims or pseudomorphs after clinopyroxene. Heavily altered along chlorite + amphibole veins.

Comment type	Comment
Vein 1 minerals:	green Amp
Vein 2 minerals:	Chl

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50		50
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		5		5
Amphibole, green		40		
Chlorite				35
Clay minerals		40		
Oxide		4		n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Sulfide		1		n/a
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Patchy undulose extinction.
Oxide:	Small patches of oxide.
Vein:	Amphibole veins, some shear and breakup larger altered pyroxenes.

THIN SECTION LABEL ID: **360-U1473A-58R-8-W 71/77-TSB-TS_196** Piece no.: #02 TS no.: 196

Group	Summary
Igneous petrology:	There are two domains in the thin section. The coarse-grained olivine gabbro displays an ophitic texture and the fine-grained olivine gabbro shows a mylonitic texture. The crosscutting ultramylonite vein contains ca 105 oxides.
Metamorphic petrology:	The rock shows an oxide-rich ultra-mylonite along the contact between a nearly undeformed gabbro and a mylonite. In deformed domains, Pl and Cpx are almost completely recrystallized. The static alteration of the host gabbro is slight.
Structure:	Contact between an undeformed, coarse-grained olivine gabbro and a fine-grained ultramylonite. The ultramylonite is composed of a matrix of recrystallized plagioclase, cpx, olivine, oxides and amphibole (as alteration product).

Plane-polarized

33213171

Cross-polarized

33213191

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: ophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with an ophitic texture. Olivine is moderately altered, but an overgrowth of orthopyroxene can be still seen at the rim. Plagioclase is partly recrystallized and displays undulose extinction and deformation twins. Tabular plagioclase is partly or completely enclosed within clinopyroxene. Clinopyroxene occasionally shows a consertal intergrowth texture and is rimmed by brown amphibole together with ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			3.6	anhedral	elongate	rimmed by orthopyroxene
Plagioclase	50		8	6	anhedral	tabular	undulose extinction
Clinopyroxene	45		10	6	anhedral	poikilitic	
Opaques	0.5						
Ilmenite	0.5						

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro, which is strongly foliated. The foliation is defined by the preferred orientation of olivine and plagioclase. Olivine is strongly altered. Plagioclase is recrystallized and shows undulose extinction. Clinopyroxene is distributed along the foliation and preserves a the consertal intergrowth texture with orthopyroxene. It is also commonly rimmed by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			0.1	anhedral	subequant	strongly altered
Plagioclase	55		1.2	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	39		1	0.8	anhedral	subequant	with a consertal texture

Interval domain no: **3** Domain rel. abundance (%): 10 Domain name: vein

Lithology: **oxide mylonite** Observer: CL

Texture: mylonitic Ave. grain size: fine grained

Detailed description: This is an ultramylonite vein, which contains 10% oxides. Big zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Opaques	10						
Ilmenite	10						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: coarse grained rock

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description The rock shows an oxide-rich ultra-mylonite along the contact between a nearly undeformed gabbro and a mylonite. In deformed domains, Pl and Cpx are almost completely recrystallized. The static alteration of the host gabbro is slight.

Comment type	Comment
Alteration general comments:	The static backgrund alteration is slight.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		3
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		10		30
Chlorite	20			70
Clay minerals		10		
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: mylonite

Total rock alteration estimate (%): 5 Observer(s): RT

Comment type	Comment
Mylonite comments:	Mylonite characterized by recrystallization of almost complete recrystallization of Pl and Cpx. Cpx neoblasts are associates with brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		10		2
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		50		30
Chlorite				70
Subtotals replaced		100		100

Interval domain no: 3 Domain rel. abundance (%): 10 Domain name: ultramylonite

Total rock alteration estimate (%): Observer(s): RT

Comment type	Comment
Alteration general comments:	Brown is locally rimmed by green amphibole.
Mylonite comments:	Contact between nearly undeformed rock and mylonite. The ultra-mylonite is fine-grained and rich in oxides, and locally brown Amp-bearing.

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 40 Domain name:

Microstructure: crystal-plastic Observer: GV

Detailed description Contact between an undeformed, coarse-grained olivine gabbro and a fine-grained ultramylonite. The ultramylonite is composed of a matrix of recrystallized plagioclase, cpx, olivine, oxides and amphibole (as alteration product). The foliation is defined by the alignment of the recrystallized phases. Towards the contact with the gabbro, the grain size decreases and a layer of thin patches of oxides is observed. Cpx porphyroclasts are commonly rimmed by alteration products. Plagioclase is recrystallized into an ultrafine-grained matrix at the contact zone.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	ultramylonitic [CPF_fabric]	5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: fine shape: anhedral boundaries: curved undulose extinction: irregular texture: fine-grained recrystallized grains composing the matrix of the ultramylonite.
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: tapered undulose extinction: irregular texture: fine recrystallized grains forming the matrix of the rock. At the contacts the matrix becomes ultrafine-grained in contact with oxides and alteration products.
Clinopyroxene:	size: fine shape: anhedral boundaries: straight to curved fractures: common texture: fine recrystallized grains mixed in the matrix and also rimming porphyroclasts.
Oxide:	geometry: dispersed patches in the fine-grained matrix.

Interval domain no: 2 Domain rel. abundance (%): 60 Domain name:

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved undulose extinction: irregular fractures: common texture: medium grains fractured and partially altered.
Plagioclase:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved twinning: tapered (magmatic locally preserved) undulose extinction: irregular textures: subhedral grains in a random orientation.

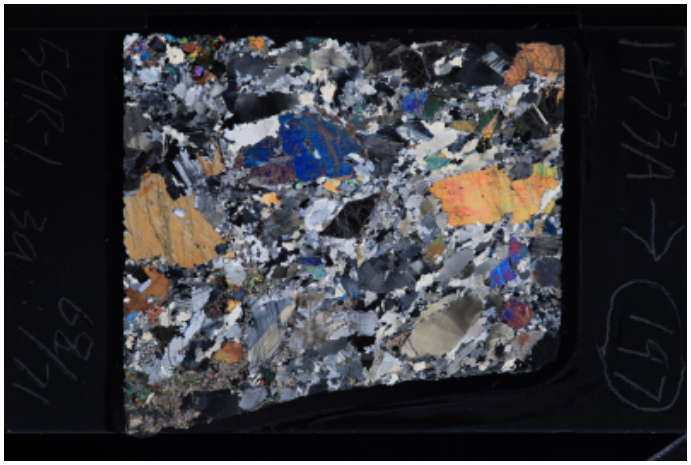
THIN SECTION LABEL ID: **360-U1473A-59R-1-W 68/71-TSB-TS_197** Piece no.: #03 TS no.: 197

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is recrystallized and strongly altered. Plagioclase is commonly in a tabular shape, which is partly or fully enclosed within clinopyroxene. Clinopyroxene is partly recrystallized and the porphyroclasts show a consertal intergrowth texture.
Metamorphic petrology:	The alteration intensity of this thin section is substantial.
Structure:	Subophitic, weakly deformed olivine gabbro with recrystallized plagioclase.

Plane-polarized

33212871

Cross-polarized



33212911

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is recrystallized and strongly altered, but the overgrowth by clinopyroxene can still be seen. Plagioclase is commonly in a tabular shape, which is partly or fully enclosed within clinopyroxene. It is also partly recrystallized and displays undulose extinction. Deformation twins are common in plagioclase. Clinopyroxene is partly recrystallized and the porphyroclasts show a consertal intergrowth texture. Brown amphibole is interstitial between clinopyroxene and plagioclase, or occurs as blebs among clinopyroxene neoblasts. Very few opaque minerals are present, but tiny sulfides and magnetite occur together with the altered olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			1.2	anhedral	subequant	strongly altered
Plagioclase	64		7.6	4	anhedral	tabular	undulose extinction
Clinopyroxene	30		8	7	anhedral	poikilitic	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Ol mainly altered into assemblage of talc, oxide and colorless amphibole. It showed talc pseudomorph with oxides and carbonate pseudomorph. Amphibole replacement was dominant after Cpx. Pl was mostly replaced by secondary plagioclase with minor colorless amphibole occurring in the cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	25		35
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	7	70		5
Amphibole, green		10		
Carbonate	35	n/a	n/a	n/a
Chlorite				10
Clay minerals	10	10		
Oxide	8			n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

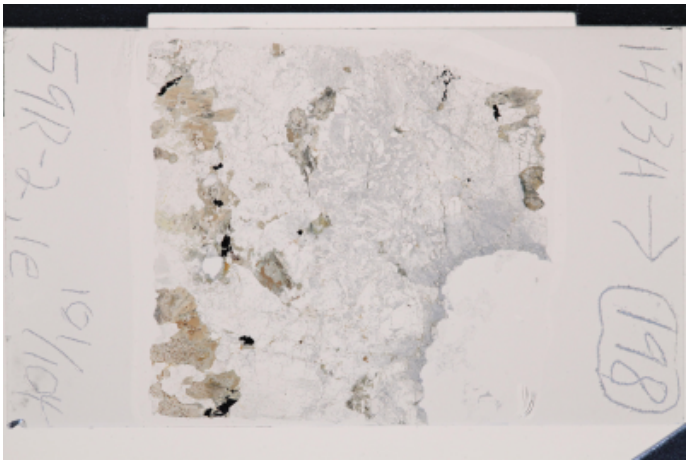
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:		0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium- to fine-grained; Grain shape: anhedral; Grain boundary: straight to curved, altered; Undulose extinction: irregular; Texture: fractured and extensively altered;
Plagioclase:	Grain size: medium- to coarse-grained porphyroclasts, medium- to fine-grained neoblasts; Grain shape: subhedral to anhedral porphyroclasts, anhedral neoblasts; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: porphyroclasts encompassed by neoblasts
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: Texture: clinopyroxene oikocrysts with (tabular) plagioclase chadacrysts, minor recrystallization at clinopyroxene grain boundaries
Oxide:	interstitial oxides associated to olivine alteration

THIN SECTION LABEL ID: **360-U1473A-59R-2-W 101/104-TSB-TS_198** Piece no.: #01 TS no.: 198

Group	Summary
Igneous petrology:	A trondhjemite mainly consists of plagioclase and quartz, which displays a graphic texture.
Metamorphic petrology:	The trondhjemite is strongly altered. Plagioclase is mostly recrystallized to secondary plagioclase, intensely filled with cloudy, dusty material. Amphibole is altered to actinolite. Background alteration as overgrowth on grain boundaries consist of actinolite, chlorite, clay, oxide, secondary titanite, secondary oxides.

Plane-polarized



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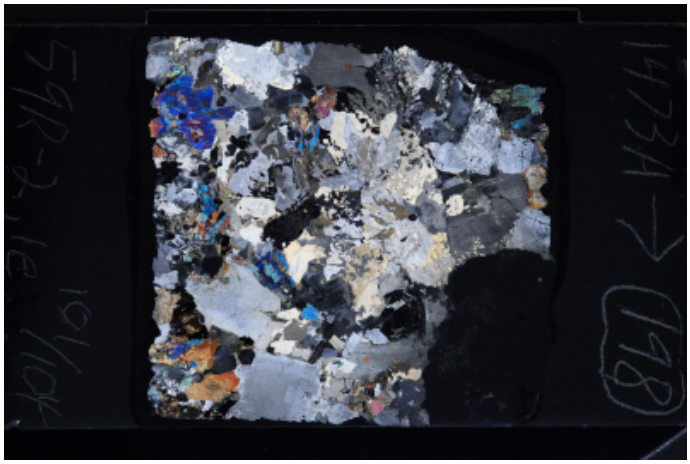
Cross-polarized



33212851

IGNEOUS PETROLOGY

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A granular trondhjemite. It mainly consists of plagioclase and quartz. Plagioclase is in a tabular to subequant shape and occasionally displays an oscillatory zoning. It shows a graphic texture with quartz. It also contains small amount of amphibole. Euhedral apatite, zircon and titanite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	65		5.6	4	anhedral	tabular	
Amphibole	5		1	0.8	anhedral	subequant	
Quartz	30		4	2.4	anhedral	subequant	showing a graphic texture with plagioclase

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s): JK

Detailed description The trondhjemite is strongly altered. Plagioclase is mostly recrystallized to secondary plagioclase, intensely filled with cloudy, dusty material. Amphibole is altered to actinolite. Background alteration as overgrowth on grain boundaries consisting of actinolite, chlorite, clay, oxide, secondary titanite, secondary oxides.

Comment type	Comment
Alteration general comments:	The trondhjemite is strongly altered. Plagioclase is mostly recrystallized to secondary plagioclase, intensely filled with cloudy, dusty material. Amphibole is altered to actinolite. Background alteration as overgrowth on grain boundaries consisting of actinolite, chlorite, clay, oxide, secondary titanite, secondary oxides.
Vein 1 minerals:	actinolite
Vein 2 minerals:	chlorite
Vein 3 minerals:	clay

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Vein:	policrystalline felsic vein with plagioclase, quarz and minor zircon.

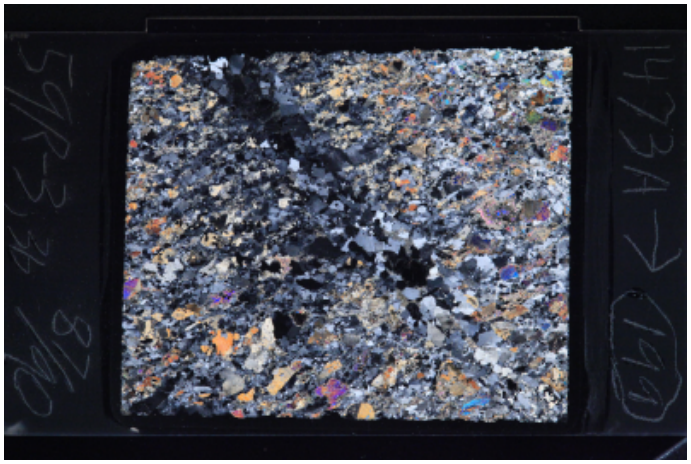
THIN SECTION LABEL ID: **360-U1473A-59R-3-W 87/90-TSB-TS_199** Piece no.: #03 TS no.: 199

Group	Summary
Igneous petrology:	An olivine gabbro intruded by a trondhjemite vein. The primary magmatic texture of the gabbro is not preserved and the trondhjemite shows a granular texture.
Metamorphic petrology:	The gabbro intruded by the trondhjemite is slightly to moderately altered. The trondhjemite is strongly altered: Plagioclase is mostly recrystallized to secondary plagioclase, intensely filled with cloudy, dusty material. Amphibole is altered to actinolite. Background alteration as overgrowth on grain boundaries consist of actinolite, chlorite, clay, secondary oxides.
Structure:	Porphyroclastic olivine gabbro with trondhjemite vein.

Plane-polarized

33212791

Cross-polarized



33212811

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 80 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is an olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. The foliation is defined by the preferred orientation of both plagioclase and clinopyroxene. Olivine is commonly altered and tiny sulfides occur within the altered rims. Plagioclase is elongated and shows undulose extinction. Deformation twins can be occasionally seen. Clinopyroxene is strongly altered, but a consertal intergrowth texture is preserved in some porphyroclasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.6	anhedral	subequant	strongly altered
Plagioclase	60		5	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	35		2.8	1.6	anhedral	subequant	strongly altered

Interval domain no: **2** Domain rel. abundance (%): 20 Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a trondhjemite vein with a granular texture. It consists of plagioclase and quartz and both of them display undulose extinction. Both zircon and titanite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		2	1	subhedral	subequant	undulose extinction
Quartz	30		3.2	1.2	anhedral	subequant	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 90 Domain name: olivine gabbro

Total rock alteration estimate (%): 20 Observer(s): JK

Detailed description The gabbro intruded by the trondhjemite is slightly to moderately altered. The trondhjemite is strongly altered. Plagioclase is mostly recrystallized to secondary plagioclase, intensely filled with cloudy, dusty material. Amphibole is altered to actinolite. Background alteration as overgrowth on grain boundaries consist of actinolite, chlorite, clay, secondary oxides.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the trondhjemite is slightly to moderateley altered

Interval domain no: 2 Domain rel. abundance (%): 10 Domain name: trondhjemite

Total rock alteration estimate (%): 50 Observer(s): JK

Comment type	Comment
Alteration general comments:	The trondhjemite is strongly altered. Plagioclase is mostly recrystallized to secondary plagioclase, intensely filled with cloudy, dusty material. Amphibole is altered to actinolite. Background alteration as overgrowth on grain boundaries consisting of actinolite, chlorite, clay, secondary oxides.
Vein 1 minerals:	actinolite
Vein 2 minerals:	clay

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: submagmatic Observer: OP

Type	Comment
Plagioclase:	Grain size: medium- to coarse-grained; Grain shape: granular; Grain boundary: straight to curved; Texture: granular plagioclase in felsic vein

Interval domain no: 2 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: submagmatic Observer: OP

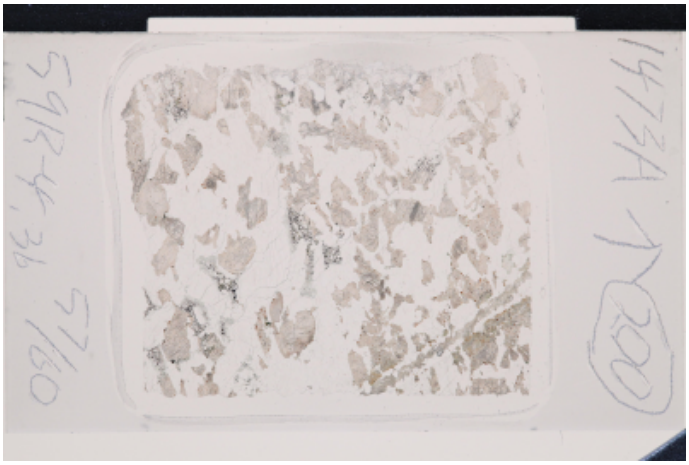
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: curved, alterd; Texture; fractured and partly to fully altered olivine
Plagioclase:	Grain size: medium-grained porphyroclasts, fine-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: porphyroclastic plagioclase with some neoblasts
Clinopyroxene:	Grain size: medium- to coarse-grained; Grain shape: anhedral to subhedral; Grain boundary: straight to curved, altered; Undulose extinction: irregular; Texture: partly altered clinopyroxene porphyroclasts with neoblasts
Oxide:	oxides associated to olivine alteration

THIN SECTION LABEL ID: **360-U1473A-59R-4-W 57/60-TSB-TS_200** Piece no.: #03 TS no.: 200

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro. The primary magmatic texture is not preserved but could be subophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock shows a substantial recrystallization of Ol and Pl into nearly polygonal aggregates; Cpx is only locally recrystallized, with Cpx neoblasts associated with minor brown Amp and oxide phases. The rock is crosscut by a thin felsic vein. The inner portion of the vein consists of acicular pale-green to green amphibole probably related to late re-opening of the vein. The static alteration of the host rock is moderate and confined to Ol and Pl.
Structure:	Weak to moderate magmatic fabric overprinted by weak to moderate crystal plastic fabric.

Plane-polarized



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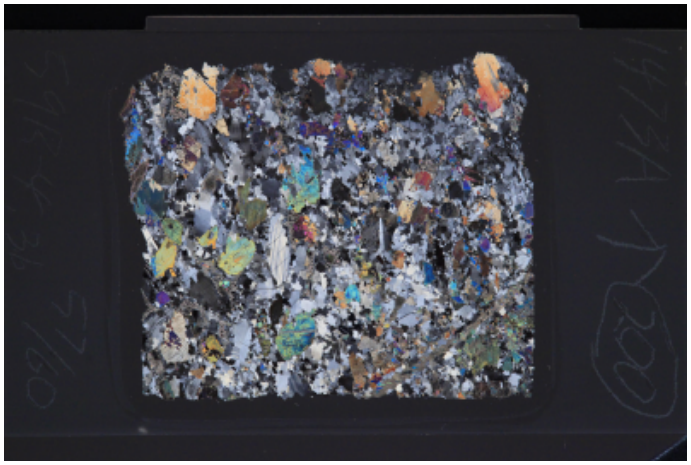
Cross-polarized



33212751

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved but could be subophitic, as tabular plagioclase is partly or fully enclosed within clinopyroxene. Olivine is strongly altered. Plagioclase is recrystallized and displays undulose extinction and deformation twins. Clinopyroxene is partly recrystallized and brown amphiboles are interstitial among the neoblasts. Very few opaque minerals are present and tiny sulfides occur with the altered olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			1	anhedral	subequant	strongly altered
Plagioclase	55		5.6	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	38		4.2	1.6	anhedral	subequant	with a consertal intergrowth texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): RT

Detailed description Ol and Pl substantially recrystallized in nearly polygonal aggregates. Cpx locally recrystallized, with Cpx neoblasts associated with minor brown Amp and oxide phases. Felsic vein including euhedral to subhedral Pl and minor brown Amp. Cpx from host gabbro rimmed by brown to brown green Amp along the contact with the felsic vein. The inner portion of the vein consists of acicular pale-green to green amphibole probably related to late re-opening of the vein. The static alteration of the gabbro is moderate and confined to Ol and Pl.

Comment type	Comment
Alteration general comments:	The static alteration is moderate and confined to Ol and Pl.
Mylonite comments:	Ol and Pl substantially recrystallized in nearly polygonal aggregates. Cpx locally recrystallized, with Cpx neoblasts associated with minor brown Amp and oxide phases.
Vein 1 minerals:	Felsic vein including euhedral to subhedral Pl and minor brown Amp. Cpx from host gabbro rimmed by brown to brown green Amp along the contact with the felsic vein. The inner portion of the vein consists of acicular pale-green to green amphibole probably related to late re-opening of the vein.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	45	15		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		20
Chlorite	20	10		80
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Weak to moderate magmatic fabric overprinted by weak to moderate crystal plastic fabric. The plagioclase and pyroxene define the foliation. Plagioclase has weak recrystallization and well developed subgrain boundaries.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	moderate	2
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: 1-3 mm. Grain shape: anhedral. Grain boundary: curved. Undulose extinction: complete, rectilinear. Texture: anhedral, porphyroclastic.
Plagioclase:	Grain size: porphyroclasts: 1.5-8 mm. neoblasts: ~0.15 mm. Grain shape: elongated to anhedral. Grain boundary: curved. Twinning: tapered. Subgrains: developed as protrusions into other crystals. Undulose extinction: patchy. Texture: elongated defining a foliation, with limited recrystallization.
Clinopyroxene:	Grain size: 1-6 mm Grain shape: subhedral. Grain boundary: irregular. Texture: primary igneous texture.
Vein:	Amphibole vein crosscuts the sample. Not sheared.

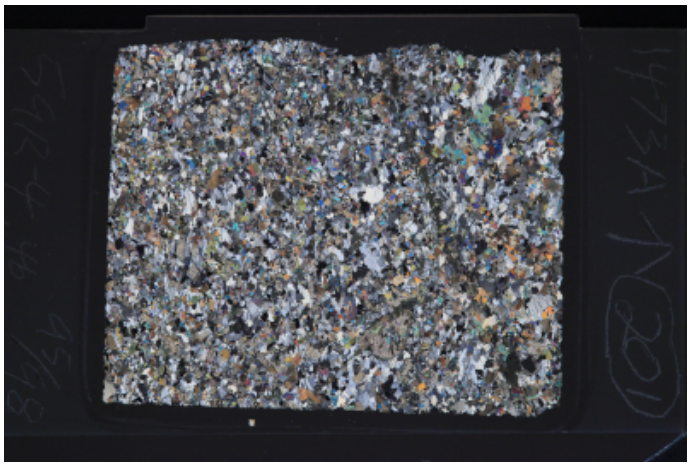
THIN SECTION LABEL ID: **360-U1473A-59R-4-W 95/98-TSB-TS_201** Piece no.: #04 TS no.: 201

Group	Summary
Igneous petrology:	A fine-grained olivine gabbro with a granular texture. A igneous lamination is shown by the shape preferred orientation of both plagioclase and clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is substantial.
Structure:	Moderate sub-horizontal magmatic fabric defined by elongated plagioclase

Plane-polarized

33212691

Cross-polarized



33212711

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: A fine-grained olivine gabbro with a granular texture. A igneous lamination is shown by the shape preferred orientation of both plagioclase and clinopyroxene. Olivine is completely altered. Plagioclase shows undulose extinction. Clinopyroxene is partly altered and a consertal intergrowth texture with orthopyroxene is occasionally preserved. Brown amphibole commonly associates with the clinopyroxene neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10						completely altered
Plagioclase	52		1.6	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	38		2	0.8	anhedral	subequant	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Ol totally altered into talc pseudomorphs with colorless amphibole. Cpx was replaced by secondary Cpx, colorless amphibole, brown amphibole with clay pervasive occurring in the cleavages of Cpx. Pl mainly altered into secondary Pl and chlorite. Chlorite occurred along the boundaries among Pl crystals.

Comment type	Comment
Vein 1 minerals:	Several chlorite veins were observed and most of them showing brownish color may mix with some clay.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	30		30
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	35	40		
Chlorite				30
Clay minerals		40		
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	65	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Detailed description Moderate sub-horizontal magmatic fabric defined by elongated plagioclase. No crystal plastic overprint. There are fractures that run through the sample, at high angle to the inclined vein.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Undulose extinction: patchy and weak. Twinning: magmatic, some tapered.
Vein:	Inclined vein, not sheared.

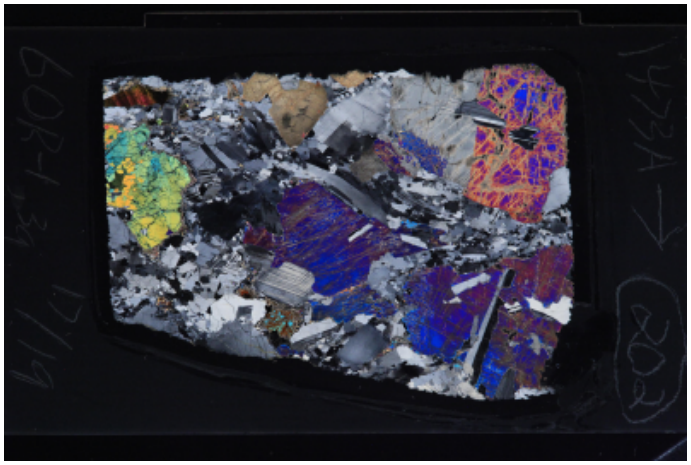
THIN SECTION LABEL ID: **360-U1473A-60R-1-W 17/19-TSB-TS_202** Piece no.: #03 TS no.: 202

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is moderately altered. Predominant secondary phases observed are chlorite, talc, actinolite/tremolite and reddish clay minerals.
Structure:	Strongly deformed and weakly foliated. Olivine and plagioclase are deformed, and clinopyroxene is undeformed.

Plane-polarized

33227631

Cross-polarized



33227671

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. The olivine rim is commonly altered, but overgrowth of orthopyroxene can be seen. Plagioclase is partly recrystallized and displays undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within clinopyroxene, which occasionally shows a consertal intergrowth texture with orthopyroxene. Very few ilmenite is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			4.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	52		11	4	anhedral	tabular	undulose extinction
Clinopyroxene	36		12	8	anhedral	poikilitic	with a consertal intergrowth texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Sample is moderately altered. Olivine is the most altered phase, with some grains completely altered into talc + actinolite or reddish clays. Plagioclase-Olivine corona structures of talc + magnetite, actinolite and chlorite are conspicuous. Cpx is mostly transformed into 2nd Cpx, brown amphibole and late stage clay overprints. Plag is only slightly altered into mostly chlorite microveins.

Comment type	Comment
Vein 1 minerals:	Chlorite-clay vein cuts chlorite microveins in plagioclase grains
Vein 2 minerals:	chlorite microveins in plagioclase grains

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	20		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	15	10		
Chlorite				70
Clay minerals	50	40		10
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

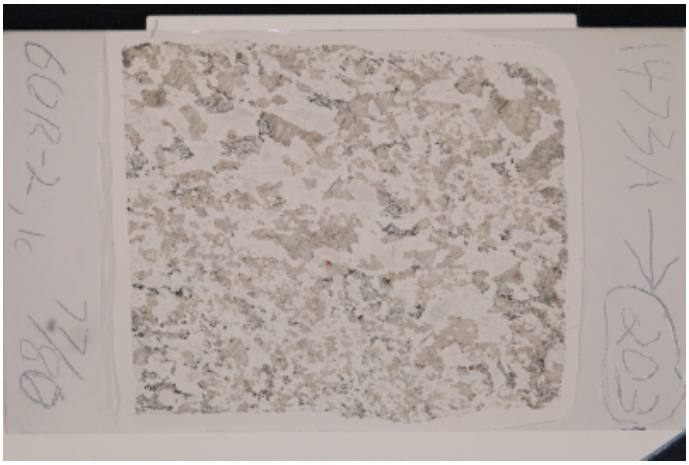
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: fractured and partially altered
Plagioclase:	Grain size: coarse preserved and medium recrystallized Grain shape: anhedral Grain boundary: straight to curved Twinning: tapered Undulose extinction: irregular texture: deformed porphyroclasts strongly recystallized; chadacrysts included in clinopyroxene oikocryst are undeformed
Clinopyroxene:	Grain size: coarse Grain shape: poikilitic Grain boundary: straight Texture: undeformed, oikocryst including subhedral plg chadacryst

THIN SECTION LABEL ID: **360-U1473A-60R-2-W 77/80-TSB-TS_203** Piece no.: #01 TS no.: 203

Group	Summary
Igneous petrology:	There are two domains, a medium- and fine-grained olivine gabbro. The primary magmatic textures of both domains are not preserved. The medium-grained olivine gabbro probably had a primary texture of subophitic, as subhedral plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	Sample is moderately altered. Many olivine grains are completely altered into greenschist assemblages.
Structure:	Moderate magmatic fabric, weakly overprinted by locally distributed crystal-plastic deformation. Fine grained and medium grained-domain show low recrystallizzation of olivine and plagioclase, and minor clinopyroxene.

Plane-polarized



33227591

Cross-polarized

33227611

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved but is very likely to be subophitic, as subhedral plagioclase is partly enclosed within clinopyroxene. Olivine is rimmed by orthopyroxene. It is partly recrystallized and altered. Plagioclase is strongly recrystallized and displays undulose extinction and deformation twins. Clinopyroxene displays a consertal intergrowth texture. Brown amphibole commonly occurs as an interstitial phase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		3.6	1	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	32		4	2.4	anhedral	subequant	with a consertal intergrowth texture

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Both plagioclase and olivine are completely recrystallized. Olivine is also elongated and partly altered. Plagioclase displays undulose extinction. Clinopyroxene is partly recrystallized and preserve a consertal intergrowth texture. Tiny brown amphibole associates with the neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.6	anhedral	elongate	partly altered
Plagioclase	55		1.2	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	40		2.6	0.8	anhedral	subequant	with a consertal intergrowth texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Sample is moderately altered. A number of olivine grains are completely altered into talc + magnetite + tremolite. Primary Cpx is substantially replaced by 2nd Cpx. Plag is only slightly altered.

Comment type	Comment
Vein 1 minerals:	chlorite microveins

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	40	30		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	20	10		
Chlorite				100
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	20			n/a
Talc	50	n/a		n/a
Subtotals replaced	100	90		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name:

Microstructure: magmatic Observer: CF

Detailed description Fabric defined by elongated pyroxene and plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	moderate	2
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved and altered Undulose extinction: regular Subgrains: straight Texture: fractured and altered; at grain boundaries partially and very locally recrystallized
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: straight to curved Twinning: igneous and tapered Undulose extinction: regular Texture: preserved magmatic texture with partial and locally overprint of crystal-plastic deformation
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: elongated crystals define the fabric; locally recrystallized at grain boundary

Interval domain no: 2 Domain rel. abundance (%): 70 Domain name:

Microstructure: magmatic Observer: CF

Detailed description Fabric defined by elongated pyroxene and plagioclase, and minor olivine.

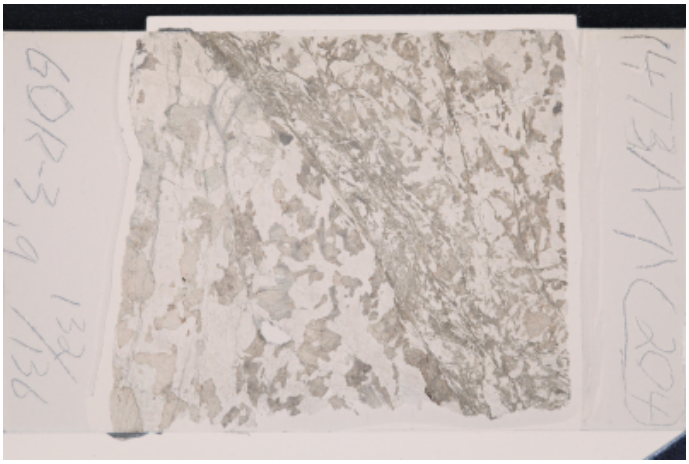
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	moderate	2
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: straight to curved and altered Undulose extinction: weak Subgrains: straight Texture: fractured and altered; at grain boundaries partially and very locally recrystallized
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: straight to curved Twinning: igneous and tapered Undulose extinction: regular Texture: preserved magmatic texture with partial and locally overprint of crystal-plastic deformation
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: undeformed and elongated crystals that define the fabric

THIN SECTION LABEL ID: **360-U1473A-60R-3-W 132/136-TSB-TS_204** Piece no.: #09 TS no.: 204

Group	Summary
Igneous petrology:	There are two mains, medium- and fine-grained gabbros, crosscut by a mylonite vein. The medium-grained gabbro probably has a primary texture of subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. The fine-grained gabbro is highly foliated and does not preserve the primary texture.
Metamorphic petrology:	Greenschist facies alteration is more intense in fine-grained domain and cataclastic zone. A carbonate vein cuts the cataclastic zone.
Structure:	There is an alteration vein crosscutting a coarse-grained gabbro. The vein is primarily composed of alteration products and medium to fine plagioclase and cpx fragments.

Plane-polarized



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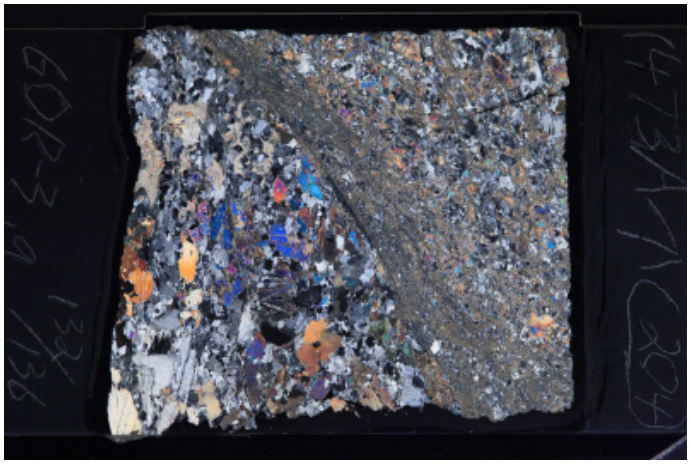
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1 major

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained gabbro with porphyroclastic texture. The primary magmatic texture is likely to be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. It is slightly foliated, as both plagioclase and clinopyroxene are oriented in a preferred direction. Plagioclase is strongly recrystallized and displays undulose extinction and deformation twins. Clinopyroxene occasionally displays a consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	65		4.4	1.6	anhedral	subequant	undulose extinction
Clinopyroxene	35		4	3.6	anhedral	subequant	with a consertal intergrowth texture

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: lithology domain 2 minor

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained

Detailed description: This domain is a fine-grained gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Both plagioclase and clinopyroxene are recrystallized and strongly foliated. Plagioclase displays undulose extinction and deformation twins. Clinopyroxene is highly altered.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		2	1	anhedral	subequant	undulose extinction
Clinopyroxene	40		2.8	1	anhedral	elongate	

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: Ol gabbro

Total rock alteration estimate (%): 20 Observer(s): TN

Detailed description Olivine replaced by actinolite + talc pseudomorph; clinopyroxene by secondary clinopyroxene and brown amphibole patches and colorless amphibole rims; plagioclase by chlorite, actinolite and secondary plagioclase along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	5		10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	20	40		10
Chlorite	10			40
Clinopyroxene, sec.	n/a	30	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Talc	70	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: altered gabbro

Total rock alteration estimate (%): 60 Observer(s): TN

Detailed description Colorless amphibole and secondary plagioclase are abundant. Evidence for original olivine is not observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		60		60
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		80		10
Chlorite				40
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description There is an alteration vein crosscutting a coarse-grained gabbro. The vein is primarily composed of alteration products and medium to fine plagioclase and cpx fragments. Plagioclase is partially altered and also recrystallized to fine-grained aggregates. The vein walls may propagate into the host gabbro; a medium grained foliation is observed where alteration products develop thin bands concordant with the overall strain field.

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: medium shape: subhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular texture: coarse to medium fractured grains, partially altered.
Clinopyroxene:	size: medium shape: subhedral boundaries: straight to curved fractures: common texture: coarse fractured grains.

Microstructure: metamorphic Observer: OP

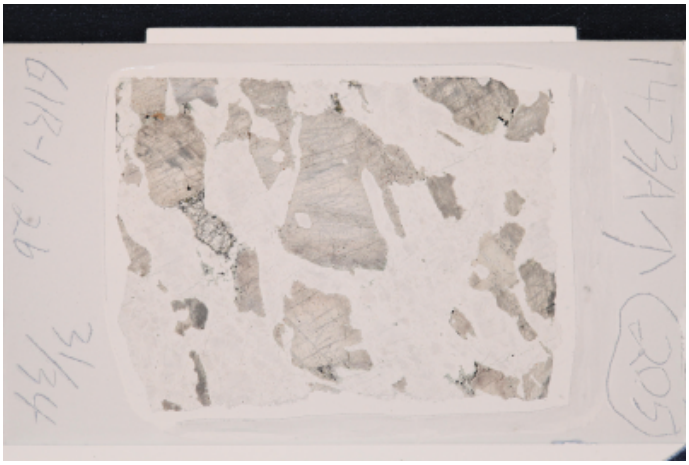
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: tapered (locally observed in medium clasts) undulose extinction: irregular texture: medium to fine fragments and recrystallized grains contained in alteration vein.
Clinopyroxene:	size: medium to fine shape: anhedral boundaries: curved fractures: rare texture: bent cleavage planes, partially altered crystals and recrystallized grains.

THIN SECTION LABEL ID: **360-U1473A-61R-1-W 31/34-TSB-TS_205** Piece no.: #02 TS no.: 205

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing gabbro with a subophitic texture. Subhedral plagioclase is partly or fully enclosed within clinopyroxene, which commonly shows a consertal intergrowth texture with orhtopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is substantial.
Structure:	Moderate magmatic fabric overprinted by weak crystal plastic deformation.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine-bearing gabbro with a subophitic texture. Olivine is recrystallized and moderately altered. It is rimmed by orthopyroxene. Plagioclase is highly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene, which commonly shows a consertal intergrowth texture with orhtopyroxene. Small amount of ilmenite, together with brown amphibole, occur at the rim of olivine and clinopyroxene. Tiny sulfide occurs with the altered olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			0.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	65		8	2.4	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	32		10	6	anhedral	poikilitic	showing a consertal intergrowth with orthopyroxene
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Ol partly altered into talc with oxides, as well as colorless amphibole. Ol relics exhibited mesh textures. Px mainly altered into colorless amphibole. Tiny colorless amphibole was pervasive in the cleavages and along the edges of Cpx mixing with clay. Pl were mostly replaced by secondary Pl with minor tiny colorless amphibole occurring in the micro-fractures of Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	25	20	35
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	10	50	90	10
Clay minerals	20	40	10	5
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc	55	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Moderate magmatic fabric overprinted by weak crystal plastic deformation. Plagioclase porphyroclasts are elongated with magmatic twinning mantled by aggregates of equigranular neoblasts. Pyroxene and olivine form porphyroclasts with limited recrystallization.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	moderate	2
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~1 mm. neoblasts: ~0.15 mm. Grain shape: equigranular. Grain boundary: curved. Undulose extinction: complete. Texture: one porphyroclast mantled with neoblasts elongated parallel to the foliation.
Plagioclase:	Grain size: porphyroclasts: 0.5-4 mm. neoblasts: ~0.1 mm. Grain shape: elongated porphyroclasts, equigranular neoblasts. Grain boundary: serrate Twinning: magmatic to tapered. Undulose extinction: patchy, better developed in larger crystals. Subgrains: large patches defined by undulose extinction. Texture: elongated porphyroclasts mantled by aggregates of neoblasts.
Clinopyroxene:	Grain size: porphyroclats: ~5 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular. Texture: porphyroclastic with limited recrystallization.

THIN SECTION LABEL ID: **360-U1473A-61R-3-W 100/103-TSB-TS_206** Piece no.: #03 TS no.: 206

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. It has been slightly deformed. Olivine, plagioclase and clinopyroxene were partly recrystallized. Tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is slightly altered. Common assemblages observed are 2nd Cpx after primary Cpx and the plagioclase-olivine coronitic assemblage consisting of talc + tremolite + chlorite + oxide.
Structure:	Weakly deformed olivine gabbro with partly recrystallized plagioclase, olivine and clinopyroxene.

Plane-polarized

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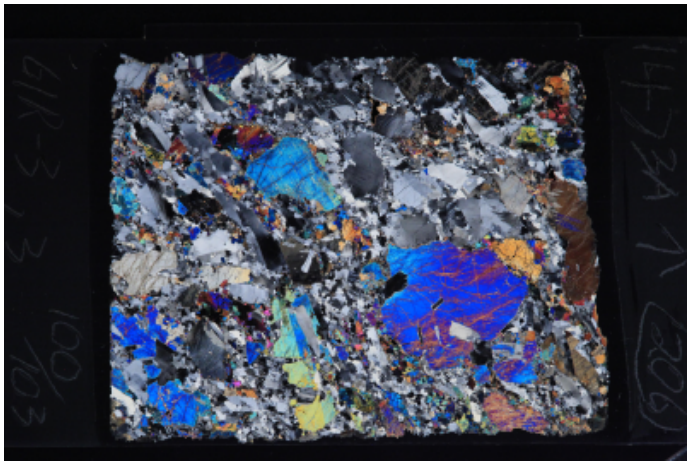
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. It has been slightly deformed. Olivine, plagioclase and clinopyroxene were partly recrystallized. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Olivine is rimmed by brown amphibole with opaque minerals and occasionally by pyroxenes. The olivine neoblasts are subhedral and displays triple junctions. Plagioclase commonly shows undulose extinction and deformation twins. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene, and is rimmed by brown amphibole. Brown amphibole also occurs as blebs interstitial among the clinopyroxene neoblasts. Opaque minerals are predominated by ilmenite, with minor sulfides. They commonly have corona of brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			0.6	subhedral	subequant	rimmed by orthopyroxene and brown amphibole
Plagioclase	45		6.4	3.6	anhedral	tabular	undulose extinction
Clinopyroxene	45		10	5	anhedral	poikilitic	with a consertl intergrowth texture
Amphibole	0.2		0.6	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Sample is slightly altered. Common alteration assemblages observed are the talc + magnetite + tremolite + chlorite coronitic assemblage between olivine and plagioclase. 2nd Cpx replacement after primary Cpx is conspicuous.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	20		5
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		10		
Chlorite				100
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium- to coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: curved; Undulose extinction: irregular; Subgrains: straight to curved; Texture: olivine phenocrysts with neoblasts and some olivine aggregates
Plagioclase:	Grain size: coarse-grained porphyroclasts, medium- to fine-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: porphyroclasts with neoblasts
Clinopyroxene:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: clinopyroxene oikocrysts with plagioclase chadacrysts and some secondary clinopyroxene at grain boundaries
Oxide:	rare interstitial oxide pods; oxides mainly associated to olivine alteration

THIN SECTION LABEL ID: **360-U1473A-61R-4-W 31/35-TSB-TS_207** Piece no.: #01 TS no.: 207

Group	Summary
Igneous petrology:	There are two mains in the thin section, an oxide olivine gabbronorite and an olivine gabbro. Both domains are highly foliated and their primary magmatic textures are not preserved. A primary subophitic texture can be inferred for both domains, as subhedral plagioclase is partly or fully enclosed within clinopyroxene in both domains.
Metamorphic petrology:	The mylonite is characterized by almost complete recrystallization of Pl and Ol, whereas Cpx and Opx are only locally recrystallized. The static alteration is overall slight.
Structure:	Fine-grained mylonite with a dominant porphyroclastic texture.

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology domain 1 major

Lithology: **oxide gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a oxide olivine gabbronorite with a porphyroclastic texture. The primary texture might be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. A strong foliation is defined by the preferred orientation of olivine, plagioclase and pyroxenes. Both olivine and plagioclase are completely recrystallized. Plagioclase displays undulose extinction. Opaque minerals mainly consist of ilmenite and magnetite, with minor sulfides. Although they occasionally occur as inclusions within pyroxenes, they are commonly distributed along the foliation and occur within the pressure shadows of pyroxenes.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.1	subhedral	subequant	completely recrystallized
Plagioclase	45		0.4	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	27		5.6	4	anhedral	poikilitic	
Orthopyroxene	18		20	4	anhedral	elongate	
Opaques	5						
Magnetite	3						
Ilmenite	1.8						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a olivine gabbro with a porphyroclastic texture. The primary magmatic texture could be subophitic, as subhedral plagioclase is partly enclosed within clinopyroxene. Olivine is recrystallized and partly altered. Aggregates of clinopyroxene neoblasts are common around clinopyroxene. Plagioclase is recrystallized and displays undulose extinction. The plagioclase porphyroclasts show deformation twins. Clinopyroxene occasionally shows a consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1	anhedral	subequant	
Plagioclase	60		4.4	0.4	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	35		6.8	4	anhedral	subequant	showing a consertal intergrowth texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): RT

Detailed description The mylonite is characterized by almost complete recrystallization of Pl and Ol, whereas Cpx and Opx are only locally recrystallized. The static alteration is overall slight.

Comment type	Comment
Alteration general comments:	Static alteration is slight.
Mylonite comments:	The mylonite is characterized by almost complete recrystallization of Pl and Ol. Cpx and Opx are locally recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	10	10	5
Amphibole, colorless		50	70	30
Clay minerals	100	50	30	70
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description Fine-grained mylonite with a dominant porphyroclastic texture.Olivine grains are partially recrystallized and mixed in the fine-grained matrix. Cpx clasts have local sigmoid shapes and bent cleavage planes. Recrystallized cpx may rim previous clasts and is also observed as part of the fine grained matrix. Plagioclase is completely recrystallized into a fine-grained matrix, but some local porphyroclasts can be observed. The differences in plagioclase grain size within the sample derive from the presence of plagioclase layers at the mesoscale.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular fractures: common texture: anhedral porphyroclasts rimmed by tails of recrystallized grains that also form the matrix.
Plagioclase:	size: fine shape: anhedral boundaries: curved to straight twinning: tapered (locally observed due to fine grain size) undulose extinction: rare texture: fine recrystallized aggregates forming the matrix of the rock. Also observed as fine-grained recrystallized layers (slightly coarser grain size).
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: medium-grained porphyroclasts with local sigmoid shapes immersed in the fine-grained matrix. Recrystallized grains are mixed with plagioclase and may be associated with oxides.
Oxide:	geometry: pods with irregular shapes associated with cpx. Locally oriented parallel to the foliation.

THIN SECTION LABEL ID: **360-U1473A-62R-1-W 79/84-TSB-TS_208** Piece no.: #05 TS no.: 208

Group	Summary
Igneous petrology:	A coarse-grained to pegmatic gabbronorite with a porphyroclastic texture. The primary texture could be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene..
Metamorphic petrology:	Moderately altered sample. Large Cpx grains are partially transformed into different colorations of amphibole. Olivine is altered into typical greenschist assemblage.
Structure:	Weakly recrystallized plagioclase between pegmatitic pyroxene.

Plane-polarized

33227711

Cross-polarized

33227731

IGNEOUS PETROLOGY

Lithology: **gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: A coarse-grained to pegmatic gabbronorite with a porphyroclastic texture. The primary texture could be subophitic, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. Olivine is partly altered and rimmed by orthopyroxene. Plagioclase is partly recrystallized, and displays undulose extinction and deformation twins. Clinopyroxene occur as the porphyroclast, and contains abundant tiny brown amphibole blebs. Orthopyroxene commonly occurs at the rim of clinopyroxene, and is moderately altered. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1			4.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	48		6.8	4	anhedral	subequant	undulose extinction
Clinopyroxene	45		45	15	anhedral	poikilitic	
Orthopyroxene	5		3.6	2.4	anhedral	subequant	
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): JL

Detailed description Sample is moderately altered. Large Cpx primary grains are partially replaced by brown, green, pale green and brown, and colorless amphibole. Green amphibole was observed to be replacing brown amphibole. Secondary phases after olivine are talc, tremolite, serpentine and oxides. Plagioclase is moderately replaced by 2nd plagioclase and clays.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	30		15
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	15	50		
Amphibole, green		10		
Chlorite				20
Clay minerals	20	10		40
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	40
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Undulose extinction.
Plagioclase:	Grain size: porphyroclasts: 2.5-8 mm. neoblasts: ~0.5 mm. Grain shape: anhedral. Grain boundary: very irregular. Twinning: tapered. Subgrains: protrusions into adjacent crystals. Undulose extinction: patchy. Texture: irregular, intergrown, with limited recrystallization.
Clinopyroxene:	Pegmatitic. Undeformed
Oxide:	Forms in interstitial spaces between clinopyroxene crystals.

THIN SECTION LABEL ID: **360-U1473A-62R-3-W 114/118-TSB-TS_209** Piece no.: #01 TS no.: 209

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Subhedral plagioclase is partly or fully enclosed within clinopyroxene, which sometimes shows a consertal intergrowth with orthopyroxene.
Metamorphic petrology:	Sample is moderately altered. Corona forming minerals between plagioclase and olivine is common.
Structure:	Subophitic olivine gabbro with minor deformation feature

Plane-polarized

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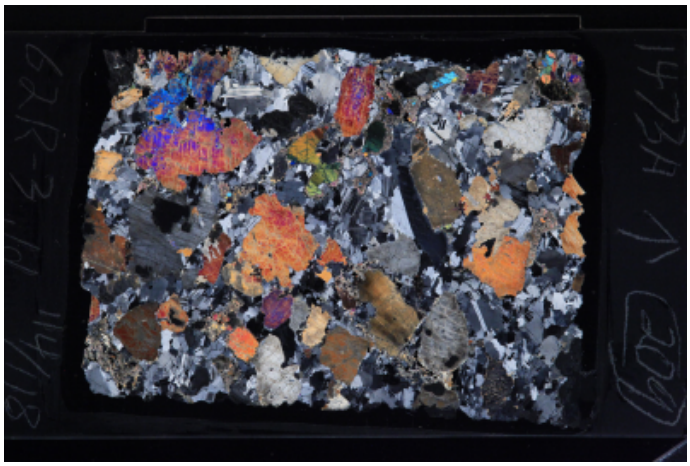
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is heavily altered, but the overgrowth by orthopyroxene can be occasionally seen. Plagioclase is recrystallized, and displays undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene, which sometimes shows a consertal intergrowth with orthopyroxene. Opaque minerals are dominated by ilmenite, and small amount of sulfides occur with the altered olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			2.4	anhedral	subequant	strongly altered and rimmed by orthopyroxene
Plagioclase	47		8	2.4	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	39		7	6	anhedral	poikilitic	showing a consertal texture
Orthopyroxene	1.2		3.6	3.6	anhedral	subequant	showing a consertal texture with clinopyroxene
Opaques	0.8						
Ilmenite	0.8						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): JL

Detailed description Sample is moderately altered. Dominant alteration assemblage observed are the corona forming minerals between olivine and plagioclase comprising of talc + magnetite + tremolite + chlorite. Cpx is altered into mostly colorless amphibole along cleavage planes. Plagioclase is mostly replaced by chlorite in microveins and in grain rims proximal to olivine.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	50		20
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	30	50		
Amphibole, green		5		
Chlorite				80
Clay minerals		5		
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	15			n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: curved; Undulose extinction: irregular; Subgrain: straight; Texture: partly fractured and altered olivine grains
Plagioclase:	Grain size: coarse- to medium-grained Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered to magmatic; Texture: plagioclase grains with some recrystallization
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Texture: poikiolitic clinopyroxene with plagioclase inclusions

THIN SECTION LABEL ID: **360-U1473A-62R-4-W 129/132-TSB-TS_210** Piece no.: #09 TS no.: 210

Group	Summary
Igneous petrology:	A medium-grained gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved.
Metamorphic petrology:	Sample is substantially altered into greenschist assemblages. Chlorite and tremolite/actinolite are common. Numerous veins of chlorite and chlorite-tremolite were observed obliquely cutting the mylonite foliation.
Structure:	Porphyroclastic texture defined by mainly by recrystallized plagioclase

Plane-polarized

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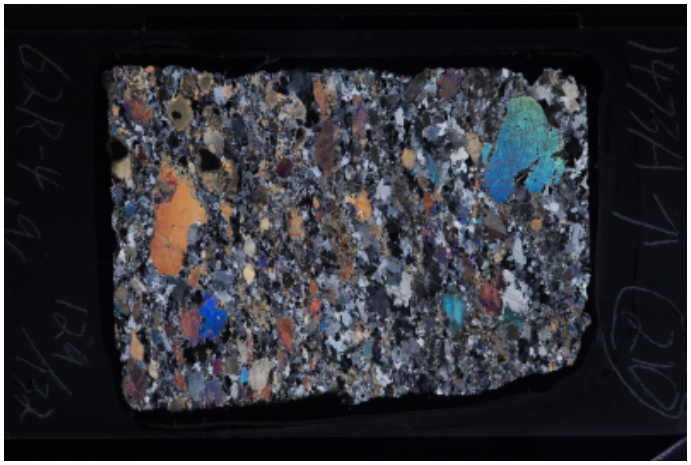
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. A strong foliation is defined by the preferred orientation of both clinopyroxene and elongated plagioclase. Plagioclase commonly displays undulose extinction and deformation twins. Clinopyroxene is strongly altered, but a consertal intergrowth texture is occasionally preserved.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	60		4	2	anhedral	elongate	undulose extinction
Clinopyroxene	40		7	2	anhedral	subequant	with a consertal intergrowth texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): JL

Detailed description Sample is substantially replaced by mostly greenschist assemblages. Cpx is mostly replaced by pale green and pale brown amphibole that is likely tremolite/actinolite. Some plagioclase grains are completely replaced by chlorite and tremolite/actinolite. Chlorite veins are common and cuts the mylonite foliation.

Comment type	Comment
Mylonite comments:	Plagioclase grains are mostly recrystallized.
Vein 1 minerals:	Subparallel chlorite-tremolite veins cutting the mylonitic foliation obliquely
Vein 2 minerals:	A chlorite vein cuts the smaller chlorite-tremolite vein. This vein is almost perpendicular to the mylonite foliation.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		60		30
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		90		20
Chlorite				65
Epidote/zoisite	n/a	n/a	n/a	5
Plagioclase, sec.	n/a	n/a	n/a	10
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

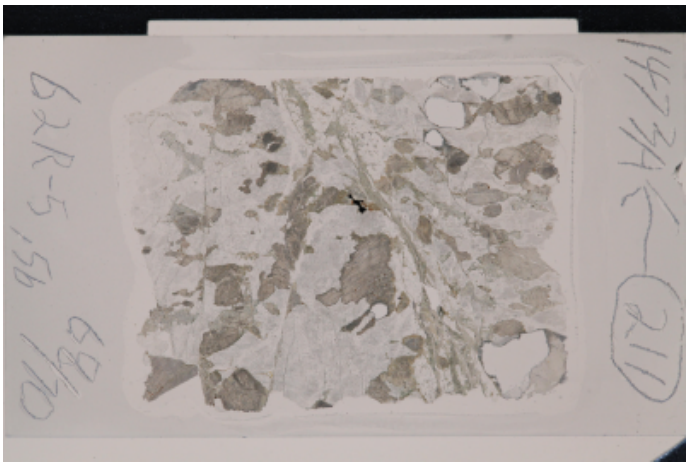
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	completely replaced by alteration
Plagioclase:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Twinning: rare igneous, mainly tapered Undulose extinction: irregular Texture: partially to strongly recrystallized, preserved grains are deformed
Clinopyroxene:	Grain size: coarse to medium Grain shape: anhedral Grain boundary: curved Texture: very weakly deformed, recrystallized at grain boundary and within the matrix
Oxide:	Foliation defined by recrystallized plagioclase and clinopyroxene oriented.

THIN SECTION LABEL ID: **360-U1473A-62R-5-W 68/70-TSB-TS_211** Piece no.: #05 TS no.: 211

Group	Summary
Igneous petrology:	A medium-grained gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved.
Metamorphic petrology:	Static alteration intensity is substantial. Minerals indicate that amphibolite and greenschist facies alteration is dominant and related to veining.
Structure:	Extensively fractured gabbro with faulted felsic vein

Plane-polarized



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Cross-polarized

33227371

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Plagioclase is strongly recrystallized and displays undulose extinction and deformation twins. Clinopyroxene is deformed and pervasively replaced by green amphibole. Very few opaque minerals and brown amphibole are present. It is crosscut by a small diorite vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	65		7.6	4	anhedral	subequant	undulose extinction
Clinopyroxene	35		6	3	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): TN

Detailed description Clinopyroxene is replaced by amphibole patches and fringes, and by clays alon cleavage surfaces. Orthopyroxene (?) is completely altered to psudomorphic aggregates conposed of chlorite, small amount titanite and actinorite rims. Plagioclase is replaced mainly by secondary plagioclase, and subordinate epidote, chlorite and actinolite.

Comment type	Comment
Vein 1 minerals:	Amp

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50	100	30
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		20	30	5
Amphibole, green		20		
Chlorite			60	20
Clay minerals		35		
Epidote/zoisite	n/a	n/a	n/a	15
Oxide		4		n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Sulfide		1		n/a
Other			10	10
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 20 Domain name: microfabric

Microstructure: fault rock sheared felsic vein Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Fault rock intensity:	cataclasite	5

Type	Comment
Plagioclase:	Grain size: fine-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: fine-grained vein filling

Interval domain no: 2 Domain rel. abundance (%): 80 Domain name: microfabric

Microstructure: fault rock extensively fractured wall rock Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:		1
Fracture abundance:	common	n/a
Fault rock intensity:	dense anastomosing fracturing and incipient breccia	3

Type	Comment
Plagioclase:	Grain size: coarse- to medium-grained porphyroclasts, medium- to fine-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered Texture: Plagioclase porphyroclasts with some neoblasts along grain boundaries. Porphyroclasts are extensively fractured.
Clinopyroxene:	Grain size: coarse-grained porphyroclasts, fine-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to irregular, altered; Undulose extinction: irregular; Texture: partly altered and fractured clinopyroxene porphyroclasts exhibiting local recrystallization

THIN SECTION LABEL ID: **360-U1473A-62R-6-W 22/25-TSB-TS_212** Piece no.: #03 TS no.: 212

Group	Summary
Igneous petrology:	There are two domains in the thin section, a coarse-grained gabbro and a fine-grained olivine gabbro. The gabbro displays a subophitic texture and the olivine gabbro is highly foliated.
Metamorphic petrology:	The alteration intensity of this thin section is substantial.
Structure:	Weakly deformed coarse-grained gabbro in contact with a microgabbro characterized by a strong magmatic fabric. The contact is sharp.

Plane-polarized

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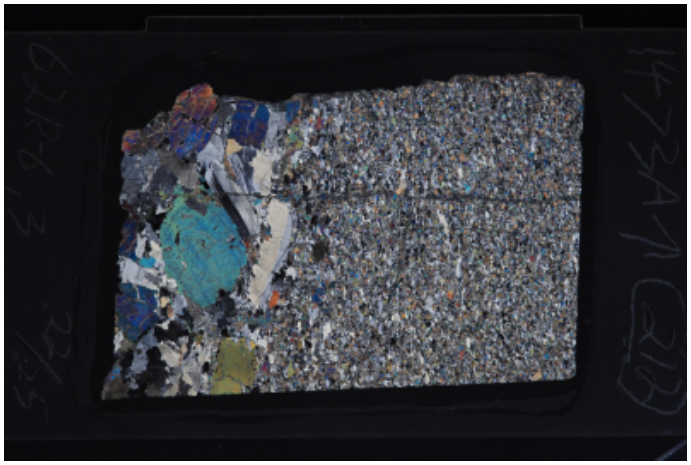
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 20 Domain name: lithology domain 1 major

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained gabbro with a subophitic texture. Plagioclase is partly recrystallized and displays undulose extinction. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is slightly altered and occasionally displays a consertal intergrowth texture. Both brown amphibole and ilmenite sometimes occur at the rim of clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		8	3.2	anhedral	tabular	undulose extinction
Clinopyroxene	45		9	5	anhedral	subequant	with a consertal intergrowth texture

Interval domain no: **2** Domain rel. abundance (%): 80 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained

Detailed description: This domain is a highly foliated fine-grained olivine gabbro. The foliation is defined by the preferred orientation of olivine, plagioclase and clinopyroxene. Olivine is strongly altered. Plagioclase is recrystallized and partly elongated. It displays undulose extinction. Clinopyroxene is moderately altered.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			0.2	anhedral	subequant	strongly altered
Plagioclase	50		1	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	43		1	0.4	anhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Ol displayed talc pseudomorphs with colorless amphibole. Cpx mainly altered into tiny colorless amphibole with brown amphibole and clay replacement. Pl was mostly replaced by secondary Pl with minor tiny colorless amphibole and clay occurring in the cleavages of Pl.

Comment type	Comment
Vein 1 minerals:	Several chlorite veins were observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	80	30		20
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless	20	70		10
Clay minerals	5	15		3
Oxide	2			n/a
Plagioclase, sec.	n/a	n/a	n/a	87
Talc	73	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): 30 Domain name:

Microstructure: magmatic Observer: CF

Detailed description Fabric defined by elongated clinopyroxene and plagioclase.The fine grained material along the contact partially include a coarse grained-plagioclase crystal.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	strong	3
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: altered Texture: fractured and strongly altered
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: curved Twinning: igneous and tapered Undulose extinction: irregular Subgrains: curved Texture: partially recrystallized along grain boundaries
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: altered Texture: strongly altered, elongated crystals

Interval domain no: Domain rel. abundance (%): 70 Domain name:

Microstructure: magmatic Observer: CF

Detailed description The contact with the microgabbro is sharp and characterized by strongly deformed and fractured plagioclase.

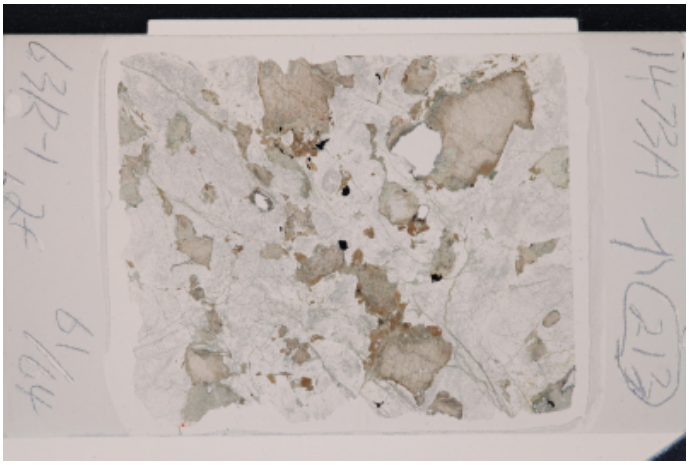
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinning: igneous and tapered Undulose extinction: irregular Subgrains: curved Texture: porphyroclastic partially and locally recrystallized, strongly deformed along the contact
Clinopyroxene:	Grain size: coarse Grain shape: poikilitic Grain boundary: straight Texture: undeformed oikocryst including euhedral weakly deformed plg

THIN SECTION LABEL ID: **360-U1473A-63R-1-W 61/64-TSB-TS_213** Piece no.: #02 TS no.: 213

Group	Summary
Igneous petrology:	A medium-grained gabbro intruded by a diorite vein. The primary magmatic texture of the gabbro is not preserved and the diorite shows a granular texture. Clinopyroxene within the reaction halo commonly has a corona of brown amphibole.
Metamorphic petrology:	The thin section includes a felsic/vein patch within a gabbro. Near the felsic material, Cpx from host gabbro is rimmed by brown Amp, frequently in association with zircon. The alteration of the host gabbro is substantial.
Structure:	Porphyroclastic fabric defined by neoblasts of plagioclase overprinted by dense anastamosing fracturing and incipient breccia.

Plane-polarized



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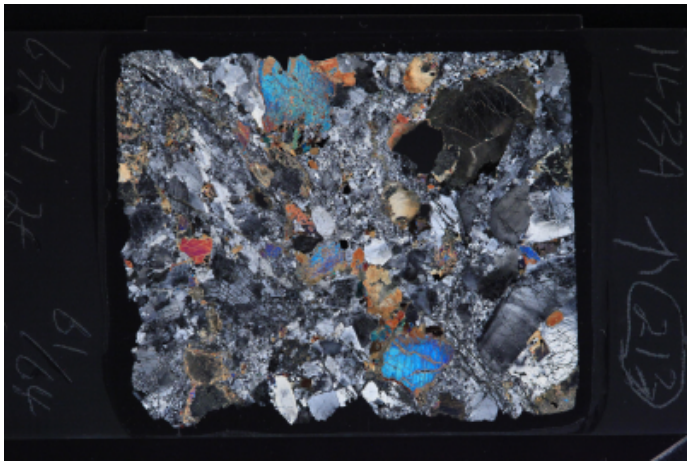
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 70 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained gabbro with a porphyroclastic texture. The primary magamtic texture is not preserved. Plagioclase is strongly recrystallized and displays undulose extinction. Clinopyroxene is strongly altered and pervasively replaced by amphibole. Clinopyroxene in the halo between gabbro and the diorite vein has a brown amphibole corona.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		8.4	4	anhedral	subequant	undulose extinction
Clinopyroxene	30		10	6	subhedral	subequant	

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a diorite vein with a granular texture. It consists of subhedral plagioclase and amphibole. Plagioclase displays an oscillatory zoning. Both zircon and titanite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		4	3.2	subhedral	subequant	
Amphibole	10		0.8	0.8	subhedral	subequant	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): RT

Detailed description The thin section includes a felsic/vein patch within a gabbro. Near the felsic material, Cpx from host gabbro is rimmed by brown Amp, frequently in association with zircon. The alteration of the host gabbro is substantial.

Comment type	Comment
Alteration general comments:	The alteration of the gabbro is substantial.
Vein 1 minerals:	The rock includes a felsic vein/patch. Cpx from host gabbro is rimmed by brown Amp and zircon.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	30		30
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	30			30
Amphibole, green		50		
Chlorite	70			30
Plagioclase, sec.	n/a	n/a	n/a	30
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: fault rock Amphibole is fractured. Observer: JD

Detailed description Porphyroclastic fabric defined by neoblasts of plagioclase overprinted by dense anastamosing fracturing and incipient breccia. Plagioclase and olivine clasts are highly fractured. Pyroxene and amphibole clasts are less so.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	common	n/a
Clasts in fault rock (%)	50	n/a
Fault rock clast size:	50	n/a
Fault rock intensity:	dense anastomosing fracturing and incipient breccia	3
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Highly fractured.
Plagioclase:	Grain size: clasts: 1.5-6 mm. matrix: ~0.01 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered to absent. Undulose extinction: patchy. Texture: Partly recrystallized plagioclase with brittle overprint.
Clinopyroxene:	Fractured, veined, and kinked.

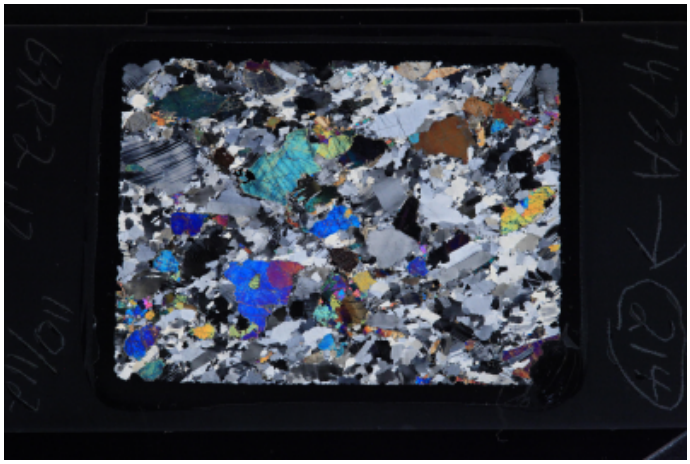
THIN SECTION LABEL ID: **360-U1473A-63R-2-W 110/112-TSB-TS_214** Piece no.: #17 TS no.: 214

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a granular texture. Olivine is recrystallized and rimmed by orthopyroxene. Plagioclase is partly recrystallized, and displays undulose extinction and deformation twins. Clinopyroxene shows a consertal intergrowth texture with orthopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	Strongly foliated with strongly recrystallized plagioclase and minor olivine and clinopyroxene along grain boundaries.

Plane-polarized

33226971

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a granular texture. Olivine is recrystallized and rimmed by orthopyroxene. It is elongated and the neoblasts occur as aggregates around clinopyroxene. Plagioclase is partly recrystallized, and displays undulose extinction and deformation twins. Clinopyroxene shows a consertal intergrowth texture with orthopyroxene, and occasionally contain olivine and plagioclase inclusions. Opaque minerals are dominated by ilmenite, with minor sulfides. They sometimes occurs at the rim of clinopyroxene, together with brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	75		6	4	anhedral	subequant	undulose extinction
Clinopyroxene	17		8	6	anhedral	subequant	with olivine and plagioclase inclusions
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 12 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol showed typical mesh texture with talc forming in mesh textures. Cpx altered into colorless amphibole, brown amphibole and clay. Pl were mostly replaced by secondary Pl with tiny colorless amphibole occurring in the micro-fractrues.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	8		15
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		75		
Amphibole, green				12
Clay minerals	5	15		3
Oxide	2			n/a
Plagioclase, sec.	n/a	n/a	n/a	85
Talc	93	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation defined by recrystallized plagioclase. Minor olivine and clinopyroxene recrystallization occur along grain boundaries.

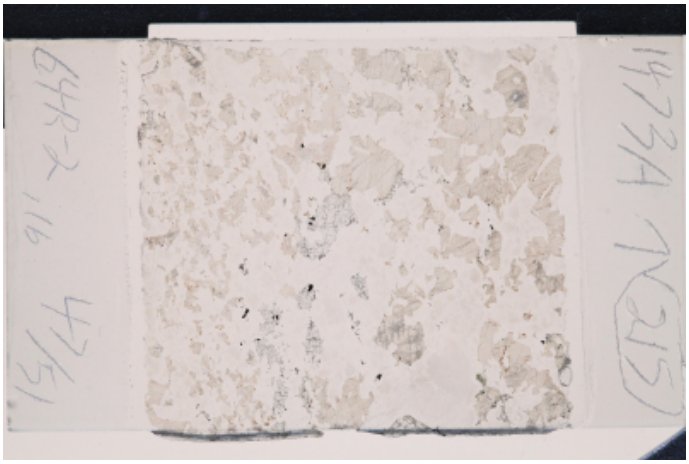
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and medium recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: preserved and deformed porphyroclasts partially and locally recrystallized at grain boundaries
Plagioclase:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: subhedral to anhedral Grain boundary: curved Twinning: rare igneous and tapered Undulose extinction: irregular Subgrains: curved Texture: strongly recrystallized and porphyroclasts deformed
Clinopyroxene:	Grain size: coarse and rare medium Grain shape: anhedral Grain boundary: straight to curved Texture: undeformed porphyroclasts include olivine and plagioclase; minor recrystallization along grain boundary.

THIN SECTION LABEL ID: **360-U1473A-64R-2-W 47/51-TSB-TS_215** Piece no.: #01 TS no.: 215

Group	Summary
Igneous petrology:	There are two domains, an olivine gabbro and an orthopyroxene-bearing gabbro. The olivine gabbro preserves a subophitic texture, in which subhedral plagioclase is partly or fully enclosed within cinopyroxene. The orthopyroxene-bearing gabbro is foliated and does not preserve the primary magmatic texture.
Metamorphic petrology:	The rocks experienced crystal-plastic deformation, as shown by the frequent recrystallization of Pl and Ol into nearly polygonal neoblastic aggregates. The original magmatic structure of Cpx is frequently preserved, particularly in the coarsest grained portion of the thin section. The static alteration is overall slight.
Structure:	Weak magmatic fabric defined by aligned plagioclase crystals overprinted by weak to moderate crystal plastic fabric.

Plane-polarized



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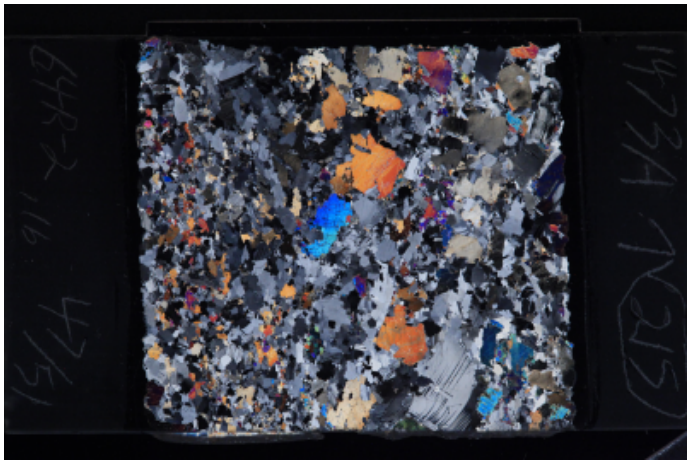
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 80 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro. A subophitic primary magmatic texture is preserved, as tabular plagioclase is partly or fully enclosed within clinopyroxene. Olivine is partly recrystallized and altered. Subhedral olivine neoblasts with triple junctions are aggregated. Plagioclase is partly recrystallized, and display undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			0.8	anhedral	subequant	recrystallized
Plagioclase	60		6	1.2	anhedral	subequant	undulose extinction
Clinopyroxene	33		5	3	anhedral	poikilitic	showing a consertal intergrowth texture
Opaques	0.5						
Ilmenite	0.3						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 20 Domain name: lithology domain 2 minor

Lithology: **orthopyroxene-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained orthopyroxene gabbro. It is weakly foliated, as indicated by the preferred orientation of both plagioclase and clinopyroxene. Small amount of subhedral olivines are present. Plagioclase is highly recrystallized, and displays undulose extinction and deformation twins. Clinopyroxene is commonly rimmed by brown amphibole, occasionally together with ilmenite. Primary orthopyroxene is in a subequant to tabular shape, and sometimes contains abundant brown amphiboles.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.5			0.6	subhedral	subequant	
Plagioclase	70		1.8	1.4	anhedral	subequant	undulose extinction
Clinopyroxene	27		2	1.2	anhedral	subequant	rimmed by brown amphibole
Orthopyroxene	2		2	0.6	anhedral	subequant	
Amphibole	0.5		0.4	0.2	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description The rocks experienced crystal-plastic deformation, as shown by the frequent recrystallization of Pl and Ol into nearly polygonal neoblastic aggregates. The original magmatic structure of Cpx is frequently preserved, particularly in the coarsest grained portion of the thin section. The static alteration is overall slight.

Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	Frequent recrystallization of Pl and Ol.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		2
Amphibole, brown	n/a	70	n/a	n/a
Amphibole, colorless		30		40
Chlorite	20			60
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Detailed description Weak magmatic fabric defined by aligned plagioclase crystals overprinted by weak to moderate crystal plastic fabric. The plagioclase has primary twinning, patchy undulose extinction, and can be kinked. Olivine has undulose extinction. Clinopyroxene is magmatic, but can have patchy undulose extinction.

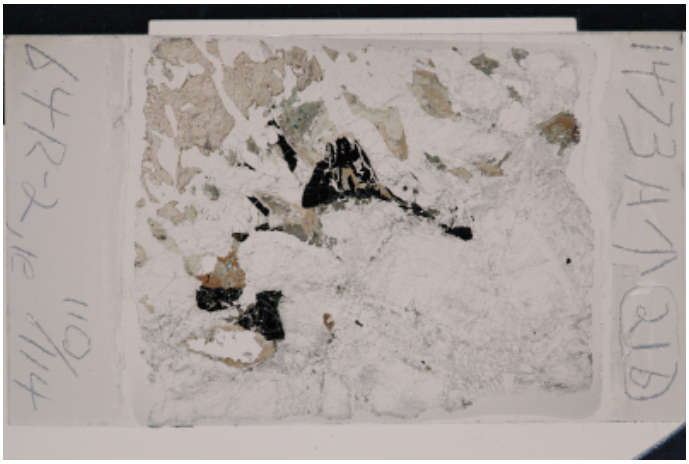
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	subhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Magmatic. Undulose extinction. Fractured.
Plagioclase:	Grain size: porphyroclasts: 1-5 mm. neoblasts: ~0.15 mm. Grain shape: elongated to anhedral. Grain boundary: straight to curved. Twinning: magmatic to tapered. Undulose extinction: patchy to absent. Subgrains: not well developed. some protrusions into adjacent crystals. Texture: limited recrystallization, mostly magmatic with primary twinning, patchy to no undulose extinction. Sometimes kinked.
Clinopyroxene:	Magmatic. Slightly kinked based on patchy, incomplete undulose extinction.

THIN SECTION LABEL ID: **360-U1473A-64R-2-W 110/114-TSB-TS_216** Piece no.: #01 TS no.: 216

Group	Summary
Igneous petrology:	There are two domains in the thin section, i.e., a gabbro intruded by a trondhjemite vein. The gabbro shows a granular texture, in which both clinopyroxene and plagioclase are recrystallized. Clinopyroxene within the halo between these two domains is highly replaced by amphibole. The trondhjemite is mainly composed of subhedral plagioclase, with interstitial quartz. The plagioclase commonly displays an oscillatory zoning and also a graphic texture with quartz.
Metamorphic petrology:	The gabbro intruded by the trondhjemite is strongly altered at the contact to the trondhjemite with decreasing intensity away from the contact. The trondhjemite is moderately altered. Plagioclase is mostly recrystallized to secondary plagioclase. Amphibole is altered to actinolite. Background alteration in the trondhjemite as overgrowth on grain boundaries consists of actinolite, chlorite, clay, secondary oxides.
Structure:	Weakly deformed and foliated olivine gabbro intruded by a felsic vein showin an halo.

Plane-polarized



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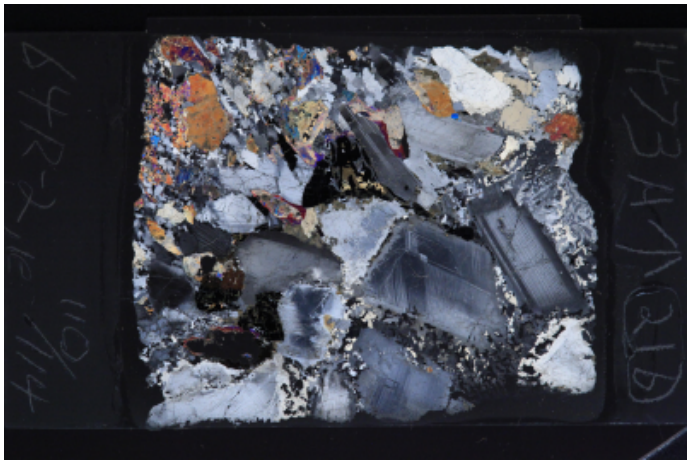
Cross-polarized



33247461

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 15 Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained gabbro with a granular texture. Plagioclase is recrystallized and shows undulose extinction. Clinopyroxene is recrystallized and strongly replaced by brown amphibole. Tiny brown amphibole is interstitial between clinopyroxene neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	45		5	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	55		6	4	anhedral	subequant	replaced by amphibole

Interval domain no: **2** Domain rel. abundance (%): 85 Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained trondhjemite vein. It is mainly consist of plagioclase and quartz, with minor amphibole and opaque oxides. Plagioclase is in tabular shape and displays an oscillatory zoning. Quartz is interstitial between plagioclase, and shows a graphic texture with plagioclase. Opaque oxides are mainly composed of ilmenite, with some exsolution of magnetite. Few zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	82		10	8	subhedral	tabular	
Amphibole	5		3.2	2	subhedral	subequant	
Opaques	5						
Magnetite	0.5						
Ilmenite	4.5						
Quartz	8		2.4	0.6	anhedral	interstitial	showing a graphic texture with plagioclase

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: olivine gabbro

Total rock alteration estimate (%): Observer(s): JK

Detailed description The gabbro intruded by the trondhjemite is strongly altered at the contact to the trondhjemite with decreasing intensity away from the contact. The trondhjemite is moderately altered. Plagioclase is mostly recrystallized to secondary plagioclase. Amphibole is altered to actinolite. Background alteration in the trondhjemite as overgrowth on grain boundaries consists of actinolite, chlorite, clay, secondary oxides.

Comment type	Comment
Alteration general comments:	The gabbro intruded by the trondhjemite is strongly altered at the contact to the trondhemite with decreasing intensity away from the contact.
Vein 1 minerals:	actinolite

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: trondhjemite

Total rock alteration estimate (%): 50 Observer(s): JK

Comment type	Comment
Alteration general comments:	The trondhjemite is moderately altered. Plagioclase is mostly recrystallized to secondary plagioclase. Amphibole is altered to actinolite. Background alteration as overgrowth on grain boundaries consists of actinolite, chlorite, clay, secondary oxides.
Vein 1 minerals:	actinolite

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description The foliation is defined by neoblasts of plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	strongly altered
Plagioclase:	Grain size: medium to coarse porphyroclasts and fine to medium recrystallized Grain shape: subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: regular Subgrains: curved Texture: deformed porphyroclasts partially recrystallized, neoblasts are oriented and define foliation
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: very weak Texture: very weakly deformed porphyroclasts partially and locally recrystallized between porphyroclasts grain boundaries

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Fracture abundance:	rare	n/a

Type	Comment
Vein:	policrystalline felsic vein showing an halo. Plagioclase is coarse grained and zoned, with igneous twinnings. Intergrowth of plg and quarz occur.

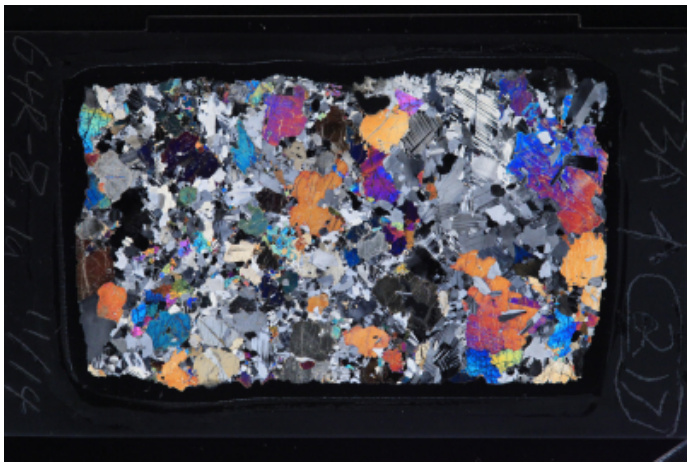
THIN SECTION LABEL ID: **360-U1473A-64R-8-W 11/14-TSB-TS_217** Piece no.: #01 TS no.: 217

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock locally shows recrystallization of Pl and Ol into neoblastic nearly polygonal aggregates. The static alteration is negligible.
Structure:	Isotropic magmatic fabric overprinted by very weak crystal plastic deformation.

Plane-polarized

33247341

Cross-polarized



33247371

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is weakly recrystallized and rimmed by clinopyroxene. Subhedral olivine neoblasts are aggregated at the rim of clinopyroxene. Clinopyroxene commonly displays magmatic twins. It is slightly recrystallized and displays undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally shows a consertal intergrowth texture. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			2.4	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	55		5	1.6	anhedral	tabular	undulose extinction
Clinopyroxene	38		6	4	anhedral	poikilitic	occasionally showing a consertal texture
Opaques	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The rock locally shows recrystallization of Pl and Ol into neoblastic nearly polygonal aggregates. The static alteration is negligible.

Comment type	Comment
Alteration general comments:	The rock is fresh.
Mylonite comments:	The rock locally shows recrystallization of Pl and Ol into neoblastic nearly polygonal aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		20		
Clay minerals	10			
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	20			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Detailed description Isotropic magmatic fabric overprinted by very weak crystal plastic deformation. No foliation present. Aggregates of plagioclase preserve magmatic twinning, and intergrowths. The olivine and pyroxene are magmatic with very limited if any undulose extinction.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	Magmatic. Patchy undulose extinction.
Plagioclase:	Magmatic twinning, some tapered. Patchy to no undulose extinction. Irregular contacts between adjacent plagioclase crystals.
Clinopyroxene:	Magmatic.

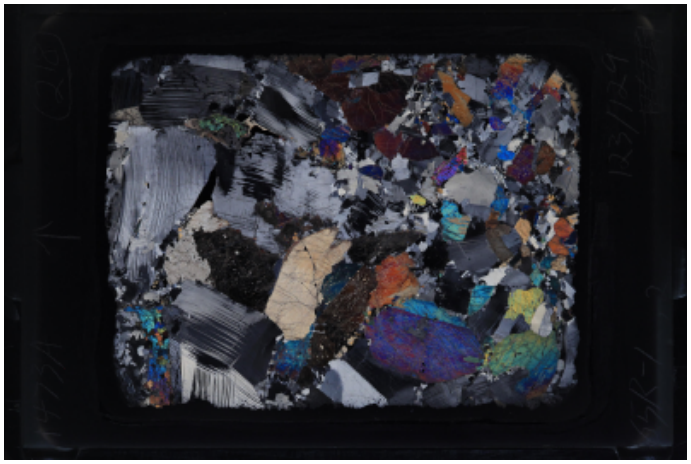
THIN SECTION LABEL ID: **360-U1473A-65R-1-W 123/129-TSB-TS_218** Piece no.: #02 TS no.: 218

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a granular texture. Olivine is recrystallized and rimmed by orthopyroxene. Plagioclase is partly recrystallized and displays deformation twins and undulose extinction. Clinopyroxene displays a consertal intergrowth texture and is pervasively replaced by green amphibole.
Metamorphic petrology:	Sample is only slightly altered. Cpx is the most altered primary phase and is mostly altered into 2nd Cpx, brown and pale green amphibole.
Structure:	Largely undeformed, coarse-grained olivine gabbro with recrystallized olivine and partly recrystallized plagioclase

Plane-polarized

33247701

Cross-polarized



33247751

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a granular texture. Olivine is recrystallized and the subhedral neoblasts are commonly aggregated. Overgrowth of orthopyroxene can be occasionally seen at the olivine rim. Plagioclase is partly recrystallized and displays deformation twins and undulose extinction. Clinopyroxene displays a consertal intergrowth texture and is pervasively replaced by green amphibole. It also contains plagioclase in an irregular shape and abundant tiny brown amphibole blebs. Opaque oxides are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			1.2	subhedral	subequant	
Plagioclase	55		20	12	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	39		14	12	anhedral	subequant	showing a consertal texture
Opaques	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): Observer(s): JL

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	20		3
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		
Clay minerals		10		
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	20			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a

Type	Comment
Olivine:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: recrystallized, elongated olivine aggregates, partly fractured and altered
Plagioclase:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture coarse-grained plagioclase grains with minor recrystallization
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Texture: coarse-grained, altered clinopyroxene grains
Oxide:	minor interstitial oxide pods

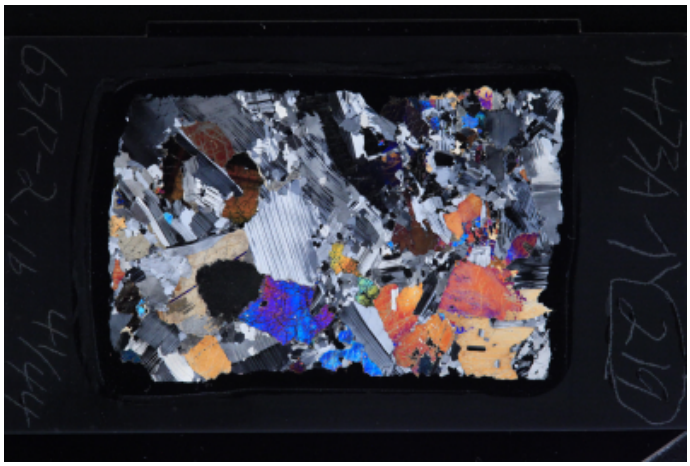
THIN SECTION LABEL ID: **360-U1473A-65R-2-W 41/44-TSB-TS_219** Piece no.: #01 TS no.: 219

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Subhedral tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	The rock has a slight, static background alteration.
Structure:	Largely undeformed, coarse-grained olivine gabbro with isotropic magmatic fabric

Plane-polarized

33247221

Cross-polarized



33247291

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Subhedral tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is rimmed mostly by orthopyroxene and sometimes by clinopyroxene. Plagioclase is commonly tabular and shows magmatic twins. Both undulose extinction and deformation twins can be occasionally seen in some plagioclases. Clinopyroxene sometimes displays a consertal intergrowth texture with orthopyroxene. Opaque minerals are dominated by sulfides, with very few ilmenite, which associate with brown amphibole and occur at the rim of clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			3.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		9	7	anhedral	tabular	
Clinopyroxene	35		8	6	anhedral	poikilitic	occasionally showing a consertal texture
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description The background static alteration of this rock is slight.

Comment type	Comment
Alteration general comments:	The background static alteration is slight.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		3
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		30
Chlorite				70
Clay minerals	30			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	20			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: curved Undulose extinction: rare, regular; Subgrain: curved; Texture: coarse-grained, anhedral olivine grains exhibiting fractures and minor alteration
Plagioclase:	Grain size: coarse- to medium-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: coarse-grained plagioclase grain with some minor recrystallization;
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Texture: clinopyroxene oikocrysts with tabular plagioclase chadacrysts
Oxide:	minor oxide related to olivine grains

THIN SECTION LABEL ID: **360-U1473A-65R-3-W 65/70-TSB-TS_220** Piece no.: #05 TS no.: 220

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved.
Metamorphic petrology:	The rock is fresh. Pl and Ol are locally recrystallized into neoblastc aggregates.
Structure:	Porphyroclastic texture with moderate foliation. The grain size is variable, from coarse grained to medium grained.

Plane-polarized

33247091

Cross-polarized

33247171

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Olivine is rimmed by orthopyroxene and occasionally contains plagioclase inclusions. Plagioclase is commonly recrystallized and shows undulose extinction and deformation twins. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene. Brown amphibole occurs at the rim of clinopyroxene or as blebs in clinopyroxene. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			1.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		7	3.2	anhedral	subequant	undulose extinction
Clinopyroxene	39		4	3	anhedral	subequant	showing a consertal texture
Amphibole	0.4		0.2	0.1	anhedral	interstitial	
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The rock is fresh. Pl and Ol are locally recrystallized into neoblastc aggregates.

Comment type	Comment
Alteration general comments:	The rock is fresh.
Mylonite comments:	Pl and Ol are locally recrystallized into neoblastc aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		20		
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	30			n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation is defined by elongated neoblasts of plagioclase, and rare elongated aggregates of olivine in association with clinopyroxene.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Undulose extinction: regular and common Subgrains: weakly developed Texture: porphyroclastic partially and locally recrystallized, neoblasts form aggregates with cpx
Plagioclase:	Grain size: medium to coarse porphyroclasts and fine recrystallized Grain shape: rare subhedral porphyroclasts and anhedral recrystallized Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: irregular and common Subgrains: curved Texture: porphyroclastic partially recrystallized, neoblasts along grain boundaries and in aggregates.
Clinopyroxene:	Grain size: medium and coarse to fine Grain shape: anhedral Grain boundary: curved Undulose extinction: weakly developed Texture: porphyroclastic partially and locally recrystallized at grain boundaries, neoblasts form aggregates with ol

THIN SECTION LABEL ID: **360-U1473A-65R-5-W 2/4-TSB-TS_286** Piece no.: #01 TS no.: 286

Group	Summary
Igneous petrology:	There are two domains in the thin section. The major domain at the top side is an olivine gabbro with a granular texture, which is highly foliated, and the minor domain at the bottom side is an olivine-bearing gabbro with a subophitic texture.
Metamorphic petrology:	Local recrystalllization of Ol, Pl and Cpx. Static alteration is slight and mostly confined to olivine.
Structure:	Weakly crystal-plastically deformed and foliated. Deformation overprint pre-existing weak magmatic fabric.

Plane-polarized

33327011

Cross-polarized

33327031

IGNEOUS PETROLOGY

Interval domain no: **bottom** Domain rel. abundance (%): 10 Domain name: lithology domain 2

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine-bearing gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is in a tabular to subequant shape. It is partly recrystallized and shows undulose extinction and deformation twins. Small tabular plagioclase is partly enclosed within clinopyroxene, which occasionally shows a consertal texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			1.2	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	74		4.8	1.2	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	23		2.8	1.2	anhedral	subequant	with brown amphibole blebs and plagioclase inclusions
Opaques	0.1						
Sulfide	0.1						

Interval domain no: **top** Domain rel. abundance (%): 90 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro with a granular texture. A strong foliation is defined by the preferred orientation of plagioclase and elongated olivine. Plagioclase is completely recrystallized and shows undulose extinction and deformation twins. Olivine is commonly recyrstallized and is elongated along the foliation. Clinopyroxene is strongly recrystallized and the big grains shows a consertal texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			0.4	anhedral	elongate	
Plagioclase	54		1.2	0.6	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	40		1.2	0.6	anhedral	subequant	with a consertal texture
Amphibole	0.1		0.1	0.05	anhedral	interstitial	
Opaques	0.3						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): RT

Detailed description Mylonite foliation characterized by Ol, Pl and Cpx. Minor amounts of brown Amp and opaque phases are also present, typically associated with Cpx. Static alteration is slight and mostly confined to olivine.

Comment type	Comment
Alteration general comments:	Static alteration is slight and mostly confined to olivine.
Mylonite comments:	Weak mylonite foliation characterized by Ol, Pl and Cpx. Minor amounts of brown Amp and opaque phase are also present, typically associated with Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	2		
Amphibole, colorless		100		
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): 20 Domain name:

Microstructure: magmatic Observer: CF

Detailed description Weak magmatic fabric defined by euhedral to subhedral plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	interstitial medium-grained with weak undulose extinction; fractured and partially altered
Plagioclase:	medium grained with igneous and tapered twins, weak undulose extinction; partially and locally recrystallized along grain size
Clinopyroxene:	medium-grained undefomed, oikocrysts include plg chadacrysts

Interval domain no: Domain rel. abundance (%): 80 Domain name:

Microstructure: magmatic Observer: CF

Detailed description Weak magmatic fabric defined by elongated subhedral plagioclase. Crystal-plastic foliation defined by recrystallized plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	fine-grained; granular texture, fractured and partially altered
Plagioclase:	fine-grained with igneous and tapered twinnings showing undulose extinction and curved subgrains; partially recrystallized along grain boundaries
Clinopyroxene:	fine-grained granular and undeformed

THIN SECTION LABEL ID: **360-U1473A-65R-5-W 5/9-TSB-TS_287** Piece no.: #01 TS no.: 287

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. Plagioclase is in a tabular to subequant shape and shows undulose extinction and deformation twins. Occasionally, subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Pl is locally recrystallized into nearly polygonal neblastic aggregates. Static alteration is slight and mostly confined to Ol and Cpx.
Structure:	Weakly developed magmatic fabric overprinted by crystal-plastic deformation.

Plane-polarized

33326971

Cross-polarized

33326991

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a granular texture. Olivine is rimmed by orthopyroxene. Plagioclase is in a tabular to subequant shape and shows undulose extinction and deformation twins. Occasionally, subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene. Opaque minerals are dominated by sulfides. Very few brown amphibole is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	59		4.4	2	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	36		3.6	2	anhedral	subequant	with a consertal texture
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description Pl is locally recrystallized into nearly polygonal neblastic aggregates. Static alteration is slight and mostly confined to Ol and Cpx.

Comment type	Comment
Alteration general comments:	Static alteration is slight and mostly confined to Ol and Cpx.
Mylonite comments:	Pl is locally recrystallized into nearly polygonal neblastic aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		1
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		70		50
Chlorite				20
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	30
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Weak magmatic fabric defined by euhedral to subhedral plagioclase.

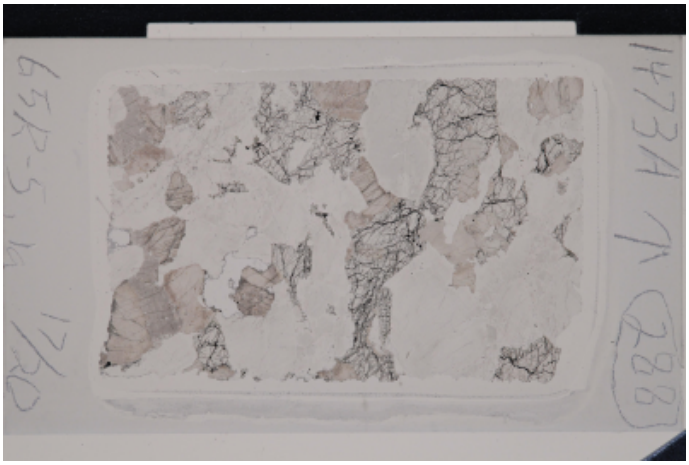
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	granular to interstitial medium-grained with weak undulose extinction; fractured and partially altered
Plagioclase:	medium grained with igneous and tapered twins, weak undulose extinction; partially and locally recrystallized along grain size
Clinopyroxene:	medium-grained undefomed, oikocrysts include plg chadacrysts

THIN SECTION LABEL ID: **360-U1473A-65R-5-W 17/20-TSB-TS_288** Piece no.: #01 TS no.: 288

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is commonly in a tabular shape and shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Ol and Pl are locally recrystallized into nearly polygonal aggregates. The static alteration is slight and mostly restricted to Ol and Cpx.
Structure:	Isotropic magmatic fabric weakly deformed.

Plane-polarized



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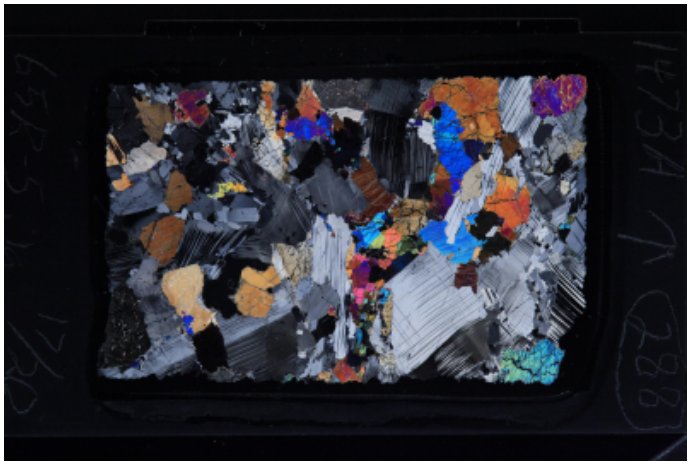
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is commonly in a tabular shape and shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene contains abundant brown amphibole blebs and occasionally shows a consertal texture. Primary orthopyroxene is in a tabular shape and contains abundant brown amphibole blebs along the exsolution lamellae. Small relict olivine grains occur at the rim of orthopyroxene. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	17			4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	68		9	6.8	anhedral	tabular	
Clinopyroxene	13		5	4	anhedral	poikilitic	with a consertal texture
Orthopyroxene	2		6.8	4	anhedral	tabular	with abundant brown amphiboles
Amphibole	0.2		0.1	0.05	anhedral	interstitial	blebs within pyroxenes
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description Ol and Pl are locally recrystallized into nearly polygonal aggregates. The static alteration is slight and mostly restricted to Ol and Cpx.

Comment type	Comment
Alteration general comments:	The static alteration is slight and mostly restricted to Ol and Cpx.
Mylonite comments:	Ol and Pl are locally recrystallized into nearly polygonal aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		1
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		70		50
Chlorite				20
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	30
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Isotropic texture, with olivine and plagioclase deformed. Plagioclase is weakly recrystallized along grain boundaries.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Olivine:	coarse grained deformed with undulose extinction and straight regular subgrain boundaries; fractured and partially altered
Plagioclase:	subhedral coarse-grained weakly deformed with igneous and tapered twins; partially and locally recrystallized along grain boundaries.
Clinopyroxene:	coarse-grained undeformed

THIN SECTION LABEL ID: **360-U1473A-65R-5-W 30/33-TSB-TS_221** Piece no.: #01 TS no.: 221

Group	Summary
Igneous petrology:	There are two domains in the thin section, a medium-grained and a fine-grained olivine gabbro. Both domains display granular texture.
Metamorphic petrology:	Flesh rock. Small amounts of alteration minerals include secondary clinopyroxene and brown amphibole replacing clinopyroxene, and mesh-forming serpentine-like mineral after olivine.
Structure:	Preserved isotropic texture. The coarser-grained domain shows local deformation features. The contact between fine and medium-grained material is defined by a diffuse increase in grain size.

Plane-polarized

33246991

Cross-polarized

33247041

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a granular texture. Olivine is rimmed by orthopyroxene. Plagioclase is commonly in a tabular shape, and displays undulose extinction and deformation twins. Clinopyroxene occasionally shows a consertal intergrowth texture with orthopyroxene. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			2.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		4	3	anhedral	tabular	undulose extinction
Clinopyroxene	33		3.6	2	anhedral	subequant	showing a consertal texture
Opaques	0.2						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro with a granular texture. Olivine is occasionally rimmed by orthopyroxene. Plagioclase is in a tabular to subequant shape and shows undulose extinction. Clinopyroxene is sometimes interstitial between plagioclase and olivine, and displays a consertal texture. Tiny sulfides are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.6	anhedral	subequant	
Plagioclase	55		4	0.8	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	40		1.2	0.6	anhedral	subequant	showing a consertal texture
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): TN

Detailed description Flesh rock. Olivine is replaced by mesh-forming serpentine (?) + oxide + sulfide, and clay; clinopyroxene by secondary clinopyroxene and brown amphibole patches, and by clay along fracture and cleavage surfaces; plagioclase has narrow microfracures filled with clay-like mineral.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	2		1
Amphibole, brown	n/a	50	n/a	n/a
Clay minerals	25	20		100
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4			n/a
Sulfide	1			n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Preserved fine grained isotropic texture.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: very weak Texture; undeformed, fractured
Plagioclase:	Grain size: fine Grain shape: anhedral Grain boundary: straight to curved Twinnings: igneous and rare tapered Undulose extinction: weakly developed Texture: granular magmatic texture preserved
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: undeformed, granular to interstitial

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Deformed plagioclase and olivine. The contact with fine-grained material is planar and defined by a sharp increase in grain size.

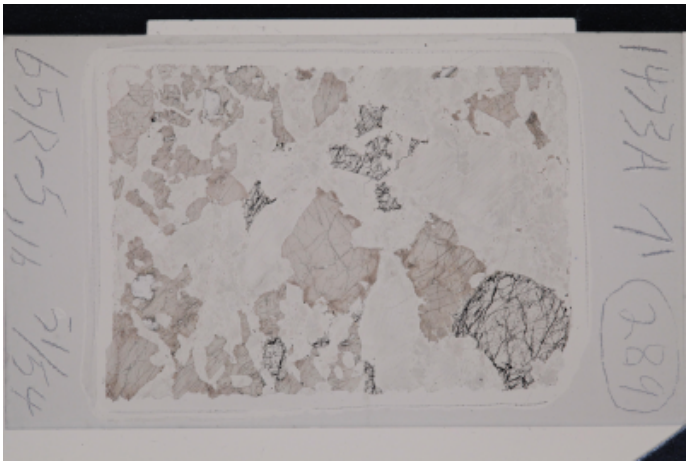
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	Grain size: medium Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture; weakly deformed, fractured
Plagioclase:	Grain size: medium to fine Grain shape: subhedral to anhedral Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: regular Subgrains: curved Texture: mainly preserved magmatic texture, deformed, locally and very weakly recrystallized
Clinopyroxene:	Grain size: medium Grain shape: anhedral Grain boundary: curved Texture: undeformed, poikilitic to interstitial

THIN SECTION LABEL ID: **360-U1473A-65R-5-W 51/54-TSB-TS_289** Piece no.: #01 TS no.: 289

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape, but weakly recrystallized. It shows undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	Pl and Ol are locally recrystallized to form nearly polygonal neoblastic aggregates. The static background alteration is negligible.
Structure:	Isotropic magmatic fabric weakly deformed with plagioclase and plagioclase neoblasts.

Plane-polarized



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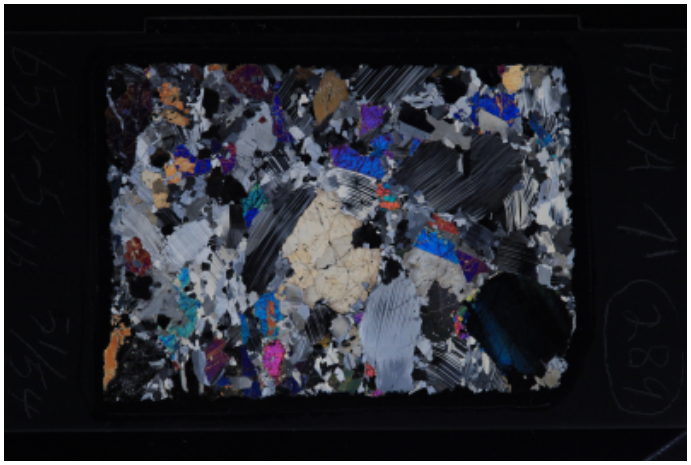
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape, but weakly recrystallized. It shows undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is weakly recrystallized and commonly rimmed by orthopyroxene. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene and contain brown amphibole blebs. Primary orthopyroxene with abundant brown amphibole blebs is present. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	68		10	5	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	21		8	6	anhedral	poikilitic	with a consertal texture
Orthopyroxene	1		4.4	4.4	anhedral	subequant	with abundant brown amphibole blebs
Amphibole	0.2		0.1	0.1	anhedral	interstitial	
Opaques	0.4						
Ilmenite	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description Pl and Ol are locally recrystallized to form nearly polygonal neoblastic aggregates. The static background alteration is negligible.

Comment type	Comment
Alteration general comments:	The rock is fresh.
Mylonite comments:	Pl and Ol are locally recrystallized to form nearly polygonal neoblastic aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	3		1
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		70		40
Chlorite				30
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	30
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Weakly deformed and not foliated with olivine and plagioclase partially and locally recrystallized along grain boundaries.

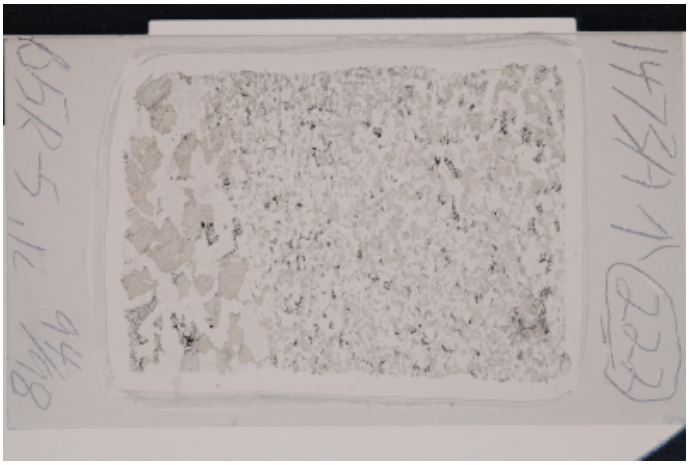
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	coarse grained deformed with undulose extinction and straight regular subgrain boundaries; fractured and partially altered; partially and locally recrystallized at grain boundaries between porphyroclasts
Plagioclase:	subhedral coarse-grained weakly deformed with igneous and tapered twins; partially and locally recrystallized along grain boundaries.
Clinopyroxene:	coarse-grained weakly deformed; sometimes oikocrysts include plg chadacrysts.

THIN SECTION LABEL ID: **360-U1473A-65R-5-W 94/98-TSB-TS_222** Piece no.: #01 TS no.: 222

Group	Summary
Igneous petrology:	There are two domains in the thin section. The medium-grained olivine gabbro preserve a subophitic texture and the fine-grained olivine gabbro shows an igneous lamination.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	Medium- to coarse-grained olivine gabbro with a weakly developed magmatic fabric, intruded by moderately foliated microgabbro.

Plane-polarized



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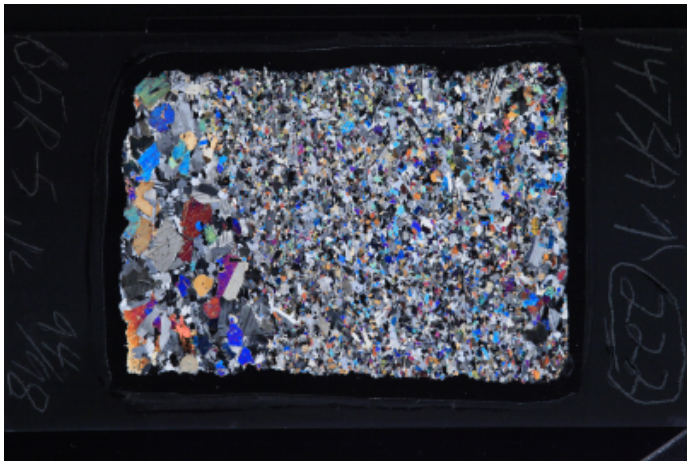
Cross-polarized



33246941

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 85 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro with a granular texture. An igneous lamination is shown by the shape preferred orientation of plagioclase and clinopyroxene. Olivine is commonly in subequant shape and rimmed by orthopyroxene. Tiny olivine in a round shape occurs as inclusion within plagioclase. Plagioclase shows a tabular to subequant shape, and displays undulose extinction. Clinopyroxene occasionally displays a consertal texture. Very tiny sulfides are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.8	anhedral	subequant	
Plagioclase	60		4	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	35		1	0.6	anhedral	subequant	
Opaques	0.2						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 15 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domains is a medium-grained olivine gabbro, with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase commonly shows magmatic twins and undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene and olivine. Clinopyroxene occasionally displays a consertal intergrowth texture with orthopyroxene. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	50		4.8	2.8	anhedral	tabular	undulose extinction
Clinopyroxene	42		4.4	2.8	anhedral	poikilitic	showing a consertal texture
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol altered into talc, probably mixed with serpentine and minor oxide. Cpx were replaced by colorless amphibole and minor brown amphibole. Pl was mostly replaced by secondary Pl with minor colorless amphibole occurring in the micro-fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		3
Amphibole, brown	n/a	2	n/a	n/a
Amphibole, colorless		98		10
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	90	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 75 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Magmatic fabric defined by elongated subhedral plagioclase, and minor elongated olivine and clinopyroxene.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: very weak Texture; undeformed, fractured
Plagioclase:	Grain size: fine Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinnings: igneous and rare tapered Undulose extinction: weakly developed Texture: granular magmatic texture preserved with elongated crystals that define the fabric.
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: undeformed, granular to interstitial

Interval domain no: 2 Domain rel. abundance (%): 25 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Weak magmatic fabric defined by elongated subhedral plagioclase.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: medium Grain shape: subhedral to anhedral Grain boundary: curved Undulose extinction: regular and weak Texture; weakly deformed, fractured
Plagioclase:	Grain size: fine to medium and coarse Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinnings: igneous and rare tapered Undulose extinction: weakly developed Texture: magmatic texture preserved with elongated crystals that define the fabric.
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Texture: undeformed, poikilitic texture that include ol and euhedral plg

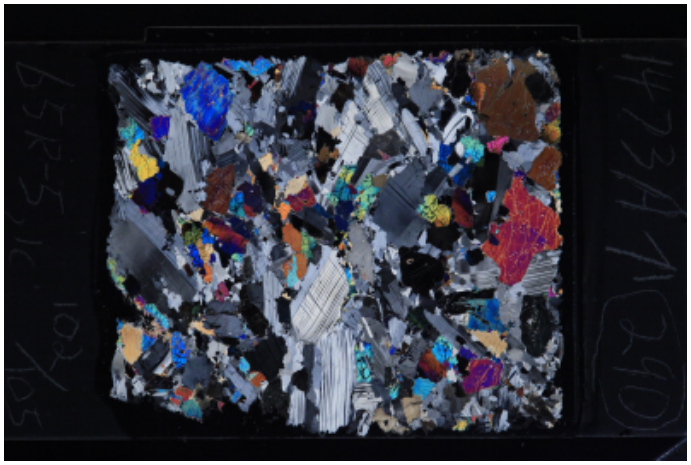
THIN SECTION LABEL ID: **360-U1473A-65R-5-W 102/105-TSB-TS_290** Piece no.: #01 TS no.: 290

Group	Summary
Igneous petrology:	An orthopyroxene-bearing coarse-grained olivine gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape, but weakly recrystallized. It shows undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	The rock is fresh. Ol and Pl locally recrystallized into nearly polygonal aggregates.
Structure:	Weakly deformed with a isotropic pre-existing magmatic fabric.

Plane-polarized

33326791

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained orthopyroxene-bearing olivine gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape, but weakly recrystallized. It shows undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is commonly rimmed by clinopyroxene and occasionally by orthopyroxene. Small olivine grains occur as inclusions within clinopyroxene and plagioclase. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene. Occasionally, it contains abundant brown amphibole blebs. Primary orthopyroxene contains abundant tiny brown amphibole and shows a consertal texture with clinopyroxene. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			2.4	anhedral	subequant	rimmed by clinopyroxene and orthopyroxene
Plagioclase	58		8	5	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	28		8	6	anhedral	poikilitic	with a consertal texture
Orthopyroxene	2		3.2	2.8	anhedral	subequant	with abundant tiny brown amphibole
Opaques	0.4						
Ilmenite	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The rock is fresh. Ol and Pl locally recrystallized into nearly polygonal aggregates.

Comment type	Comment
Alteration general comments:	The rock is fresh
Mylonite comments:	Ol and Pl locally recrystallized into nearly polygonal aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	3	1		1
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		40		50
Chlorite				50
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	30			n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Weakly deformed with a isotropic pre-existing magmatic fabric. Olivine and clinopyroxene show lobate contacts with plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	subhedral to anhedral coarse grained deformed with undulose extinction and straight regular subgrain boundaries; fractured and partially altered with curved to lobate grain boundaries.
Plagioclase:	subhedral medium- to coarse-grained weakly deformed with igneous and tapered twins; partially and locally recrystallized along grain boundaries.
Clinopyroxene:	coarse-grained weakly deformed; sometimes shows lobate contacts against plg

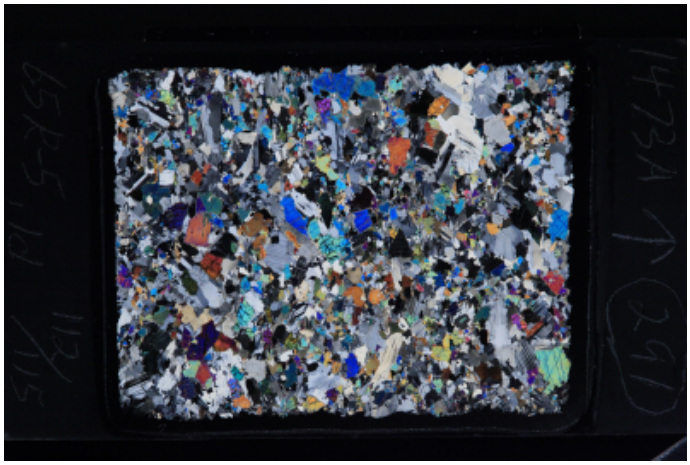
THIN SECTION LABEL ID: **360-U1473A-65R-5-W 112/115-TSB-TS_291** Piece no.: #01 TS no.: 291

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular to subophitic texture. Plagioclase is in a tabular to subequant shape and commonly shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	The rock shows negligible static background alteration.
Structure:	medium to fine-grained olivine gabbro with incipient crystal-plastic fabric. Plagioclase shows tapered twins, undulose extinction and local subgrain development. Recrystallized grains may form local polygonal aggregates with triple junctions.

Plane-polarized

33326731

Cross-polarized



33326751

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a granular to subophitic texture. Plagioclase is in a tabular to subequant shape and commonly shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is rimmed by clinopyroxene and orthopyroxene. Clinopyroxene commonly displays a consertal intergrowth texture. Small amount of opaque minerals are present, which are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	11			2.8	anhedral	subequant	rimmed by orthopyroxene and clinopyroxene
Plagioclase	48		5.6	2.8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	41		3.6	2	anhedral	poikilitic	with a consertal texture
Opaques	0.3						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The rock shows negligible static background alteration.

Comment type	Comment
Alteration general comments:	The rock shows negligible static background alteration.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	3		
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		70		
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description medium to fine-grained olivine gabbro with incipient crystal-plastic fabric. Plagioclase shows tapered twins, undulose extinction and local subgrain development. Recrystallized grains may form local polygonal aggregates with triple junctions.

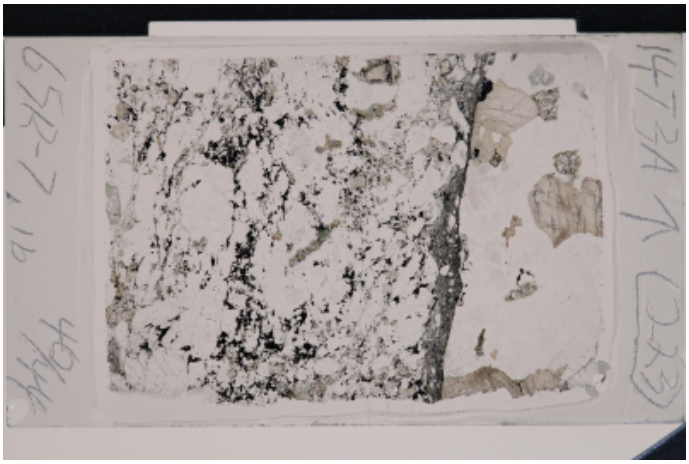
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture; medium to fine grains with curved contacts.
Plagioclase:	size: medium to fine shape: anhedral boundaries: curved twinning: tapered undulose extinction: irregular subgrains: curved boundaries. texture: weakly recrystallized fine grains.
Clinopyroxene:	size: medium to fine shape: anhedral boundaries: curved fractures: common texture: medium to fine grains, partially altered.
Oxide:	geometry: thin pods associated with olivine.

THIN SECTION LABEL ID: **360-U1473A-65R-7-W 40/44-TSB-TS_223** Piece no.: #01 TS no.: 223

Group	Summary
Igneous petrology:	There two domains in thin section. The medium-grained olivine gabbro displays a granular texture, where the oxide gabbro shows a mylonitic texture. The boundary between both domains is very sharp.
Metamorphic petrology:	This thin section contains two alteration domains. The alteration intensities of olivine gabbro and oxide gabbro are moderate and substantial, respectively.
Structure:	Contact between a coase-grained olivine gabbro and an oxide-bearing recrystallized rock. Plagioclase is completely recrystallized into a fine-grained matrix that contains cpx and olivine as local porphyroclasts and fine-grained recrystallized crystals.

Plane-polarized



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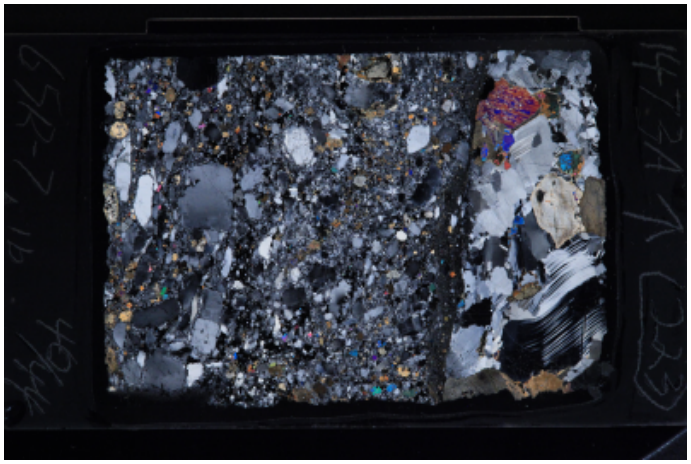
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 20 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro. Both olivine and plagioclase is rimmed by green amphibole. Plagioclase occasionally preserves the magmatic twins but more commonly displays undulose extinction and deformation twins. Clinopyroxene occasionally shows a consertal texture. Small amount of opaque minerals consist of ilmenite and sulfides, which are overgrown by brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by green amphibole
Plagioclase	80		7.6	4.4	anhedral	subequant	undulose extinction
Clinopyroxene	15		6	5	anhedral	subequant	showing a consertal texture

Interval domain no: **2** Domain rel. abundance (%): 80 Domain name: vein

Lithology: **oxide gabbro** Observer: CL

Texture: mylonitic Ave. grain size: medium grained

Detailed description: This domain is an oxide gabbro with a mylonitic texture. It mainly consists of plagioclase and oxides, with minor pyroxenes. Plagioclase is highly recrystallized and the porphyroclasts show undulose extinction. Clinopyroxene is subhedral and in a subequant to equant shape. Orthopyroxene is in a tabular shape. Opaque oxides are mainly composed of magnetite, with minor ilmenite. Abundant zircons and apatites are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	84		5	1.6	anhedral	tabular	undulose extinction
Clinopyroxene	5		1.4	1.2	subhedral	subequant	
Orthopyroxene	1		1.6	1			
Opaques	10						
Magnetite	8						
Ilmenite	2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 22 Observer(s): QM

Detailed description The alteration intensity of this domain is moderate. Ol exhibits typical mesh texture and mesh rims consist of talc, clay and serpentine. Cpx mainly alters into pale color amphibole with minor clay, brown amphibole and oxide replacement. Pl is mostly replaced by secondary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	30		20
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless	5	85		10
Clay minerals	17	5		
Oxide	3	5		n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

Total rock alteration estimate (%): 35 Observer(s): QM

Detailed description The alteration intensity of this domain is substantial. Cpx alters into colorless amphibole with brown amphibole. The replacements of Opx consist of pale color/colorless amphibole, talc, chlorite and clay. Pl was mostly replaced by secondary Pl with chlorite and minor colorless amphibole occurring in the cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		20	25	40
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		90	45	5
Chlorite			20	15
Clay minerals			5	
Plagioclase, sec.	n/a	n/a	n/a	80
Talc		n/a	30	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description contact between a coase-grained olivine gabbro and an oxide-bearing recrystallized rock. The undeformed gabbro shows limited tapered twins in plag and partial alteration of olivine and cpx. The contact is oxide-rich and is very sharp, marked by oxide bands and fine-grained recrystallized plagioclase. Cpx and olivine are observed as medium grained porphyroclasts within this contact shear zone. Away from it, plagioclase is completely recrystallized into a fine-grained matrix that contains cpx and olivine as local porphyroclasts and fine-grained recrystallized crystals.

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved undulose extinction: rare fractures: common texture: coarse, partially altered grains.
Plagioclase:	size: coarse shape: subhedral boundaries: straight to curved (locally) twinning: tapered undulose extinction: local texture: coarse grains forming the magmatic texture
Clinopyroxene:	size: coarse shape: subhedral to anhedral boundaries: straight fractures: common texture: coarse, fractured grains, locally altered.

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4

Type	Comment
Olivine:	size fine shape: anhedral boundaries: curved undulose extinction: irregular fractures: common texture: fine recrystallized grains in the matrix, partially altered.
Plagioclase:	size: fine shape: anhedral boundaries: straight to curved twinning: tapered (locally observed) undulose extinction: irregular texture: fine-grained recrystallized aggregates forming the matrix of the rock
Clinopyroxene:	size: fine shape: anhedral boundaries: curved fractures: rare texture: recrystallized, partially altered grains.
Oxide:	geometry: irregular pods randomly distributed in the fine-grained recrystallized matrix. Also observed at the boundaries with the undeformed gabbro.

THIN SECTION LABEL ID: **360-U1473A-66R-1-W 81/85-TSB-TS_224** Piece no.: #04 TS no.: 224

Group	Summary
Igneous petrology:	There are two domains, a medium-grained and a fine-grained olivine gabbro. The medium-grained olivine gabbro displays a subophitic texture, in which clinopyroxene contain olivine and plagioclase inclusions. The fine-grained olivine gabbro shows a granular texture, in which an igneous laminated is indicated by the shape preferred orientation of plagioclase and clinopyroxene. A suturing boundary between both domains.
Metamorphic petrology:	The background static alteration is overall slight and mostly confined to mafic minerals.
Structure:	Fine-grained olivine micrograbbro in contact with a corase-grained gabbro. The contact is sharp and subparallel to the magmatic fabric displayed by both domains.

Plane-polarized

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Cross-polarized

33246741

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is in a tabular to subequant shape and partly recrystallized. It displays undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene, and contains olivine and plagioclase inclusions. Brown amphibole is interstitial between clinopyroxene and plagioclase or occurs as blebs in clinopyroxene. Opaque minerals are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			2.4	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	70		6.4	6	anhedral	subequant	undulose extinction
Clinopyroxene	21		5	4	anhedral	poikilitic	showing a consertal texture
Amphibole	0.5		0.6	0.1	anhedral	interstitial	
Opaques	0.1						
Ilmenite	0.1						

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro with a granular texture. An igneous lamination is shown by the shape preferred orientation of olivine, clinopyroxene and plagioclase. Olivine shows a subequant or round shape. Plagioclase is in a tabular shape. It displays undulose extinction, but magmatic twins are also common. Opaque minerals are dominated by tiny sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			0.2	anhedral	subequant	
Plagioclase	55		1	0.8	anhedral	tabular	undulose extinction
Clinopyroxene	38		0.6	0.4	anhedral	subequant	
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description The static alteration is overall slight and mostly confined to mafic minerals.

Comment type	Comment
Alteration general comments:	The static alteration is slight and mostly confined to mafic minerals.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		1
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		50
Chlorite				50
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Magmatic fabric defined by elongated subhedral plagioclase, and minor elongated olivine and clinopyroxene.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: very weak Texture; undeformed, fractured
Plagioclase:	Grain size: fine Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinnings: igneous and rare tapered Undulose extinction: weakly developed Texture: granular magmatic texture preserved with elongated crystals that define the fabric.
Clinopyroxene:	Grain size: fine Grain shape: anhedral Grain boundary: curved Texture: undeformed, granular to interstitial

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Weakly developed magmatic fabric defined by elongated subhedral plagioclase. The contact is irregular and sharp, with coarse plg showing curved and corroded grain boundaries toward the finer-grained material.

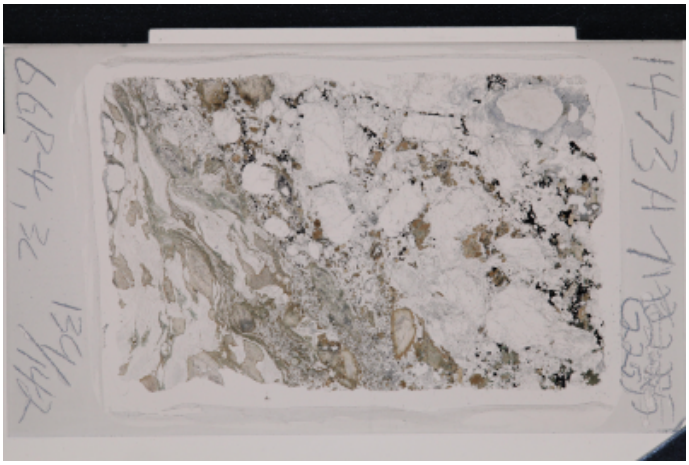
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5

Type	Comment
Olivine:	Grain size: medium to coarse Grain shape: subhedral to anhedral Grain boundary: curved Undulose extinction: regular and weak Texture; weakly deformed, fractured
Plagioclase:	Grain size: medium to coarse Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinnings: igneous and rare tapered Undulose extinction: weakly developed Texture: magmatic texture preserved with elongated crystals that define the fabric; rare recrystallized grains occur along grain boundaries
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Texture: undeformed, poikilitic texture that include ol and euhedral plg

THIN SECTION LABEL ID: **360-U1473A-66R-4-W 139/142-TSB-TS_225** Piece no.: #03 TS no.: 225

Group	Summary
Igneous petrology:	There are two domains in the thin section. The gabbro is strongly deformed and shows a mylonitic texture. The diorite shows a granular texture and mainly consists of subhedral plagioclase.
Metamorphic petrology:	In the mylonitic gabbro domain, neoblastic clinopyroxene is associated with brown Amp. The overall static alteration is moderate and mostly confined to Ol in the mylonitic gabbro domain, and to Amp in the felsic patch domain.
Structure:	This is a contact between a felsic vein patch (possibly diorite) and a mylonitic gabbro. The mylonite is characterized by a fine-grained mixture of plag+cpx+amph in which cpx and (local) plag are seen as porphyroclasts.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): Domain name: lithology

Lithology: **gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a mylonitic gabbro, in which both clinopyroxene and plagioclase are highly deformed and recrystallized.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		4	0.05	anhedral	subequant	undulose extinction
Clinopyroxene	30		4.4	3.6	anhedral	subequant	highly recrystallized

Interval domain no: **2** Domain rel. abundance (%): Domain name: Vein

Lithology: **diorite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a oxide diorite with a granular texture. It mainly consist of plagioclase, with minor amphibole and opaque minerals. Plagioclase is in tabular to subequant shape, showing an oscillatory zoning. Both amphibole and opaque minerals are interstitial between plagioclase. Opaque minerals are mainly composed of magnetite, with minor ilmenite. Abundant zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	90		6.4	5	subhedral	subequant	
Amphibole	5		2	1.2	anhedral	interstitial	
Opaques	5						
Ilmenite	0.5						
Sulfide	4.5						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: felsic patch

Total rock alteration estimate (%): Observer(s): RT

Detailed description In the mylonitic gabbro domain, neoblastic clinopyroxene is associated with brown Amp. The overall static alteration is moderate and mostly confined to Ol and to Amp in the mylonitic gabbro and the felsic patch, respectively.

Comment type	Comment
Alteration general comments:	Moderate alteration that is mostly confined to Amp.

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: host gabbro

Total rock alteration estimate (%): Observer(s): RT

Comment type	Comment
Alteration general comments:	Static alteration is moderate and mostly confined to Ol.
Mylonite comments:	Cap is recrystallized into Cpx neooblastic aggregates associated with brown Amp. These aggregates are rimmed by brown to green Amp granoblastic aggregates.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	10		
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, green	50	50		
Chlorite	20			
Oxide	10			n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: metamorphic Observer: GV

Detailed description This is a contact between a felsic vein patch (possibly diorite) and a mylonitic gabbro. Plagioclase in the diorite is observed as both coarse grains and also as recrystallized aggregates rimming the coarse clasts. The mylonite is characterized by a fine-grained mixture of plag+cpx+amph in which cpx and (local) plag are seen as porphyroclasts.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse, fractured grains mantled by fine recrystallized aggregates.

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: tapered (observed on larger fragments) undulose extinction: irregular texture: fine-grained recrystallized aggregates forming the mylonitic matrix, associated with alteration products.
Clinopyroxene:	size: fine shape: anhedral boundaries: curved fractures: rare texture: fine recrystallized matrix associated with amphibole and plagioclase.

THIN SECTION LABEL ID: **360-U1473A-66R-7-W 12/18-TSB-TS_226** Piece no.: #01 TS no.: 226

Group	Summary
Igneous petrology:	There are three domains of olivine gabbros with different sizes. Both coarse- and medium-grained olivine gabbro show a subophitic texture. The fine-grained olivine gabbro displays a granular texture. Boundaries between different domains are gradational.
Metamorphic petrology:	Section is composed of two alteration domains: a moderatley altered coarse grained olivine gabbro and a slightly altered fine grained olivine gabbro.
Structure:	Coarse, undeformed gabbro in contact with a fine-grained, weakly recrystallized and partially altered rock. Plagioclase and cpx are weakly recrystallized in the fine-grained domain, and olivine is partially altered

Plane-polarized

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Cross-polarized

33248761

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine with a subophitic texture. Olivine is partly altered and occasionally rimmed by orthopyroxene. Plagioclase is slightly recrystallized and displays undulose extinction. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene commonly shows a consertal intergrowth texture with orthopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	20			6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	65		12	8	anhedral	tabular	
Clinopyroxene	15		8	5	anhedral	poikilitic	showing a consertal texture

Interval domain no: **2** Domain rel. abundance (%): 30 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: This domain is a fine-grained olivine gabbro with a granular texture. Olivine is partly altered. Plagioclase preserve magmatic twins, but also displays undulose extinction. Occasionally, tabular plagioclase is partly or fully enclosed within clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			0.4	anhedral	subequant	
Plagioclase	50		1	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	43		2	0.8	anhedral	subequant	

Interval domain no: **3** Domain rel. abundance (%): 20 Domain name: lithology domain 3

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by clinopyroxene. Tabular plagioclase is partly or fully enclosed within clinopyroxene, which occasionally shows a consertal texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		6.4	4	anhedral	tabular	undulose extinction
Clinopyroxene	40		6.8	3.2	anhedral	poikilitic	

METAMORPHIC PETROLOGY

Interval domain no: Domain rel. abundance (%): 70 Domain name:

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Domain is moderately altered. Typical alteration assemblages are the plagioclase-olivine coronitic assemblage, 2nd Cpx and brown amphibole after Cpx, hydrogrossular microveins in plagioclase, pale amphibole rimming Cpx and serpentine + magnetite in olivine mesh rims. The domain also features relatively large fractures composed of secondary phases associated with the crosscutted primary mineral.

Comment type	Comment
Vein 1 minerals:	hydrogrossular vein is present, cutting several grains.
Vein 2 minerals:	Fractures were observed and cuts several primary grains, producing fragments and their alteration phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	25	20		10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	20	50		
Chlorite				20
Clinopyroxene, sec.	n/a	20	n/a	n/a
Garnet	n/a	n/a	n/a	40
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	40
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: Domain rel. abundance (%): 30 Domain name:

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Domain is only slightly altered. Most conspicuous alteration assemblage is that of Cpx where primary Cpx grains are replaced by 2nd Cpx, brown amphibole and colorless amphibole.

Comment type	Comment
Vein 1 minerals:	hydrogrossular microveins from domain 1 continue to cut this domain.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	20	10	3
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30	100	
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	20			n/a
Subtotals replaced	100	100	100	

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description Coarse, undeformed gabbro in contact with a fine-grained, weakly recrystallized and partially altered rock. Plagioclase and cpx are weakly recrystallized in the fine-grained domain, and olivine is partially altered.

Type	Comment
Olivine:	size: coarse to fine shape: anhedral boundaries: curved undulose extinction: irregular fractures: common texture: coarse grains partially altered and fine grains in the fine-grained domain.
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered (locally magmatic in the coarse domain) texture: coarse, fractured grains in the undeformed grain, fine incipient recrystallized grains in the fine-grained rock.
Clinopyroxene:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common in the coarse-grained domain

THIN SECTION LABEL ID: **360-U1473A-67R-1-W 124/127-TSB-TS_227** Piece no.: #06 TS no.: 227

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and shows magmatic twins. It is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is only slight altered. Observed secondary phases are serpentine, talc, magnetite, chlorite, brown amphibole and colorless amphibole.
Structure:	Isotropic.

Plane-polarized

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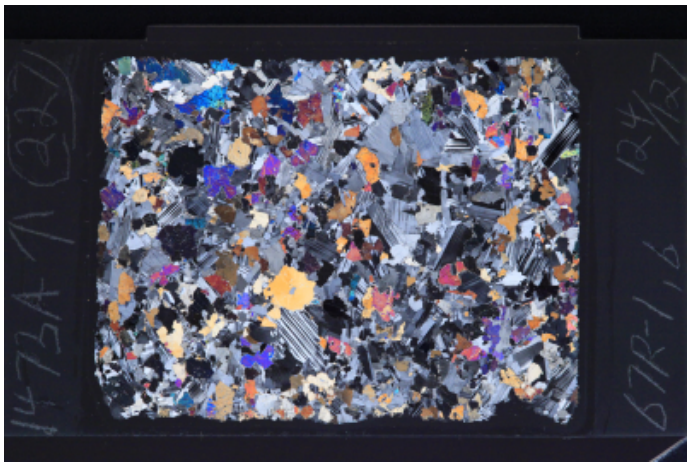
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by both clinopyroxene and orthopyroxene. It is weakly altered. Plagioclase is in a tabular shape and shows magmatic twins. It is partly or fully enclosed within clinopyroxene, which occasionally shows a consertal intergrowth texture with orthopyroxene. Very few tiny sulfides are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by clinopyroxene and orthopyroxene
Plagioclase	52		5.6	4	anhedral	tabular	
Clinopyroxene	43		3.6	2	anhedral	poikilitic	occasionally with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Sample is only slightly altered. Most common alteration phase observed are serpentine, talc and magnetite after olivine and 2nd cpx, brown and colorless amphibole after primary Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10	10	3
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	10	30	100	
Chlorite				100
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Patchy to complete undulose extinction.
Plagioclase:	Some tapered twinning, patchy extinction, and kinked.

THIN SECTION LABEL ID: **360-U1473A-67R-3-W 23/26-TSB-TS_228** Piece no.: #01 TS no.: 228

Group	Summary
Igneous petrology:	A coarse-grained gabbro with a subophitic texture. Tabular plagioclase commonly shows magmatic twins, which is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is moderately replaced by greenschist assemblages. Alteration is more pronounced near chlorite-tremolite/actinolite veins.
Structure:	Isotropic

Plane-polarized

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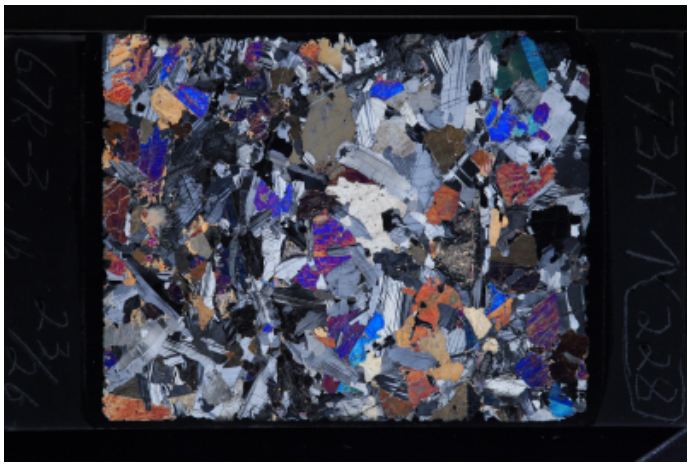
Cross-polarized



33282631

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained gabbro with a subophitic texture. Small amount olivine was present, but is completely altered. Tabular plagioclase commonly shows magmatic twins, which is partly or fully enclosed within clinopyroxene. However, both deformation twins and undulose extinction are also common. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		7	5	anhedral	tabular	undulose extinction
Clinopyroxene	45		5.6	5	anhedral	poikilitic	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): JL

Detailed description Sample is substantially altered. Olivine is completely replaced by talc and tremolite/actinolite and rimmed by chlorite. Cpx is mostly replaced by 2nd Cpx and tremolite. Replacement by tremolite is more pronounced near the vein. Minor occurrence of brown amphibole and clay. Plagioclase is moderately replaced by chlorite, either as a pseudomorph (near veins) or in microfractures.

Comment type	Comment
Vein 1 minerals:	Chlorite-tremolite/actinolite veins associated with minor epidote were observed. The proportion of tremolite/actinolite increases when the vein cuts Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		20
Amphibole, colorless	50	50		10
Chlorite		25		80
Clinopyroxene, sec.	n/a	25	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	10
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Tapered twins, patchy extinction, kinked.

THIN SECTION LABEL ID: **360-U1473A-67R-3-W 41/44-TSB-TS_229** Piece no.: #01 TS no.: 229

Group	Summary
Igneous petrology:	There are two domains in the thin section with a suture contact. The coarse-grained olivine-bearing gabbronorite shows a subophitic texture, in which subhedral plagioclase is partly or fully enclosed within clinopyroxene. The medium-grained olivine gabbro shows a granular texture.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Moderate magmatic fabric sub-parallel to sub-horizontal contact between coarse and fine-grained gabbro.

Plane-polarized

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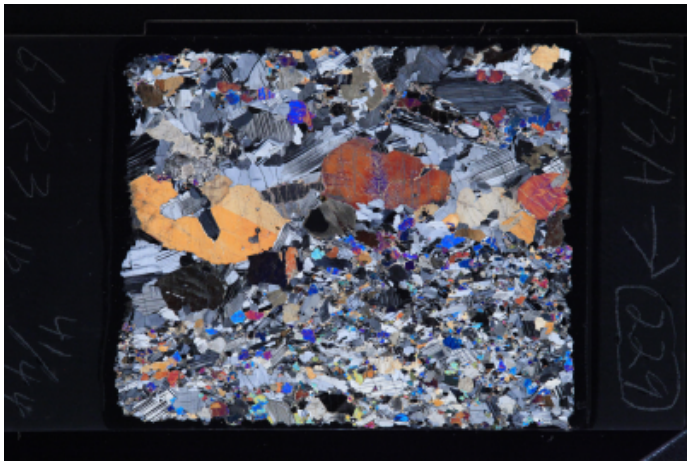
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1

Lithology: **olivine-bearing gabbronorite** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine-bearing gabbronorite with a subophitic texture. Olivine is weakly altered and rimmed by orthopyroxene. Plagioclase commonly shows magmatic twins, but both deformation twins and undulose extinction can be seen. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene, which commonly shows a consertal texture with orthopyroxene. Some primary orthopyroxenes are present, in a tabular shape.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			1.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		8	5	anhedral	tabular	undulose extinction
Clinopyroxene	38		8	5	anhedral	poikilitic	with a consertal texture
Orthopyroxene	5		5.6	5	anhedral	tabular	

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a granular texture. Olivine is partly or fully altered. Plagioclase is commonly in a tabular shape and displays magmatic twins. Undulose extinction is also shown in some plagioclases. Clinopyroxene shows a consertal intergrowth texture with orthopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.8	anhedral	subequant	moderately altered
Plagioclase	60		5.6	2.4	anhedral	tabular	undulose extinction
Clinopyroxene	35		3.2	1	anhedral	subequant	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. The replacement of Ol is dominant by talc and in some cases, Ol altered into talc pseudomorph with colorless amphibole formation. Cpx mainly altered into colorless amphibole with occurrence of secondary Cpx, clay and brown amphibole. Opx was replaced by talc, colorless amphibole and oxide. Pl mostly altered into secondary Pl with chlorite frequently occurring in the cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	25	15	15	10
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	15	75	35	
Chlorite				20
Clay minerals	10	10	10	
Clinopyroxene, sec.	n/a	5	n/a	n/a
Oxide	10		5	n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	65	n/a	50	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Detailed description Moderate magmatic fabric sub-parallel to sub-horizontal contact between coarse and fine-grained gabbro. The fabric is in both the coarse and fine-grained rocks defined by elongated tabular plagioclase.

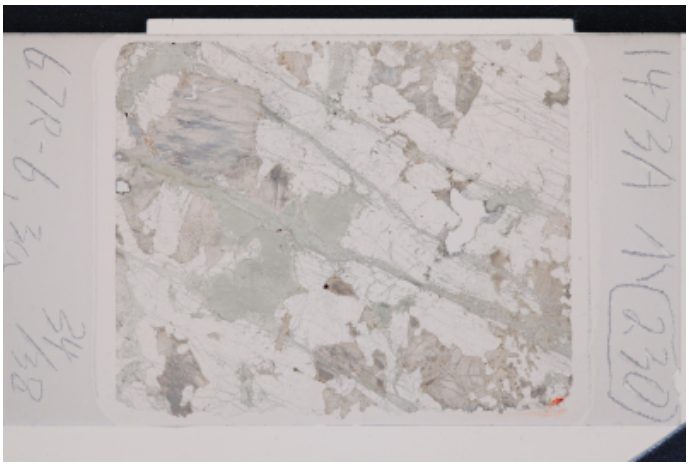
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	In both fine and coarse grained, plagioclase has tapered twinning and in some cases kinked. Elongate tabs define the magmatic foliation parallel to the contact.

THIN SECTION LABEL ID: **360-U1473A-67R-6-W 34/38-TSB-TS_230** Piece no.: #03 TS no.: 230

Group	Summary
Igneous petrology:	An altered coarse-grained olivine-bearing gabbro with a subophitic texture. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene, which is commonly altered.
Metamorphic petrology:	The alteration intensity of this thin section is extensive.
Structure:	Coarse-grained gabbro with sub-parallel shear veins

Plane-polarized



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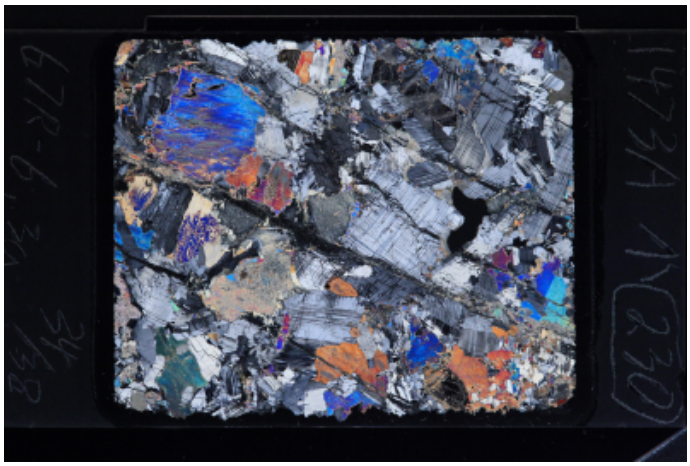
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: An altered coarse-grained olivine-bearing gabbro with a subophitic texture. Olivine is completely altered and the origin shape is not preserved. Plagioclase commonly have magmatic twins, and occasionally shows deformation twins and undulose extinction. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene, which is commonly altered. A consertal intergrowth texture is common in clinopyroxene. Very few ilmenites are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2						completely altered
Plagioclase	60		11	5	anhedral	tabular	magmatic twins
Clinopyroxene	38		7	6	anhedral	poikilitic	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 65 Observer(s): QM

Detailed description The alteration intensity of this thin section is extensive. Ol developed talc pseudomorphs with colorless amphibole occurring in the pseudomorph. Cpx altered into colorless amphibole, clay and minor brown amphibole. Pl mainly altered into chlorite, colorless amphibole and secondary Pl.

Comment type	Comment
Vein 1 minerals:	Several chlorite veins were observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		70
Amphibole, brown	n/a	2	n/a	n/a
Amphibole, colorless	30	88		15
Chlorite				40
Clay minerals		10		2
Oxide	2			n/a
Plagioclase, sec.	n/a	n/a	n/a	43
Talc	68	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: metamorphic Observer: OP

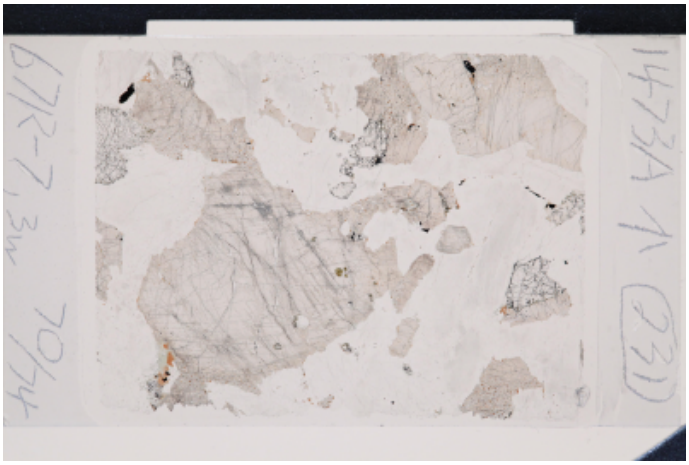
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Fracture abundance:	common	n/a
Fault rock intensity:	moderate fracturing	2

Type	Comment
Plagioclase:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered and magmatic; Texture: Coarse-grained, fracture plagioclase grains with some minor recrystallization at grain boundaries
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: coarse-grained, partly altered clinopyroxene with plagioclase inclusions, minor secondary clinopyroxene at grain boundaries
Vein:	Several sub-parallel, polycrystalline, sheared veins cross-cut the long axis of the thin sections. Veins display clear-cut relationship with the wall rock. In several cases microstructures of repeated fracturing and vein mineral precipitation are visible within the vein centers. Replacement of primary silicates is most intense in the direct vicinity of the veins.

THIN SECTION LABEL ID: **360-U1473A-67R-7-W 70/74-TSB-TS_231** Piece no.: #03 TS no.: 231

Group	Summary
Igneous petrology:	A coarse-grained orthopyroxene-bearing olivine gabbro with a subophitic texture. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Primary orthopyroxene contains blebs of brown amphibole and clinopyroxene.
Metamorphic petrology:	Slightly to moderately altered sample. Most common replacing minerals are 2nd Cpx and brown amphibole after primary Cpx.
Structure:	Weak magmatic fabric overprinted by a weak to moderate crystal plastic fabric.

Plane-polarized



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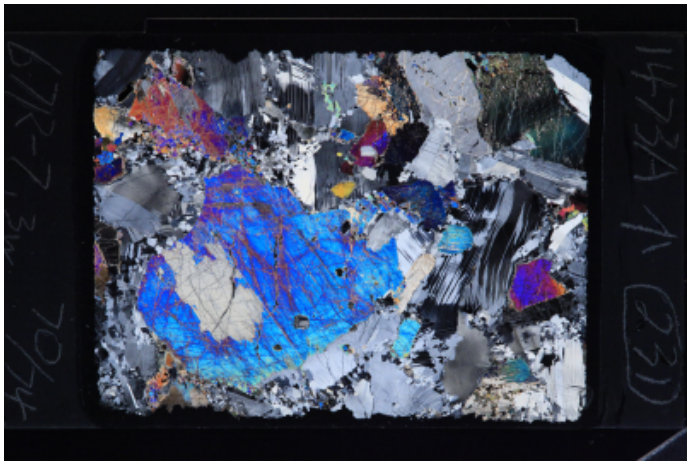
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained orthopyroxene-bearing olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and is weakly altered. Plagioclase is recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is moderately recrystallized. The porphyroclase commonly shows a consertal intergrowth texture and contains abundant brown amphibole blebs. Primary orthopyroxene contains blebs of brown amphibole and clinopyroxene. Brown amphibole, together with opaque minerals occurs at rim of clinopyroxene or is interstitial among the clinopyroxene neoblasts. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	53		11	5	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	38		15	10	anhedral	subequant	with a consertal texture
Orthopyroxene	2		9	9	anhedral	subequant	
Amphibole	0.5		1	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Sample is slightly altered. Olivine is replaced by serpentine, talc and oxide. Cpx is moderately replaced by mostly 2nd Cpx and brown amphibole. Plagioclase is only slightly altered. Recrystallized plagioclase and clinopyroxene were frequently observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	25	5	5
Amphibole, brown	n/a	25	n/a	n/a
Amphibole, colorless		15	20	
Chlorite				40
Clay minerals	10		10	
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	10			n/a
Talc	40	n/a	70	n/a
Subtotals replaced	100	100	100	40

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Weak magmatic fabric overprinted by a weak to moderate crystal plastic fabric. The magmatic fabric is defined by elongated plagioclase tabs. The crystal plastic deformation is defined by some recrystallization of plagioclase, slightly kinked pyroxene, and olivine with undulose extinction.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Patchy to rectilinear undulose extinction.
Plagioclase:	Grain size: porphyroclasts: 3-8 mm. neoblasts: ~0.15 mm. Grain shape: equigranular for neoblasts, elongated for porphyroclasts. Grain boundary: straight to curved. Twinning: magmatic to tapered. Undulose extinction: patchy to absent. Subgrains: present, curved boundaries. Texture: Porphyroclastic with limited recrystallization.
Clinopyroxene:	Patchy undulose extinction.

THIN SECTION LABEL ID: **360-U1473A-67R-7-W 74/77-TSB-TS_232** Piece no.: #03 TS no.: 232

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Both olivine and plagioclase is partly or fully enclosed within clinopyroxene, which commonly shows a consertal intergrowth texture with orthopyroxene.
Metamorphic petrology:	Moderately altered sample. Primary Cpx are substantially replaced by 2nd Cpx. Green clay after olivine were frequently observed.
Structure:	Weakly deformed olivine gabbro with partly recrystallized plagioclase.

Plane-polarized

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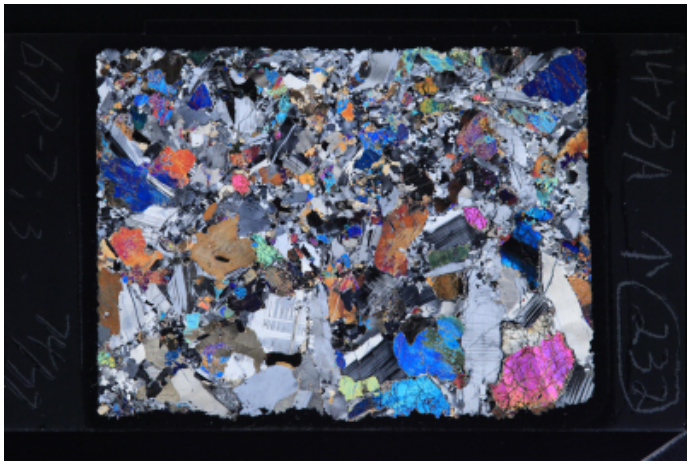
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is commonly rimmed by both clinopyroxene and orthopyroxene. Its rim is moderately altered. Plagioclase is partly recrystallized, and displays undulose extinction and deformation twins. Both olivine and plagioclase is partly or fully enclosed within clinopyroxene, which commonly shows a consertal intergrowth texture with orthopyroxene. Opaque minerals are mainly composed of sulfides, with minor ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			3.6	anhedral	subequant	rimmed by clinopyroxene and orthopyroxene
Plagioclase	49		7	4.4	anhedral	tabular	undulose extinction
Clinopyroxene	42		6	5	anhedral	poikilitic	with a consertal texture
Opaques	0.3						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Sample is moderately altered. Cpx is substantially replaced by 2nd Cpx. Olivine is replaced by talc, serpentine, magnetite and green clay. Plagioclase is rather fresh.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	40		5
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless		15		5
Chlorite				90
Clay minerals	30			
Clinopyroxene, sec.	n/a	70	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	5
Oxide	10			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved, altered; Undulose extinction: regular; Subgrain: straight; Texture: coarse-grained olivine grains with minor recrystallization
Plagioclase:	Grain size: coarse- to medium-grained; Grain shape: subhedral to anhedral, tabular; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: coarse-grained, often tabular plagioclase crystals, infrequently with neoblasts along grain boundaries
Clinopyroxene:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: curved to irregular; Texture: locally recrystallized clinopyroxene with plagioclase inclusions
Oxide:	oxides associated to olivine alteration

THIN SECTION LABEL ID: **360-U1473A-68R-2-W 74/78-TSB-TS_233** Piece no.: #03 TS no.: 233

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Undeformed, subophitic olivine gabbro

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene, but the rim is commonly altered. Plagioclase shows magmatic twins and undulose extinction. Deformation twins can also be occasionally seen. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene commonly shows a consertal intergrowth texture with orthopyroxene. Brown amphibole is interstitial between clinopyroxene and plagioclase, or occurs as blebs within clinopyroxene. Opaque minerals are mainly composed of ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	16			4.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	45		8	4	anhedral	tabular	undulose extinction
Clinopyroxene	39		5	5	anhedral	poikilitic	with a consertal texture
Amphibole	0.1		0.2	0.05	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol developed mesh texture and mainly altered into talc and oxides. Green clay and colorless amphibole were also observed. Cpx altered into colorless amphibole, brown amphibole and clay. Pl were mostly replaced by secondary Pl with chlorite and colorless amphibole occurring in the microfractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	35	10		15
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		78		5
Amphibole, green	8			
Chlorite				20
Clay minerals	12	10		
Oxide	20	2		n/a
Plagioclase, sec.	n/a	n/a	n/a	75
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

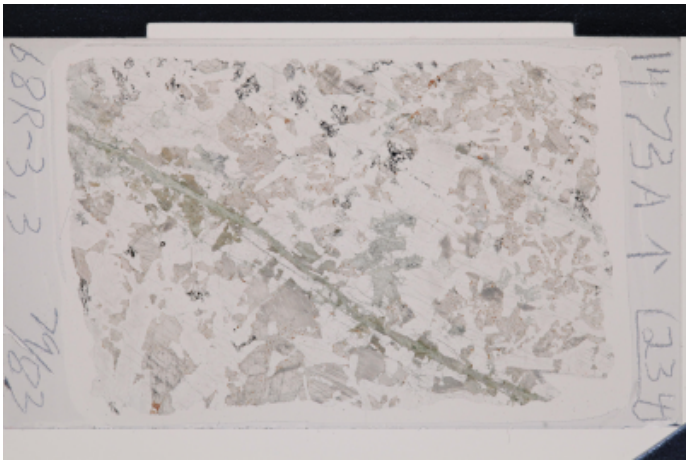
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: curved, altered; Texture: partly altered and fractured olivine grains
Plagioclase:	Grain size: coarse- to medium-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: Twinning: magmatic and tapered Texture: subhedral, tabular plagioclase, partly to fully enclosed within clinopyroxene and olivine
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Texture: clinopyroxene grains with exsolutions and plagioclase inclusions
Oxide:	oxides related to olivine alteration

THIN SECTION LABEL ID: **360-U1473A-68R-3-W 79/83-TSB-TS_234** Piece no.: #03 TS no.: 234

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is partly recrystallized and displays undulose extinction and deformation twins. Tabular plagioclase is occasionally enclosed, partly or fully, within clinopyroxene.
Metamorphic petrology:	Static alteration intensity is moderate. Alteration is intense near a green amphibole vein and amphibole-chlorite veins. Minerals indicate amphibolite to greenschist facies conditions.
Structure:	A medium-grained, subophitic olivine gabbro with a cross-cutting alteration vein. Plagioclase is partly recrystallized, displaying tapered twinning. Minerals within the vein are overall randomly orientated.

Plane-polarized



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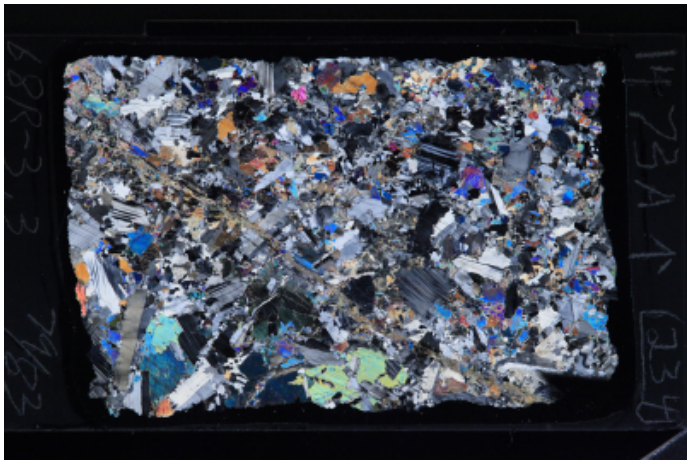
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is strongly altered and an overgrowth of orthopyroxene and clinopyroxene can be occasionally seen. Plagioclase is partly recrystallized and displays undulose extinction and deformation twins. Tabular plagioclase is occasionally enclosed, partly or fully, within clinopyroxene. Clinopyroxene commonly shows a consertal intergrowth texture with orthopyroxene. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.2	anhedral	subequant	highly altered
Plagioclase	57		4.4	3.2	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	38		5.6	2	anhedral	poikilitic	with a consertal texture
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Olivine is pseudomorphically replaced by talc and colorless amphibole and by mesh-forming serpentine (?); clinopyroxene is replaced by secondary clinopyroxene and brown amphibole patches and by pseudomorphic green/colorless amphibole; plagioclase has fracture-filling chlorite and actinolitic amphibole, and secondary plagioclase near amphibole + chlorite vein.

Comment type	Comment
Vein 1 minerals:	green Amp
Vein 2 minerals:	green Amp + Chl

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	50	10		5
Amphibole, brown	n/a	14	n/a	n/a
Amphibole, colorless	35	20		20
Amphibole, green		20		
Chlorite	5	20		60
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	4	5		n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Sulfide	1	1		n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	Grain size: medium- to fine-grained; Grain shape: anhedral Grain boundary: curved, altered; Undulose extinction: regular; Subgrain: curved; Texture: fractured and partly altered olivine grains
Plagioclase:	Gran size: coarse- to medium grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular Twining: magmatic and tapered Texture: tabular plagioclase grains, locally with neoblasts at grain boundaries
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: subhedral to anhedral Grain boundary: straight to curved Undulose extinction: irregular: Texture: clinopyroxene occasionally enclosing tabular plagioclase
Oxide:	oxides associated to olivine alteration
Vein:	Amphibole vein cross-cutting thin section. The vein has a clear cut relationship with the wall rock. Minerals within the veins are overall randomly orientated

THIN SECTION LABEL ID: **360-U1473A-68R-6-W 58/60-TSB-TS_235** Piece no.: #02 TS no.: 235

Group	Summary
Igneous petrology:	There are two domains in the thin section, an olivine gabbro and a disseminated oxide gabbronorite, which are crosscut by a mylonite vein. The olivine gabbro shows a subophitic texture, in which subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine. The disseminated oxide gabbronorite shows a porphyroclastic texture. The primary magmatic texture is not preserved. The mylonite vein contains abundant opaque oxides and few euhedral zircons.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	This is a contact between an olivine-gabbro and a fine grained rock. An oxide-rich shear zone marks the contact between the two lithologies.

Plane-polarized

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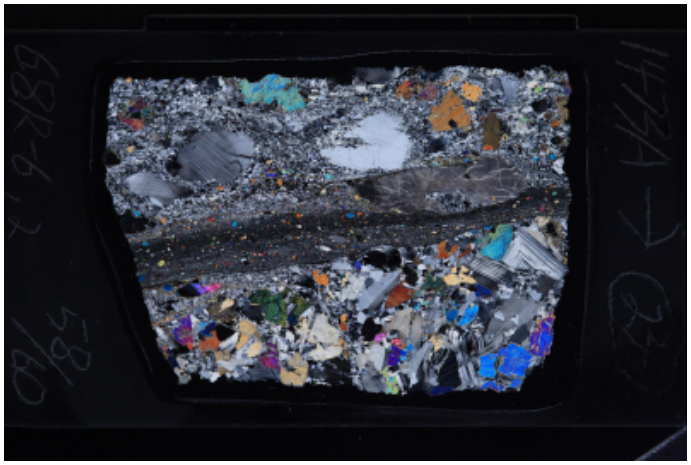
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a subophitic texture. Both olivine and clinopyroxene are rimmed by amphibole. Plagioclase is partly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine. Opaque minerals are dominated by ilmenite

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			2	anhedral	subequant	
Plagioclase	60		6.8	4	anhedral	tabular	undulose extinction
Clinopyroxene	28		3.6	2.8	anhedral	poikilitic	
Opaques	0.5						

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: lithology domain 2

Lithology: **disseminated oxide gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a disseminated oxide gabbronorite with a porphyroclastic texture. The porphyroclasts are mainly clinopyroxene, with minor plagioclase. Plagioclase is strongly recrystallized and shows undulose extinction. Clinopyroxene is partly recrystallized and contain abundant brown amphibole blebs. Primary orthopyroxene is in a tabular shape. Opaque minerals are dominated by ilmenite, with few sulfides. An euhedral apatite is partly enclosed within clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		9	0.2	anhedral	subequant	strongly recrystallized and undulose extinction
Clinopyroxene	12		5.6	2.8	anhedral	subequant	
Orthopyroxene	17		11	11	anhedral	tabular	
Opaques	1						
Ilmenite	0.9						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol developed typical mesh texture with talc, clay and minor oxide formation. Cpx mainly altered into colorless amphibole, brown amphibole and green amphibole. Pl were mostly replaced by secondary plagioclase with minor chlorite occurring in the cleavages.

Comment type	Comment
Mylonite comments:	Mylonite characterized by aggregates of recrystallization of plagioclase and clinopyroxene. Cpx neoblasts altered into green amphibole and brown amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	15	10	20
Amphibole, brown	n/a	25	n/a	n/a
Amphibole, colorless		50	30	
Amphibole, green		10	15	
Chlorite				5
Clay minerals	15	10	10	
Oxide	5	5	5	n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Talc	80	n/a		n/a
Other			40	40
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description This is a contact between an olivine-gabbro and a fine grained rock. An oxide-rich shear zone marks the contact between the two lithologies. The undeformed gabbro is mainly composed of coarse olivine, cpx and plagioclase in which crystal-plastic deformation is restricted to tapered twins in plag. In the fine-grained rock, plagiclase is completely recrystallized to a fine-grained matrix in which cpx and plag porphyroclasts are observed. The mylonite at the boundary between the two phases consists of fine-grained recrystallized pol+cpx+plag and oxides.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4

Type	Comment
Olivine:	size: fine shape: anhedral boundaries: curved undulose exitnction: irregular texture: fine-recrystallized grains contained in the mylonite matrix.
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: tapered (in larger clasts contained in the matrix) unudlose extinction: irregular subgrains: straight to curved boundaries texture: fine-grained recrystallized aggregates forming the matrix of the rock.
Clinopyroxene:	size: fine shape: anhedral boundaries: curved fractures: rare texture: fine recrystallized grains in the matrix.
Oxide:	geometry: elongate patches at the shear zone boundaries and also forming the foliation within the zone.

Microstructure: submagmatic Observer: OP

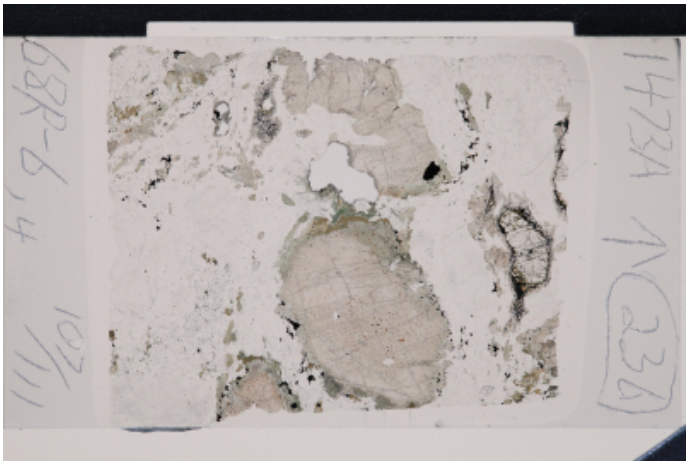
Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF fabric intensity:		1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: coarse, partially altered grains.
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered undulose extinction: irregular texture: coarse grains with minor recrystallization at the boundaries.
Clinopyroxene:	size: coarse shape: subhedral boundaries: straight fractures: common texture: coarse grains, partially altered.

THIN SECTION LABEL ID: **360-U1473A-68R-6-W 107/111-TSB-TS_236** Piece no.: #04 TS no.: 236

Group	Summary
Igneous petrology:	This is a hybrid sample. A coarse-grained olivine gabbro intruded by a felsic vein. The primary magmatic texture of the olivine gabbro has been destroyed but is very likely of subophitic, as plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The olivine gabbro is slightly altered; phase which is most strongly altered is olivine showing replacements of mostly clay, talc, oxide, and pale amphibole, followed by orthopyroxene. Plagioclase in the felsic patches are recrystallized to secondary plagioclase, filled with cloudy inclusion. Brown-green hornblende in these patches are replaced by actinolite.
Structure:	This is a hybrid sample; a coarse-grained olivine gabbro has been infiltrated by a felsic magma. The primary magmatic olivine gabbro texture is not visible anymore but was likely subophitic. Primary plagioclase grains are locally rimmed by plagioclase neoblasts and primary clinopyroxene oikocrysts show plagioclase chadacrysts. The infiltrated felsic magma frequently exhibits tabular plagioclase grains and local recrystallization.

Plane-polarized



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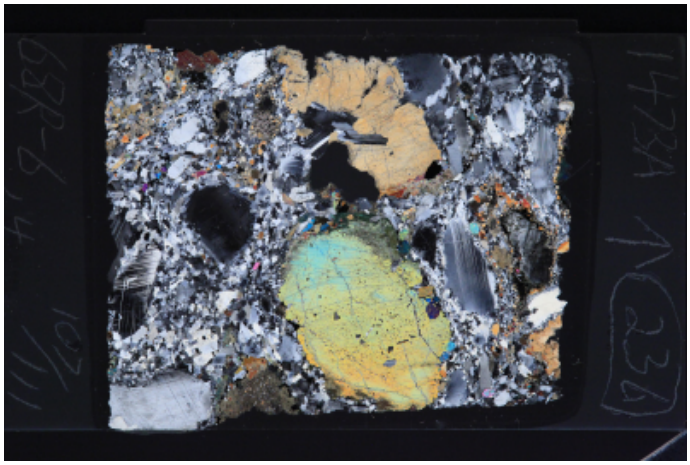
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This is a hybrid sample. A coarse-grained olivine gabbro intruded by a felsic vein. The primary magmatic texture of the olivine gabbro has been destroyed but is very likely of subophitic, as plagioclase is partly or fully enclosed within clinopyroxene. Olivine is partly recrystallized and altered. Plagioclase commonly shows undulose extinction and deformation twins. Clinopyroxene contains abundant brown amphibole blebs and is also rimmed by brown amphibole. The felsic intrusion mainly consists of euhedral plagioclase and ilmenite, with minor orthopyroxene and amphibole. Accessory minerals, such as zircon, apatite and titanite, are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			6	anhedral	subequant	highly recrystallized and altered
Plagioclase	55		8	6.8	anhedral	tabular	undulose extinction and deformation extinction
Clinopyroxene	40		14	10	anhedral	poikilitic	rimmed by amphibole

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JK

Detailed description The olivine gabbro is slightly altered; phase which is most strongly altered is olivine showing replacements of mostly clay, talc, oxide, and pale amphibole, followed by orthopyroxene. Plagioclase in the felsic patches are recrystallized to secondary plagioclase, filled with cloudy inclusion. Brown-green hornblende in these patches are replaced by actinolite.

Comment type	Comment
Alteration general comments:	The olivine gabbro is slightly altered; phase which is most strongly altered is olivine showing replacements of mostly clay, talc, oxide, and pale amphibole, followed by orthopyroxene. Plagioclase in the felsic patches are recrystallized to secondary plagioclase, filled with cloudy inclusion. Brown-green hornblende in these patches are replaced by actinolite.
Vein 1 minerals:	actinolite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	10	10	5
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	10	20	25	20
Amphibole, green	10	30		
Chlorite				10
Clay minerals	50			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10		25	n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	20	n/a	50	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a

Type	Comment
Olivine:	Grain size: medium- to fine-grained; Grain shape: subhedral to anhedral Grain boundary: curved, altered; Undulose extinction: irregular; Texture: recrystallized and partly altered olivine grains
Plagioclase:	Gran size: coarse-grained, fine-grained neoblasts; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: regular to irregular; Twining: tapered Texture: coarse-grained plagioclase with local recrystallization at grain boundaries

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a

Type	Comment
Plagioclase:	Gran size: medium- to fine-grained; Grain shape: subhedral to euhedral; Grain boundary: straight to curved; Undulose extinction: regular; Twining: magmatic; Texture: tabular plagioclase grains as part of the infiltrated felsic melt
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral to anhedral Grain boundary: straight to curved Texture: clinopyroxene oikocrysts with plagioclase chadacrysts

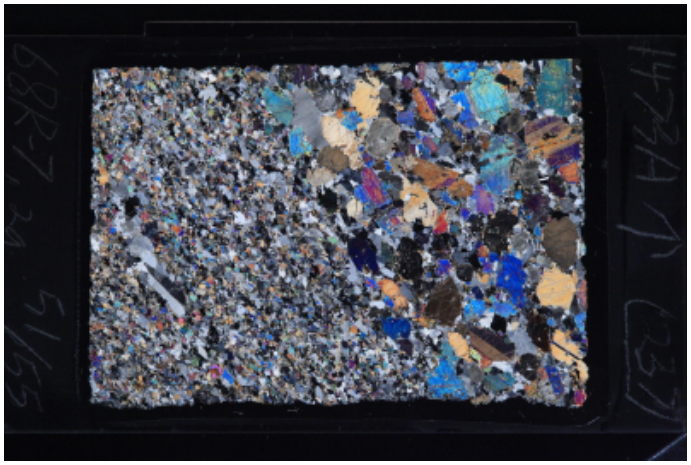
THIN SECTION LABEL ID: **360-U1473A-68R-7-W 51/55-TSB-TS_237** Piece no.: #02 TS no.: 237

Group	Summary
Igneous petrology:	There are two domains in the thin section with a suturing boundary. The coarse-grained olivine gabbro shows an intergranular texture, in which plagioclase is interstitial between clinopyroxene. The fine-grained olivine gabbro is highly foliated, as shown by the preferred orientation of recrystallized plagioclase.
Metamorphic petrology:	Sample is substantially altered. Common secondary phases are brown-green amphibole, actinolite, talc and green clay.
Structure:	Weakly deformed coarse-grained olivine gabbro in contact with fine grained strongly recrystallized fine-grained olivine gabbro. The contact is relatively diffuse marked by an increase in deformation toward the fine-grained material.

Plane-polarized

33283251

Cross-polarized



33283291

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: intergranular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a intergranular texture. Olivine is rimmed by brown amphibole. Plagioclase is recrystallized and shows undulose extinction. It is commonly interstitial between clinopyroxene. Clinopyroxene occasionally shows a consertal texture and contain inclusions of both olivine and plagioclase. Brown amphibole is interstitial between olivine, clinopyroxene and plagioclase. Opaque minerals are mainly composed of sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			1	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	25		2.8	1	anhedral	interstitial	undulose extinction
Clinopyroxene	67		5	4.4	anhedral	subequant	with plagioclase inclusions
Amphibole	0.8		0.6	0.4	anhedral	interstitial	
Opaques	0.2						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained

Detailed description: This domain is a foliated medium-grained olivine gabbro. The foliation is indicated by the preferred orientated recrystallized plagioclase, which shows undulose extinction. Olivine is moderately altered. Clinopyroxene is commonly rimmed by brown amphibole. Opaque minerals consist of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.6	anhedral	subequant	
Plagioclase	55		4.4	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	39		1	0.8	anhedral	subequant	
Amphibole	1		0.3	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): JL

Comment type	Comment
Vein 1 minerals:	Brown green amphibole cutting the coarse grained gabbro and was terminated near the fine grained contact. Vein produces a halo of pale brown amphibole. Actinolite overprint was observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	70	50	10	15
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		40	100	30
Amphibole, green		10		
Chlorite				50
Clay minerals	25			
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Talc	60	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 45 Domain name: microfabric

Microstructure: magmatic Observer: CF

Detailed description Partially preserved magmatic fabric, weakly deformed.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	common	n/a

Type	Comment
Olivine:	very altered
Plagioclase:	Grain size: coarse porphyroclasts and fine to medium recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: irregular Subgrains: curved Texture: preserved magmatic texture, locally deformed and recrystallized along some grain boundaries
Clinopyroxene:	Grain size: coarse Grain shape: anhedral, poikilitic Grain boundary: straight to curved Undulose extinction: weak Texture: preserved magmatic fabric, oikocrysts include euhedral plg chadacrysts and rare ol; rare recrystallized grains are observed at grain boundaries.

Interval domain no: 2 Domain rel. abundance (%): 55 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Strongly recrystallized plagiolcase, with neoblasts of clinopyroxene and olivine as well. The foliation is defined by elongated neoblasts of all the recrystallized phases. The contact is characterized by a relatively diffuse decrease in recrystallization and increase in grain size.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: porphyroclasts are aggregates, and neoblasts occur in association with cpx forming aggregates.
Plagioclase:	Grain size: medium rare porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: tapered Undulose extinction: irregular Subgrains: curved Texture: strongly recrystallized in elongated neoblasts that define the foliation
Clinopyroxene:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Undulose extinction: weak Texture: medium preserved grains, partially recrystallized between plg neoblasts; neoblasts also form aggregates in association with ol

THIN SECTION LABEL ID: **360-U1473A-69R-1-W 109/112-TSB-TS_238** Piece no.: #03 TS no.: 238

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase is partly or fully enclosed within clinopyroxene and olivine.
Metamorphic petrology:	the alteration intensity of this thin section is slight.
Structure:	coarse olivine gabbro with a submagmatic texture. Olivine is partially altered and can be observed as coarse grains with curved contacts with plag and Cpx. Plagioclase grain size is coarse and bent twins, undulose extinction and subgrains are observed. Cpx is fractured, altered, and weakly recrystallized at the boundaries.

Plane-polarized

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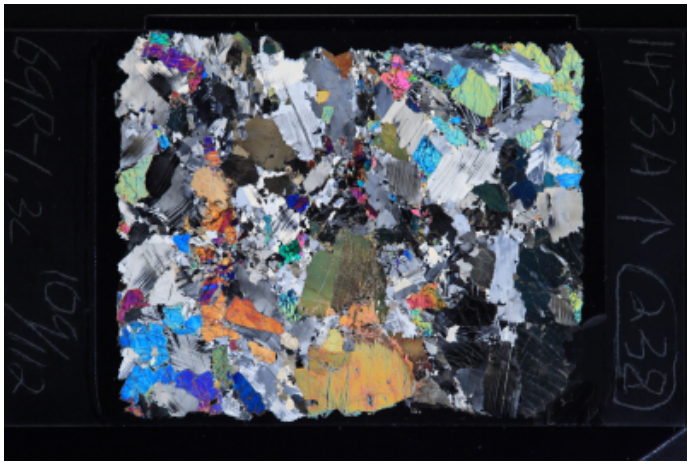
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and clinopyroxene. Plagioclase commonly displays undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within clinopyroxene and olivine. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene and contain tiny brown amphibole blebs. Brown amphibole is also interstitial among olivine, clinopyroxene and plagioclase. Opaque minerals are mainly composed of sulfides, with very few ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			2.4	anhedral	subequant	rimmed by clinopyroxene and orthopyroxene
Plagioclase	49		11	5	anhedral	tabular	undulose extinction
Clinopyroxene	41		10	6	anhedral	poikilitic	with a consertal texture
Amphibole	0.5		0.2	0.05	anhedral	interstitial	
Opaques	0.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol developed typical mesh texture with talc, green clay and minor oxide formation. Cpx altered into colorless amphibole, brown amphibole and clay. Pl were mostly replaced by secondary plagioclase with minor tiny colorless amphibole occurring in the cleavages.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		60		5
Clay minerals	15	20		
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse olivine gabbro with a submagmatic texture. Olivine is partially altered and can be observed as coarse grains with curved contacts with plag and Cpx. Plagioclase grain size is coarse and bent twins, undulose extinction and subgrains are observed. Cpx is fractured, altered, and weakly recrystallized at the boundaries.

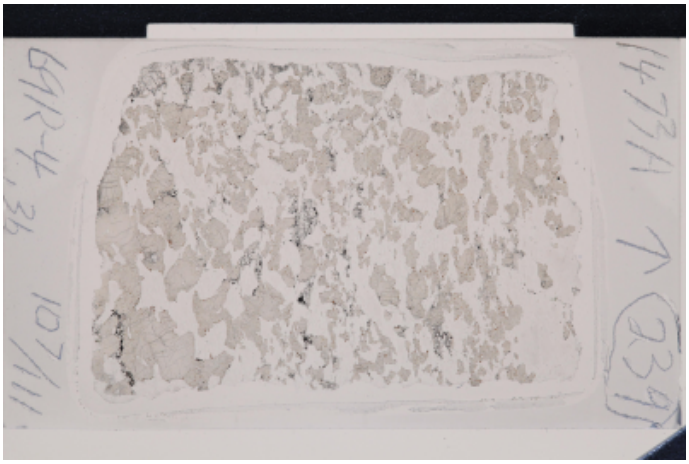
Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved undulose extinction: irregular fractures: common texture: coarse grains with curved contacts. Partially altered.
Plagioclase:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: curved boundaries texture: coarse grains typically showing bent twins. Local recrystallization is observed at grain boundaries.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains partially altered and recrystallized at grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-69R-4-W 107/111-TSB-TS_239** Piece no.: #03 TS no.: 239

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be subophitic, as some clinopyroxene porphyroclasts partly or fully contain plagioclase.
Metamorphic petrology:	Slightly altered sample. Common secondary phases are 2nd Cpx and brown amphibole after primary Cpx.
Structure:	Fine-grained porphyroclastic fabric defined by medium-grained cpx, olivine and plag porphyroclasts contained in a mixture of fine-grained recrystallized plag+ol+cpx+ox.

Plane-polarized



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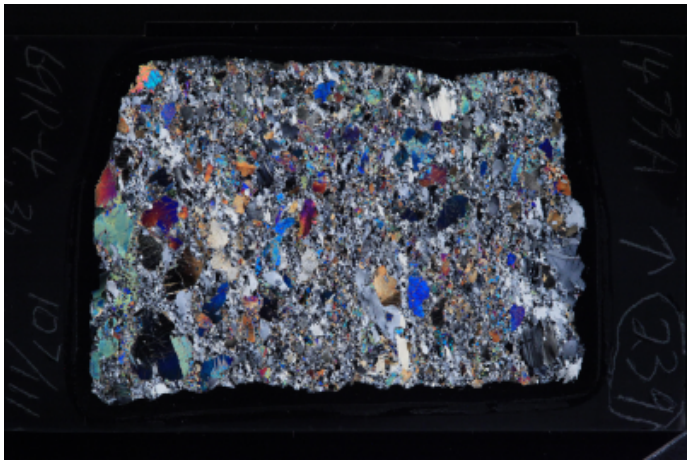
Cross-polarized



33283391

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be subophitic, as some clinopyroxene porphyroclasts partly or fully contain plagioclase. Olivine is partly recrystallized and rimmed by both clinopyroxene and orthopyroxene. Plagioclase is strongly recrystallized and displays undulose extinction. It is highly orientated and defines the foliation. Clinopyroxene is strongly recrystallized and the porphyroclasts occasionally shows a consertal texture. Opaque minerals are dominated by sulfides, which, together with brown amphibole, are interstitial among the clinopyroxene neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		6	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	40		6.4	3.2	anhedral	subequant	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Sample is only slightly altered. Common replacement minerals are 2nd Cpx and brown amphibole. Plagioclase grains are mostly recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	15	0	0
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		10		
Clay minerals	5			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10			n/a
Talc	10	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description Fine-grained porphyroclastic fabric defined by medium-grained cpx, olivine and plag porphyroclasts contained in a mixture of fine-grained recrystallized plag+ol+cpx+ox.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to fine shape: anhedral boundaries: curved undulose extinction: irregular fractures: irregular texture: observed as medium-grained porphyroclasts, partially altered, and as fine recrystallized grains in the matrix.
Plagioclase:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved tiwnning: tapered undulose extinction: irregular subgrains: curved (locally serrated) boundaries texture: medium-grained porphyroclasts and fine-grained recrystallized aggregates forming the matrix.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: fractured porphyroclasts and fine recrystallized grains forming the matrix.
Oxide:	geometry: small pods commonly associated with olivine.

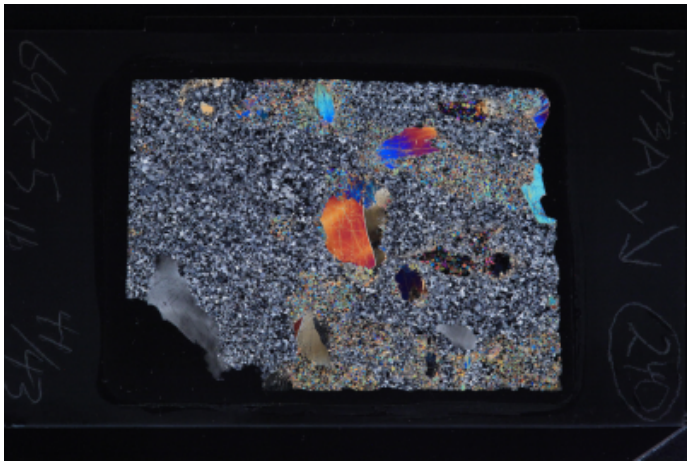
THIN SECTION LABEL ID: **360-U1473A-69R-5-W 41/43-TSB-TS_240** Piece no.: #01 TS no.: 240

Group	Summary
Igneous petrology:	A fine-grained olivine gabbro with a porphyroclastic texture. All minerals are strongly recrystallized.
Metamorphic petrology:	Static background alteration is only slight. Secondary grains after Cpx and plagioclase comprised most of the sample.
Structure:	This is a fine-grained olivine-gabbro in which all phases are strongly reduced to a fine-grained polyphase mixture. Plagioclase forms the main matrix material, while cpx is segregated into fine crystals commonly associated with newly formed amphibole, and olivine is dynamically recrystallized and partially altered in the contact with oxides.

Plane-polarized

33283431

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: fine grained

Detailed description: A fine-grained olivine gabbro with a porphyroclastic texture. All minerals are strongly recrystallized. Olivine neoblasts are subhedral and show triple junctions in the aggregates. Plagioclase display undulose extinction. Clinopyroxene porphyroclasts displays a consertal texture. Brown amphibole, together with very few tiny sulfide, is interstitial among the clinopyroxene neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.4	subhedral	subequant	completely recrystallized
Plagioclase	69		11	0.4	anhedral	subequant	highly recrystallized and showing undulose extinction
Clinopyroxene	25		6	0.4	anhedral	subequant	strongly recrystallized
Amphibole	1		0.1	0.05	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s):

Detailed description Sample is slightly altered. Most of the plagioclase grains are recrsytallized to probably 2nd plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	10		0
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		40		
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	10			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description This is a fine-grained olivine-gabbro in which all phases are strongly reduced to a fine-grained polyphase mixture. Plagioclase forms the main matrix material, while cpx is segregated into fine crystals commonly associated with newly formed amphibole, and olivine is dynamically recrystallized and partially altered in the contact with oxides.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular texture: fine recrystallized grains mixed with oxides and brown amphibole. Few porphyroclasts may be contained in the matrix.
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: tapered undulose extinction: irregular texture: fine-grained recrystallized aggregates forming the matrix of the rock.
Clinopyroxene:	size: fine shape: anhedral boundaries: curved fractures: locally observed on porphyroclast texture: fine recrystallized grains mixed with brown amphibole. Few porphyroclasts can be observed.
Oxide:	geometry: dispersed pods observed at the boundaries of olivine grains.

THIN SECTION LABEL ID: **360-U1473A-69R-5-W 68/74-TSB-TS_241** Piece no.: #01 TS no.: 241

Group	Summary
Igneous petrology:	There are three domains in the thin section, a medium-grained olivine gabbro with a porphyroclastic texture, an oxide gabbronorite with a porphyroclastic texture and an amphibole-bearing gabbro mylonite.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	A porphyroclastic fabric transposed by a normal-sense ultramylonite, both transposed by a normal-sense mylonite.

Plane-polarized

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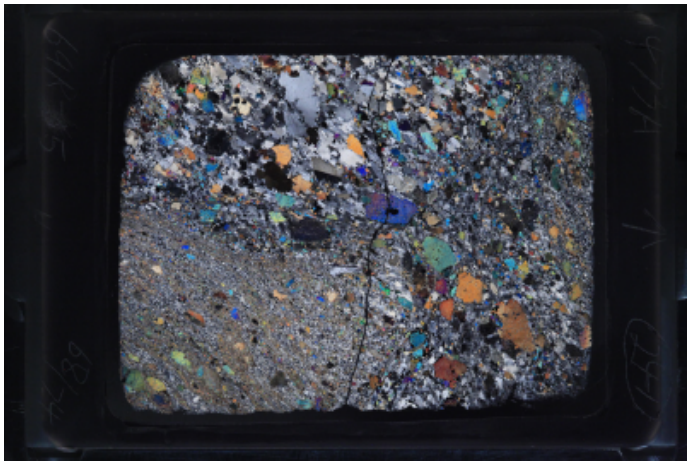
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 35 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Olivine is partly recrystallized and occasionally rimmed by clinopyroxene. Plagioclase is strongly recrystallized and displays undulose extinction and deformation twins. Small anhedral plagioclase occurs as inclusion within clinopyroxene. Clinopyroxene shows a consertal texture and contains abundant brown amphibole blebs. Brown amphibole also occurs at the rim of both clinopyroxene and olivine. Small amount of opaque minerals, dominated by tiny sulfides, are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			2	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	58		8	2.8	anhedral	subequant	undulose extinction
Clinopyroxene	36		4.4	2.8	anhedral	subequant	with a consertal texture
Amphibole	0.5		0.4	0.1	anhedral	interstitial	

Interval domain no: **2** Domain rel. abundance (%): 35 Domain name: lithology domain 2

Lithology: **oxide gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is an oxide gabbronorite with a porphyroclastic texture. Clinopyroxene contain small inclusions of both plagioclase and oxides. It is partly recrystallized and contain abundant brown amphibole blebs. Orthopyroxene occurs as porphyroclast and contain inclusions of clinopyroxene and plagioclase. Ilmenite is also occurred within orthopyroxene along the exsolution lamellae. Opaque minerals are dominated by magnetite, with minor ilmenite. Intergrowth between ilmenite and magnetite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	45		2	1	anhedral	subequant	undulose extinction
Clinopyroxene	44		8	3.2	anhedral	subequant	partly recrystallized
Orthopyroxene	5		2.8	1.6	anhedral	subequant	
Opaques	6						
Magnetite	5						
Ilmenite	1						

Interval domain no: **3** Domain rel. abundance (%): 30 Domain name: lithology domain 3

Lithology: **gabbro** Observer: CL

Texture: mylonitic Ave. grain size: fine grained

Detailed description: This domain is an amphibole-bearing gabbro mylonite. Plagioclase is completely recrystallized and foliated. Clinopyroxene is strongly recrystallized and distributed along the foliation. Brown amphibole is associated with the neoblasts or occurs at the rim of clinopyroxene porphyroclasts together with opaque minerals, which are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	50		0.4	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	45		3.2	3.2			
Amphibole	4		0.4	0.02	anhedral	interstitial	
Opaques	0.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol altered into talc, serpentine, clay and minor oxide. The replacements of Cpx were colorless amphibole, brown amphibole and clay. Pl were mostly replaced by secondary Pl with clay and colorless amphibole occurring in the micro-fractures.

Comment type	Comment
Mylonite comments:	Mylonite characterized by aggregates of recrystallization of Cpx and Pl. Cpx neoblasts were associated with brown amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	8		15
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless		30		5
Clay minerals	20	20		15
Clinopyroxene, sec.	n/a	15	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	65	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 33 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description A porphyroclastic fabric transposed by a normal-sense ultramylonite, both transposed by a normal-sense mylonite. The ultramylonite is steep, whereas the mylonite is shallow. There are Fe-Ti oxides along the boundaries between each fabric type.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~2 mm. neoblasts: ~0.15 mm. Grain shape: anhedral. Grain boundary: curved to straight. Undulose extinction: complete. Texture: weakly recrystallized, mostly has undulose extinction showing subgrain development.
Plagioclase:	Grain size: porphyroclasts: ~4.5 mm. neoblasts: ~0.15 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered. Undulose extinction: patchy. Subgrains: well developed in porphyroclasts. Texture: porphyroclastic, moderate fabric.
Clinopyroxene:	Grain size: porphyroclasts: ~2 mm. neoblasts: ~0.3 mm. Grain shape: subhedral. Grain boundary: straight or curved. Undulose extinction: patchy, weak. Texture: magmatic.

Interval domain no: 2 Domain rel. abundance (%): 33 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	normal-dextral	n/a

Type	Comment
Olivine:	Grain size: neoblasts: ~0.15 mm. Grain shape: equigranular Grain boundary: straight to curved. Undulose extinction: patchy. Texture: neoblasts.
Plagioclase:	Grain size: porphyroclasts: ~1 mm. neoblasts: ~0.01 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: absent. Undulose extinction: strong to patchy. Subgrains: well developed in porphyroclasts. Texture: porphyroclasts that are very elongate in very fine grained neoblast matrix.
Clinopyroxene:	Grain size: porphyroclasts: 2 mm. neoblasts: ~0.2 mm. Grain shape: subhedral. Grain boundary: irregular. Undulose extinction: patchy. Texture: porphyroclastic.
Oxide:	Along boundary (shear zone) between mylonite above and porphyroclastic and ultramylonitic below.

Interval domain no: 3 Domain rel. abundance (%): 33 Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	complete	n/a
CPF fabric intensity:	ultramylonitic [CPF_fabric]	5
Fracture abundance:	rare	n/a
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~1.2 mm. neoblasts: ~0.15 mm. Grain shape: anhedral. Grain boundary: curved. Undulose extinction: strong, especially in porphyroclasts. Texture: porphyroclastic.
Plagioclase:	Grain size: pophyroclasts: ~1 mm. neoblasts: 0.01-0.15 mm. Grain shape: anhedral. Grain boundary: irregular. Twinning: tapered, especially in porphyroclasts. Undulose extinction: weak and patchy. Subgrains: not well developed. Texture: aggregates of neoblasts.
Clinopyroxene:	Grain size: porphyroclasts: ~1.75 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular. Undulose extinction: strong when kinked. Texture: porphyroclastic.
Oxide:	Along boundary between mylonitic and porphyroclastic.

THIN SECTION LABEL ID: **360-U1473A-69R-6-W 132/135-TSB-TS_242** Piece no.: #04 TS no.: 242

Group	Summary
Igneous petrology:	There are two domains of olivine gabbro in the thin section with different grain sizes and textures. The primary magmatic textures of both domains are not preserved. The coarser domain displays a granular texture. The finer domain is foliated and shows a porphyroclastic texture.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	Porphyroclastic texture developed in both medium- and fine- grained domain. The foliation is defined by elongated recrystallized phases.

Plane-polarized

33283511

Cross-polarized

33283531

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a porphyroclastic texture. The foliation is indicated by the preferred orientation of olivine and plagioclase. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is recrystallized and shows undulose extinction. Clinopyroxene shows a consertal texture. Brown amphibole is interstitial among olivine, clinopyroxene and plagioclase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			2.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	50		2.8	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	42		2.6	1	anhedral	subequant	with a consertal texture
Amphibole	0.3		0.2	0.1	anhedral	interstitial	

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a granular texture. Olivine is rimmed by orthopyroxene. Plagioclase is partly recrystallized and shows undulose extinction. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene and contains abundant brown amphibole blebs.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.6	anhedral	subequant	rimmed by orthopyrpoxene
Plagioclase	55		2.8	1	anhedral	subequant	undulose extinction
Clinopyroxene	40		5.6	2.4	anhedral	subequant	with a consertal texture
Amphibole	0.5		0.1	0.05	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol developed typical mesh texture with talc, green clay and minor oxide formation. The replacements of Cpx were colorless amphibole, brown amphibole and clay. Pl were mostly replaced by secondary Pl with tiny colorless amphibole occurring in the micro-fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	8		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	10	50		20
Clay minerals	15	20		
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	70	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 70 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation defined by elongated neoblasts of plagioclase, and recrystallized aggregates of olivine and clinopyroxene.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: rare porphyroclasts strongly recrystallized, may form elongated aggregates in association with cpx that define the foliation
Plagioclase:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: regular Subgrains: curved Texture: rare porphyroclasts preserved stronlgy recrystallized; elongated neoblasts define the foliation
Clinopyroxene:	Grain size: medium porphyroclats and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: weak Texture: weakly deformed porphyroclasts partially recrystallized

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation defined by elongated neoblasts of plagioclase, and recrystallized aggregates of olivine and clinopyroxene.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium to coarse porphyroclasts and mediumd to fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: porphyroclasts partially recrystallized, may form elongated aggregates in association with cpx along porphyroclasts grain boundaries
Plagioclase:	Grain size: coarse porphyroclasts and medium to fine recrystallized Grain shape: anhedral Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: regular Subgrains: curved Texture: rare porphyroclasts preserved stronlgy recrystallized; elongated neoblasts define the foliation
Clinopyroxene:	Grain size: coarse porphyroclats and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: weak Texture: weakly deformed porphyroclasts partially recrystallized

THIN SECTION LABEL ID: **360-U1473A-70R-1-W 52/55-TSB-TS_243** Piece no.: #01 TS no.: 243

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is partly recrystallized and shows undulose extinction and deformation twins. However, the tabular plagioclase commonly display magmatic twins and is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is only slightly altered. Common secondary phases are 2nd Cpx and brown amphibole after primary Cpx.
Structure:	A coarse-grained, subophitic olivine gabbro. Plagioclase is locally recrystallized and shows undulose extinction and tapered twinning. Tabular plagioclase displays magmatic twins and is partly or fully enclosed within clinopyroxene.

Plane-polarized

33283551

Cross-polarized

33283571

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is partly recrystallized and shows undulose extinction and deformation twins. However, the tabular plagioclase commonly display magmatic twins and is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally shows a consertal intergrowth texture and contain abundant brown amphibole blebs. Opaque minerals are composed of sulfides and ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			2.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		7.2	2.8	anhedral	subequant	undulose extinction
Clinopyroxene	36		8	5	anhedral	poikilitic	occasionally with a consertal texture
Amphibole	0.2		0.4	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.2						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Static background alteration intensity is only slight. Common alteration phases are serpentine, magnetite and talc after olivine; 2nd Cpx, brown and colorless amphibole after primary Cpx; and 2nd plagioclase after primary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	10	0	3
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		30		
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: curved, altered; Undulose extinction: regular; Subgrain: curved; Texture: fractured and partly altered olivine grains wit undulose extinction and local recrystallization
Plagioclase:	Grain size: coarse- to medium-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered and magmatic; Texture: coarse-grained, tabular plagioclase grains with magmatic twinning and medium-grained recrystallized plagioclase grains
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved Undulose extinction: irregular: Texture: clinopyroxene oikocrysts with plagioclase chadacrysts
Oxide:	rare interstitial oxide

THIN SECTION LABEL ID: **360-U1473A-70R-1-W 71/75-TSB-TS_244** Piece no.: #01 TS no.: 244

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	Medium-grained, granular olivine gabbro.

Plane-polarized

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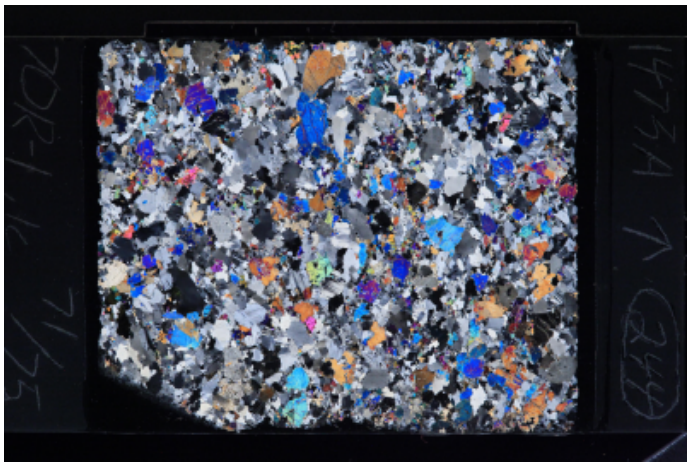
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a granular texture. Olivine is rimmed by orthopyroxene. Plagioclase commonly shows undulose extinction and deformation twins. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene and contains brown amphibole blebs and plagioclase inclusions. Opaque minerals are dominated by sulfides, with minor ilmenite. Intergrowth texture between both minerals can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			1.6	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	60		2.4	2.2	anhedral	subequant	undulose extinction
Clinopyroxene	30		4	2.8	anhedral	subequant	containing plagioclase inclusion

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol developed typical mesh texture with talc, green clay and minor oxide formation. The replacements of Cpx were colorless amphibole, brown amphibole and clay. Pl were mostly replaced by secondary Pl with minor tiny amphibole occurring in the micro-fratures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	10		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		55		5
Clay minerals	20	15		
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Talc	75	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

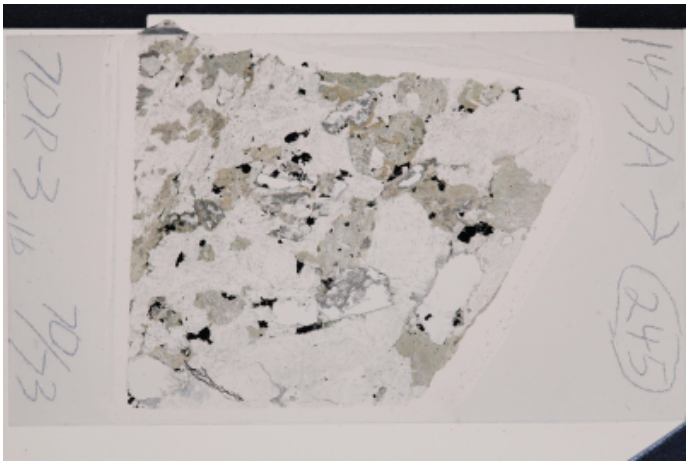
Feature type	Observation	Intensity rank
CPF dynamic recrystallization:	weak	n/a

Type	Comment
Olivine:	Grain size: medium-grained; Grain shape: anhedral Grain boundary: curved, altered; Undulose extinction: regular; Subgrain: curved; Texture: medium-grained olivine grains frequently aggregated
Plagioclase:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twining: tapered; Texture: granular plagioclase
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular: Texture: clinopyroxene with exsolution lamellae and plagioclase inclusions
Oxide:	rare interstitial oxide

THIN SECTION LABEL ID: **360-U1473A-70R-3-W 70/73-TSB-TS_245** Piece no.: #01 TS no.: 245

Group	Summary
Igneous petrology:	This is a hybrid sample, in which a coarse-grained gabbro was intruded by a felsic vein. Plagioclase is in a subequant to tabular shape and shows an oscillatory zoning. Clinopyroxene is strongly altered and replaced by amphibole. Opaque minerals are dominated by ilmenite, with minor sulfide. Accessory minerals, including zircon, apatite and titanite, are present. Apatite inclusions within plagioclase can be seen.
Metamorphic petrology:	Static alteration intensity is substantial. Minerals indicate amphibolite to zeolite facies alteration.
Structure:	Coarse undeformed rock with a high degree of alteration.

Plane-polarized



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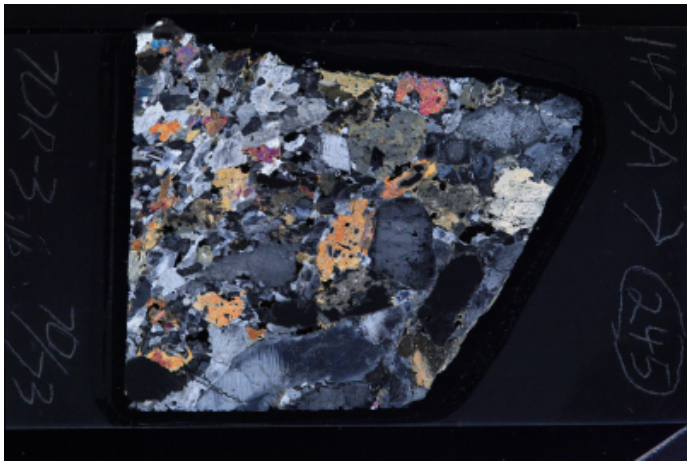
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **hybrid gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: This is a hybrid sample, in which a coarse-grained gabbro was intruded by a felsic vein. Plagioclase is in a subequant to tabular shape and shows an oscillatory zoning. Clinopyroxene is strongly altered and replaced by amphibole. Opaque minerals are dominated by ilmenite, with minor sulfide. Accessory minerals, including zircon, apatite and titanite, are present. Apatite inclusions within plagioclase can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		7.2	3.2	euhedral	subequant	
Clinopyroxene	25		6	5	anhedral	subequant	strongly altered
Opaques	5						
Ilmenite	5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): TN

Detailed description Clinopyroxene is replaceed by amphibole patches and pseudomorphs; plagioclase has network of secondary plagioclase and zeolite veins.

Comment type	Comment
Vein 1 minerals:	zeolite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		50		30
Amphibole, brown	n/a	45	n/a	n/a
Amphibole, colorless		20		10
Amphibole, green		30		
Chlorite				10
Oxide		4		n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Sulfide		1		n/a
Zeolite	n/a	n/a	n/a	20
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: GV

Detailed description Coarse undeformed rock with a high degree of alteration.

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered texture: coarse grains, partially altered.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains altered to green amphibole.

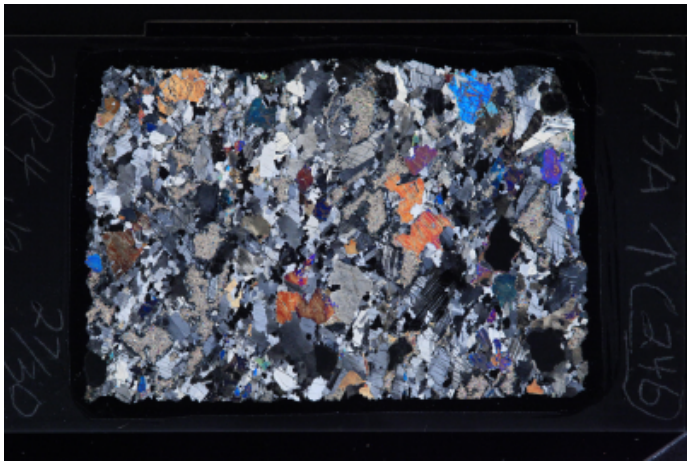
THIN SECTION LABEL ID: **360-U1473A-70R-4-W 27/30-TSB-TS_246** Piece no.: #01 TS no.: 246

Group	Summary
Igneous petrology:	A deformed olivine gabbro, preserving a subophitic texture. Olivine is completely altered and the original shape is not preserved. Plagioclase is commonly in a tabular shape, and sometimes partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Static alteration intensity is moderate. Talc + actinolite pseudomorphs after olivine with coronitic chlorite are conspicuous.
Structure:	Minor deformed olivine gabbro, preserving a subophitic texture. The olivine is entirely altered and veins nucleate radially around the olivine grains into the plagioclase grains. Plagioclase is commonly tabular in shape, however, plagioclase neoblasts are observed throughout the thin section.

Plane-polarized

33283821

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A deformed olivine gabbro, preserving a subophitic texture. Olivine is completely altered and the original shape is not preserved. Small amount of tiny sulfides occur within the altered olivine. Plagioclase is commonly in a tabular shape, and sometimes partly or fully enclosed within clinopyroxene. It is partly recrystallized and shows undulose extinction and deformation twins. Clinopyroxene occasionally shows a consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15						completely altered
Plagioclase	60		7.2	2.8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	25		4	3.6	anhedral	poikilitic	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): TN

Detailed description Olivine is replaced completely replaced by actinolite + talc aggreagte; clinopyroxene by patches and rims of secondary clinopyroxene, brown/green/colorless amphiboles and by chlorite (?) along cleavage surfaces; plagioclase has chlorite corona around pseudomorphs after olivine and chlorite + actinolite veins.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	5		10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	65	30		10
Amphibole, green	10	10		
Chlorite		20		90
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	3			n/a
Sulfide	2			n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic

Minor deformed olivine gabbro, preserving a subophitic texture. The olivine is entirely altered and veins nucleate radially around the olivine grains into the plagioclase grains. Plagioclase is commonly tabular in shape, however, plagioclase neoblasts are observed throughout the thin section.

Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: altered; Texture: fully altered olivine grains
Plagioclase:	Grain size: medium- to fine-grained; Grain shape: subhedral (tabular) to anhedral; Grain boundary: straight to curved; Undulose extinction: irregular Twining: tapered Texture: tabular plagioclase grains surrounded by anhedral plagioclase neoblasts. Tabular plagioclase is extensively fractured.
Clinopyroxene:	Grain size: medium-grained; Grain shape: anhedral Grain boundary: straight to curved Texture: partly fractured and altered clinopyroxene with plagioclase inclusions

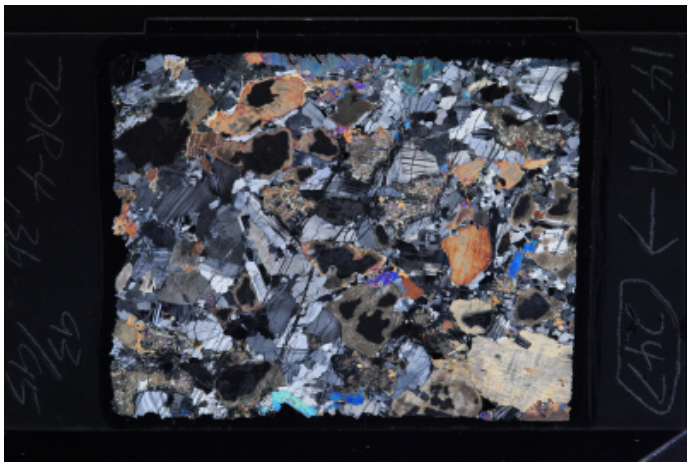
THIN SECTION LABEL ID: **360-U1473A-70R-4-W 93/95-TSB-TS_247** Piece no.: #03 TS no.: 247

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape and is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Static alteration intensity is substantial. Olivine is completely replaced by pseudomorphic aggreagte of actionolite and talc/clay with coronitic fringes of chlorite.
Structure:	Undeformed gabbro with sub-parallel vein network.

Plane-polarized

33283921

Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is completely altered. Plagioclase is commonly in a tabular shape and partly or fully enclosed within clinopyroxene. It also commonly shows undulose extinction and deformation twins. Clinopyroxene is weakly recrystallized and strongly altered. Opaque minerals are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12						completely altered
Plagioclase	48		5	3.6	anhedral	tabular	deformation twins and undulose extinction
Clinopyroxene	40		10	7	anhedral	poikilitic	highly altered
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): TN

Detailed description Olivine is completely replaced by pseudomorphic aggregates of actinolite and talc/clay with chlorite coronas, clinopyroxene is replaced by secondary clinopyroxene patches, by amphibole patches and rims, and by chlorite or clay (?) along cleavage surfaces; plagioclase has microveins of clorite or chlorite + actinolite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	60		5
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless	50	33		10
Amphibole, green	20	5		
Chlorite	10	35		90
Clay minerals	10			
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	2	1		n/a
Sulfide	1	1		n/a
Talc	7	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	Grain size: coarse- to medium-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Undulose extinction: Twinning: tapered and magmatic; Texture: partly fractured, tabular plagioclase grain with minor recrystallization
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: partly altered clinopyroxene oikocrysts with plagioclase chadacrysts
Vein:	Sub-parallel vein network cross-cutting the short axis of the thin section. Veins have a clear cut relationship with their wall rock and vein crystals are typically orientated perpendicular to the vein wall.

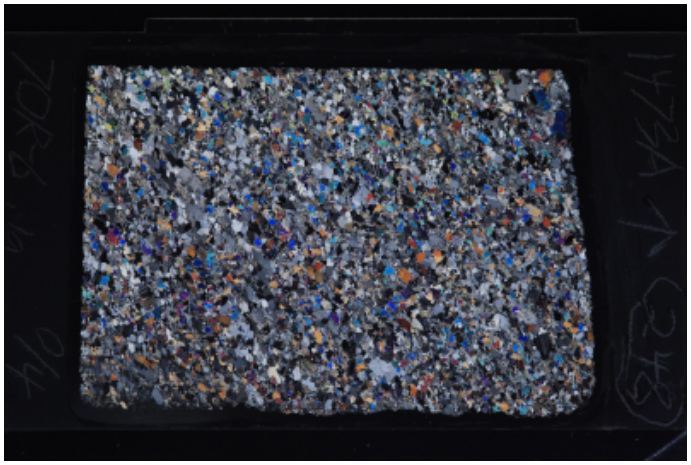
THIN SECTION LABEL ID: **360-U1473A-70R-6-W 0/4-TSB-TS_248** Piece no.: #01 TS no.: 248

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. Olivine is completely altered and the original shape is not preserved.
Metamorphic petrology:	The rock shows extensive recrystallization of Pl and Cpx, and is crosscut by a major vein filled with pale-green Amp and chlorite. The alteration is overall moderate.
Structure:	fine-grained recrystallized rock characterized by anhedral cpx and olivine grains, and recrystallized plagioclase commonly forming triple junctions.

Plane-polarized

33284101

Cross-polarized



33284121

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a granular texture. Olivine is completely altered and the original shape is not preserved. Plagioclase commonly shows magmatic twins and undulose extinction. Deformation twins can also be seen. Clinopyroxene is partly altered and occasionally displays a consertal intergrowth texture. Very tiny sulfides are associated with the altered olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5						completely altered
Plagioclase	55		2.8	1	anhedral	subequant	undulose extinction
Clinopyroxene	40		2.4	0.8	anhedral	subequant	with a consertal texture
Opaques	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): RT

Detailed description The rock shows extensive recrystallization of Pl and Cpx, and is crosscut by a major vein filled with pale-green Amp and chlorite. The alteration is overall moderate.

Comment type	Comment
Alteration general comments:	The rock overall shows a moderate alteration.
Mylonite comments:	Pl and Cpx are extensively recrystallized.
Vein 1 minerals:	The thin section is crosscut by a vein filled with pale-green Amp and chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	90	10		10
Amphibole, colorless		90		50
Chlorite	30	10		50
Oxide	10			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description fine-grained recrystallized rock characterized by anhedral cpx and olivine grains, and recrystallized plagioclase commonly forming triple junctions.

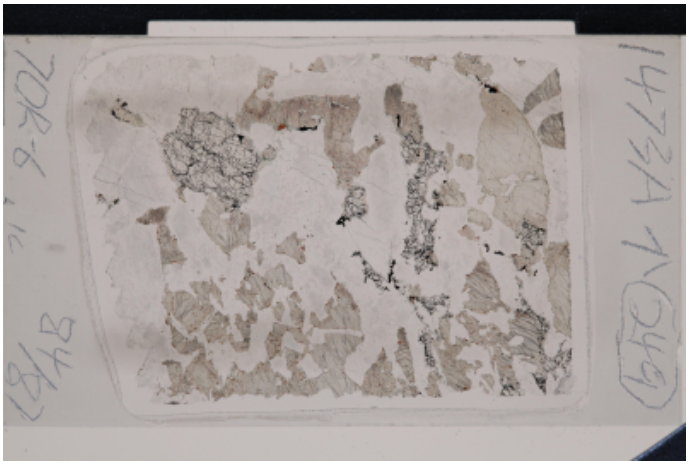
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: fine shape: anhedral boundaries: curved fractures: irregular texture: highly altered crystals.
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: tapered (magmatic locally observed) undulose extinction: irregular subgrains: curved to straight boundaries texture: fine-grained recrystallized aggregates commonly exhibiting triple junctions.
Clinopyroxene:	size: fine shape: anhedral boundaries: curved fractures: common texture: recrystallized grains locally displaying "bulging" contacts with plagioclase.
Oxide:	geometry: thin pods associated with olivine alteration.

THIN SECTION LABEL ID: **360-U1473A-70R-6-W 84/87-TSB-TS_249** Piece no.: #01 TS no.: 249

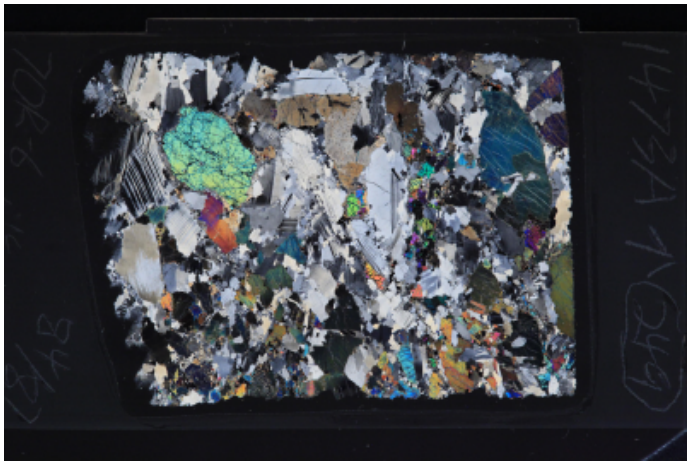
Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is commonly in a subequant shape and display undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The sample shows a slight background alteration.
Structure:	weakly deformed coarse olivine-gabbro. Olivine is observed as coarse, fractured and partially altered grains. Plag shows tapered twins and local recrystallization at grain boundaries. Cpx is fractured and may be altered.

Plane-polarized



33284141

Cross-polarized



33284161

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is commonly in a subequant shape and display undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal intergrowth texture with orthopyroxene and contains tiny brown amphibole blebs. Brown amphibole also occurs at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			1.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	59		7	2.8	anhedral	subequant	undulose extinction
Clinopyroxene	30		10	3	anhedral	poikilitic	showing a consertal texture
Amphibole	0.5		0.6	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 8 Observer(s): RT

Detailed description The static background alteration is slight.

Comment type	Comment
Alteration general comments:	The static background alteration is slight.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		50
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		50		30
Chlorite	20			20
Epidote/zoisite	n/a	n/a	n/a	50
Oxide	20			n/a
Talc	60	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description weakly deformed coarse olivine-gabbro. Olivine is observed as coarse, fractured and partially altered grains. Plag shows tapered twins and local recrystallization at grain boundaries. Cpx is fractured and may be altered.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved undulose extinction: irregular texture: fractured and altered grains associated with oxides.
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse deformed crystals rimmed by fine-recrystallized aggregates.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: irregular texture: coarse, fractured grains in contact with oxides.
Oxide:	geometry: thin pods at the boundaries of olivine and cpx.

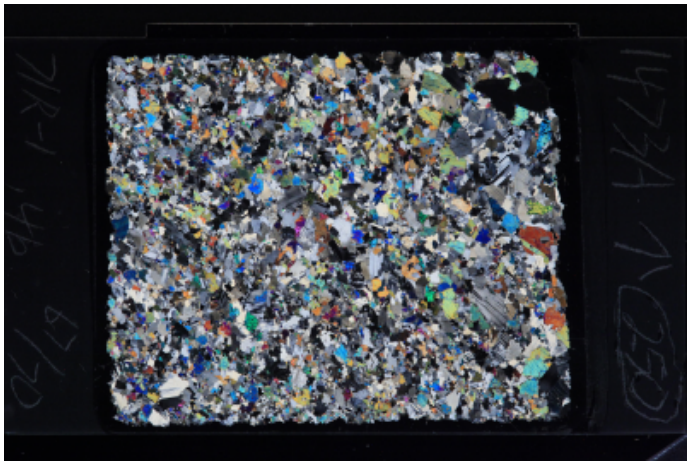
THIN SECTION LABEL ID: **360-U1473A-71R-1-W 67/70-TSB-TS_250** Piece no.: #04 TS no.: 250

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. Plagioclase displays undulose extinction and deformation twins. It also occurs as inclusions within both clinopyroxene and olivine.
Metamorphic petrology:	The sample shows negligible static background alteration.
Structure:	Fine-grained olivine gabbro consisting of a granular aggregate of subequant olivine, plagioclase and clinopyroxene.

Plane-polarized

33284241

Cross-polarized



33284261

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a granular texture. Olivine is commonly interstitial between plagioclase and is rimmed by clinopyroxene and orthopyroxene. Plagioclase displays undulose extinction and deformation twins. It also occurs as inclusions within both clinopyroxene and olivine. Clinopyroxene occasionally shows a consertal texture. Opaque minerals are dominated by tiny sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			0.8	anhedral	interstitial	rimmed by orthopyroxene and clinopyroxene
Plagioclase	45		4	1.6	anhedral	subequant	undulose extinction
Clinopyroxene	47		3.2	1.6	anhedral	subequant	
Opaques	0.3						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The static background alteration is negligible.

Comment type	Comment
Alteration general comments:	The static background alteration is negligible.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	3		
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		70		
Oxide	30			n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description fine-grained olivine gabbro consisting of a granular aggregate of subequant olivine, plagioclase and cpx.

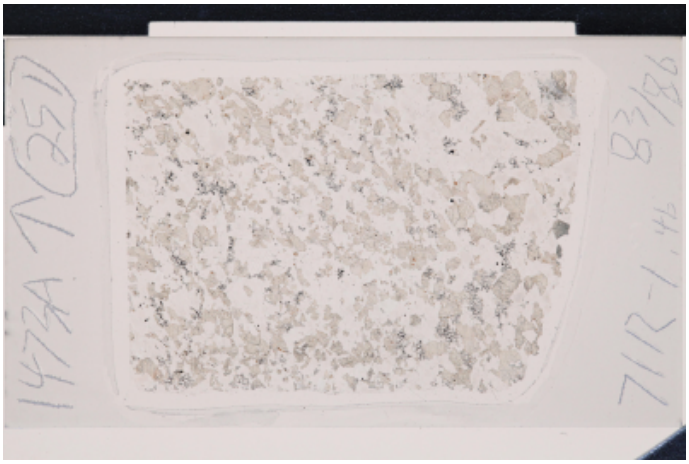
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: fine shape: subhedral boundaries: curved undulose extinction: irregular texture: fractured and partially altered grains in contact with oxides.
Plagioclase:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: curved boundaries texture: medium grains with bent twins and fine-grains with triple junctions.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: dispersed grains with curved contacts with other phases.
Oxide:	geometry: thin patches at the boundaries with olivine and cpx.

THIN SECTION LABEL ID: **360-U1473A-71R-1-W 83/86-TSB-TS_251** Piece no.: #04 TS no.: 251

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase commonly displays undulose extinction and deformation twins. Occasionally, subhedral plagioclase is partly or fully enclosed within clinopyroxene, which commonly show a consertal texture.
Metamorphic petrology:	The sample shows negligible static background alteration.
Structure:	medium to fine grained olivine gabbro with medium to fine grained olivine, plag and cpx are observed as aggregates with curved contacts and local triple junctions (plag).

Plane-polarized



33282451

Cross-polarized

33282471

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is commonly in a subequant shape and rimmed by clinopyroxene and orthopyroxene. A part of olivine is in a elongate shape and interstitial between plagioclase. Plagioclase commonly displays undulose extinction and deformation twins. Occasionally, subhedral plagioclase is partly or fully enclosed within clinopyroxene, which commonly show a consertal texture. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	11			1.2	anhedral	subequant	rimmed by clinopyroxene and orthopyroxene
Plagioclase	53		2	1.2	anhedral	subequant	undulose extinction
Clinopyroxene	36		3.2	2.8	anhedral	poikilitic	with a consertal texture
Opaques	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Comment type	Comment
Alteration general comments:	The static background alteration is negligible.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	3		
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		70		
Oxide	30			n/a
Talc	70	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description medium to fine grained olivine gabbro with medium to fine grained olivine, plag and cpx are observed as aggregates with curved contacts and local triple junctions (plag).

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular texture: medium to fine grains associated with alteration and oxides.
Plagioclase:	size: medium to fine shape: anhedral boundaries: curved twinning: tapered undulose extinction: irregular texture: deformed medium grains and recrystallized fine grains with triple junctions.
Clinopyroxene:	size: medium to fine shape: anhedral boundaries: straight to curved fractures: common texture: medium grained fragments and fine grains in contact with plagioclase.
Oxide:	geometry: thin pods at olivine grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-71R-2-W 55/58-TSB-TS_252** Piece no.: #02 TS no.: 252

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. A weak igneous lamination is shown by the shape-preferred orientation of plagioclase.
Metamorphic petrology:	static alteration intensity is slight. Most of alteration minerals occur as fracture fillings except for patchy secondary clinopyroxene and brown amphibole.
Structure:	This is an olivine gabbro with a magmatic fabric defined by the shape preferred orientation of the long axis of plagioclase grains. Olivine is partially altered in contact with oxides and Cpx is observed as medium grains with straight to curved contacts with other phases

Plane-polarized

33304681

Cross-polarized

33326451

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a granular texture. A weak igneous lamination is shown by the shape-preferred orientation of plagioclase. Olivine is rimmed by orthopyroxene and distributed roughly following the direction of lamination. Plagioclase is commonly in a tabular shape. It is weakly recrystallized and shows undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene. Opaque minerals are dominated by tiny sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	52		6	3.2	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	43		3.6	1.6	anhedral	subequant	with a consertal texture
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): TN

Detailed description Olivine is replaced by serpentine or clay along fractures; clinopyroxene by secondary clinopyroxene and brown amphibole patches and by clay (?) along cleavage surfaces; plagioclase by chloroite and clay along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		2
Amphibole, brown	n/a	40	n/a	n/a
Chlorite				50
Clay minerals		10		50
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	4			n/a
Sulfide	1			n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description This is an olivine gabbro with a magmatic fabric defined by the shape preferred orientation of the long axis of plagioclase grains. Olivine is partially altered in contact with oxides and Cpx is observed as medium grains with straight to curved contacts with other phases.

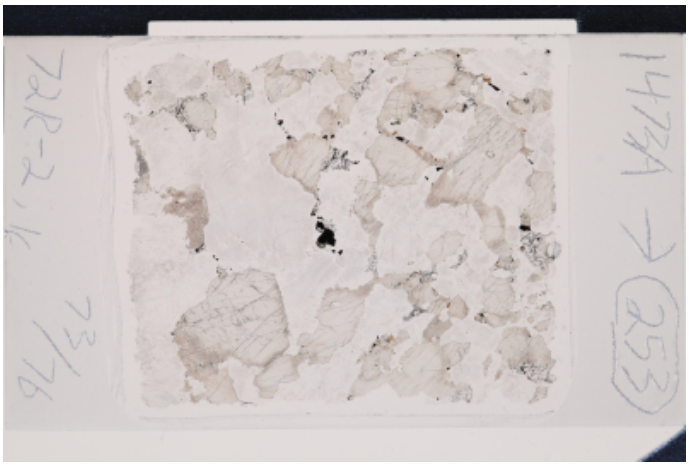
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular texture: medium grains, fractured and partially altered.
Plagioclase:	size: medium shape: subhedral boundaries: straight twinning: tapered undulose extinction: irregular texture: a weak shape preferred orientation can be observed.
Clinopyroxene:	size: medium shape: subhedral boundaries: straight to curved fractures: common texture: fractured grains in straight contact with plagioclase.
Oxide:	geometry: few pods at the boundaries of olivine grains.

THIN SECTION LABEL ID: **360-U1473A-72R-2-W 73/76-TSB-TS_253** Piece no.: #01 TS no.: 253

Group	Summary
Igneous petrology:	A coarse-grained olivine-bearing gabbro with a subophitic texture. Occasionally, subhedral olivine and plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Static alteration intensity is substantial with a considerable amount of secondary plagioclase.
Structure:	Isotropic with a very weak crystal plastic overprint.

Plane-polarized



33304641

Cross-polarized

33304661

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine-bearing gabbro with a subophitic texture. Olivine is commonly in a subequant shape and rimmed by orthopyroxene. Small olivine grains are also interstitial between plagioclase and clinopyroxene. Tabular plagioclase sommonly shows magmatic twins. It is partly recrystallized and displays undulose extinction and deformation twins. Occasionally, subhedral olivine and plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth textures and contain brown amphibole blebs. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	3			0.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	61		10	5	anhedral	tabular	undulose extinction
Clinopyroxene	35		8	6	anhedral	poikilitic	with a consertal texture
Opaques	0.7						
Ilmenite	0.5						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): TN

Detailed description Olivine is replaced by serpentine or clay along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patches and blebs, and by brwon clay along cleavage surfaces; plagioclase by secondary plagioclase network and by fracture-filling clay (?).

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		40
Amphibole, brown	n/a	30	n/a	n/a
Clay minerals		30		5
Clinopyroxene, sec.	n/a	35	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Sulfide	1	1		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Magmatic texture with patchy to rectilinear extinction.
Plagioclase:	Magmatic with some tapered twins, patchy extinction.
Clinopyroxene:	Magmatic.
Oxide:	Some small pods with silicate xenoliths.

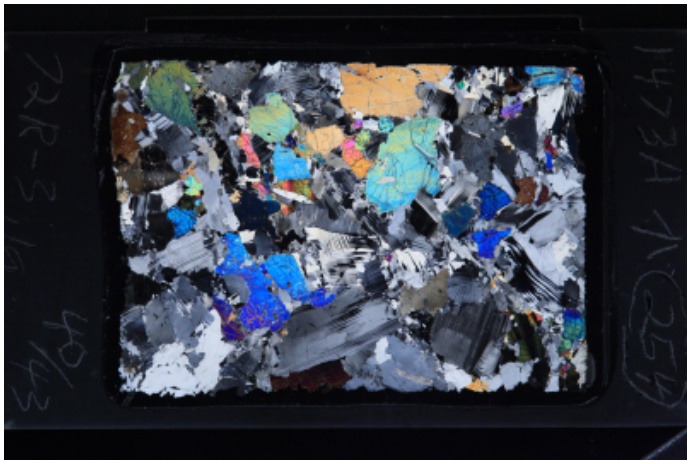
THIN SECTION LABEL ID: **360-U1473A-72R-3-W 40/43-TSB-TS_254** Piece no.: #01 TS no.: 254

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Occasionally, subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is weakly recrystallized and shows a consertal texture.
Metamorphic petrology:	Static alteration intensity is substantial. Secondary plagioclase network is the most significant alteration product.
Structure:	Weakly deformed under submagmatic regime. Plagioclase and olivine are deformed, and clinopyroxene is weakly deformed.

Plane-polarized

33304541

Cross-polarized



33304581

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size:

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is in a subequant shape and rimmed by orthopyroxene. Tabular plagioclase preserves magmatic twins. However, it is partly recrystallized and shows undulose extinction and deformation twins. Occasionally, subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene is weakly recrystallized and shows a consertal texture. It also contains small anhedral olivine inclusions. Small amount of ilmenite and sulfides are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			3.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	68		11	5	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	24		8	6	anhedral	poikilitic	occasionally with a consertal texture
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): TN

Detailed description Olivine is replaced by serpentine or clay along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patces and blebs, and by brown clay along fractures and cleavage surfaces; plagioclace by secondary plagioclase network and chlorite/clay fracture fillings.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		50
Amphibole, brown	n/a	30	n/a	n/a
Chlorite				5
Clay minerals		35		5
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Sulfide	1	1		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

Detailed description Weak deformation defined by tapered twins in plagioclase, subgrains in olivine and partially recrystallized plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: curved Undulose extinction: Regular Subgrains: straight Texture: fractured and partially altered
Plagioclase:	Grain size: coarse porphyroclasts and very fine grained recrystallized Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinnings: igneous and tapered Undulose extinction: regular Texture: coarse preserved fabric, locally and partially recrystallized along grain boundaries
Clinopyroxene:	Grain size: coarse porphyroclasts and very fine grained recrystallized Grain shape: subhedral to anhedral Grain boundary: straight to curved Undulose extinction: weak Texture: coarse preserved fabric, locally and partially recrystallized along grain boundaries

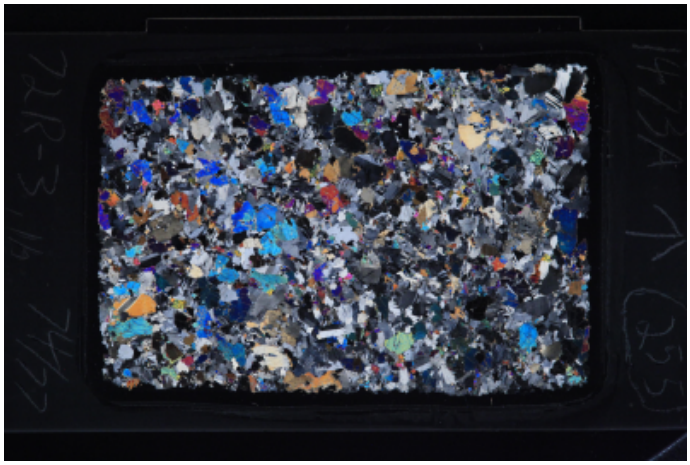
THIN SECTION LABEL ID: **360-U1473A-72R-3-W 74/77-TSB-TS_255** Piece no.: #01 TS no.: 255

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase commonly shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine.
Metamorphic petrology:	Static alteration intensity is modearte. Secondary plagioclase network is the most dominant alteration phase.
Structure:	Well-preserved magmatic texture with isotropic fabric.

Plane-polarized

33304501

Cross-polarized



33304521

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine, in particular the small grain, is commonly interstitial between plagioclases. It is rimmed by orthopyroxene. Plagioclase commonly shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine. Clinopyroxene displays a consertal intergrowth texture with orhtopyroxene. Opaque minerals are dominated by tiny sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			1.2	anhedral	interstitial	rimmed by orthopyrpxene
Plagioclase	51		3.6	2	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	43		4	2.4	anhedral	poikilitic	with a consertal texture
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): TN

Detailed description Olivine is replaced by serepntine or clay along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patches and blebs, and by clay along fracures and cleavage surfaces; plagioclase by secondary plagioclase netwaok and caly oe chlorite fracture fillings.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		40
Amphibole, brown	n/a	35	n/a	n/a
Clay minerals		30		5
Clinopyroxene, sec.	n/a	35	n/a	n/a
Oxide	4			n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Sulfide	1			n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Well-preserved isotropic texture, with discrete fine-grained areas of olivine, plagioclase and pyroxenes.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: medium to fine Grain shape: anhedral to interstitial Grain boundary: curved Undulose extinction: weak Texture: preserved magmatic texture, finer-grained are observed in discrete areas
Plagioclase:	Grain size: medium to fine Grain shape: euhedral to subhedral Grain boundary: straight to curved Twinnings: igneous and tapered Undulose extinction: regular Texture: preserved magmatic texture, finer-grained are observed in discrete areas
Clinopyroxene:	Grain size: medium to fine Grain shape: anhedral to interstitial Grain boundary: straight to curved Texture: preserved magmatic texture, finer-grained are observed in discrete areas

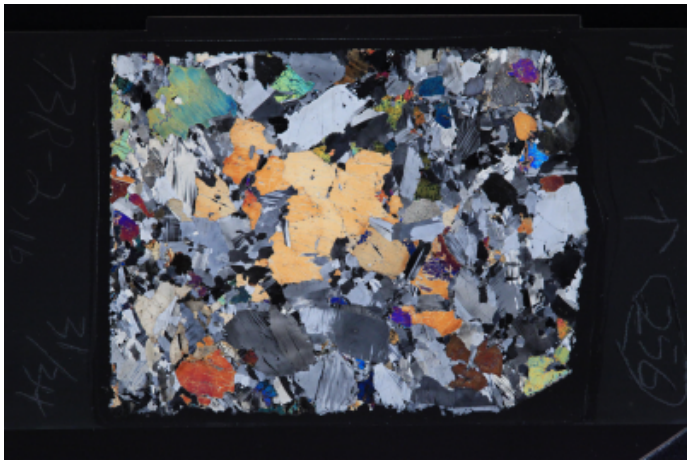
THIN SECTION LABEL ID: **360-U1473A-73R-2-W 31/34-TSB-TS_256** Piece no.: #01 TS no.: 256

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase is partly recrystallized and displays undulose extinction and deformation twins. It is partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	Static alteration intensity is moderate. Secondary plagioclase network is conspicuous.
Structure:	Undeformed, medium-grained olivine gabbro with plagioclase grains exhibiting minor tapered twinning and patchy undulose extinction. Olivine grains display minor kink banding.

Plane-polarized

33304441

Cross-polarized



33304461

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is commonly in a subequant shape and rimmed by orthopyroxene. Small olivine grains are interstitial between plagioclases. Tabular plagioclase is partly recrystallized and displays undulose extinction and deformation twins. It is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene occasionally shows a consertal intergrowth texture with orthopyroxene and contains abundant brown amphibole blebs, sometimes together with opaque minerals. The opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	70		7	5	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	25		10	5	anhedral	poikilitic	with a consertal texture
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): TN

Detailed description Olivine is replaced by serpentine/clay along fractures; clinoyproxene by secondary clinopiloxene patches, by brown amphibole patches, blebs and fringes, and by clay minerals along fractures and cleavage surfaces; plagioclase by secondary plagioclase network, and by fracture filling clay/chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		40
Amphibole, brown	n/a	40	n/a	n/a
Clay minerals		20		5
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	1			n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Sulfide	1			n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic

A coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase is partly recrystallized and displays undulose extinction and deformation twins. It is partly or fully enclosed within both clinopyroxene and olivine.

Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Texture: anhedral olivine grains with minor kink banding
Plagioclase:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular Twinning: tapered; Texture: tabular plagioclase grains are partly recrystallized and display undulose extinction and tapered twinning
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: poikilitic clinopyroxene with plagioclase inclusions

THIN SECTION LABEL ID: **360-U1473A-74R-2-W 30/36-TSB-TS_257** Piece no.: #01 TS no.: 257

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and shows magmatic twins, although undulose extinction and deformation twins are also common. Subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Static background alteration intensity is only slight.
Structure:	Well-preserved igneous texture with developed weakly to moderate magmatic fabric. Deformation overprint is related to submagmatic regime.

Plane-polarized

33304761

Cross-polarized

33304781

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is commonly in a subequant shape and rimmed by clinopyroxene. Small olivine grains are interstitial between plagioclase. Plagioclase is in a tabular shape and shows magmatic twins, although undulose extinction and deformation twins are also common. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Rarely, clinopyroxene displays a consertal texture. Opaque minerals are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			5	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	72		12	8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	23		11	8	anhedral	poikilitic	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Sample is only slightly altered. Serpentine + magnetite + talc occur in olivine microfractures (mesh rims). 2nd Cpx and minor brown amphibole after primary Cpx were observed. Plagioclase is only slightly replaced by 2nd plagioclase along grain edges.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		5
Amphibole, brown	n/a	30	n/a	n/a
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: CF

Detailed description Magmatic fabric is defined by elongated euhedral plagioclase. Deformation under submagmatic regime is expressed in locally fractured and recrystallized plagioclase along grain boundaries.

Feature type	Observation	Intensity rank
Recrystallization grain size:	medium grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	moderate	2
CPF subgrain boundary shape:	straight	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	0.5
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: coarse Grain shape: anhedral Grain boundary: straight to lobate Undulose extinction: weak Texture: interstitial texture, with lobate contacts with plg
Plagioclase:	Grain size: coarse and medium recrystallized Grain shape: subhedral to anhedral Grain boundary: straight to curved Twinnings: igneous and tapered Undulose extinction: weak and irregular Texture: elongated subhedral grains define the magmatic fabric; partially and locally recrystallized along grain boundaries
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight Texture: undeformed fractured grains including euhedral plg

THIN SECTION LABEL ID: **360-U1473A-74R-2-W 101/104-TSB-TS_258** Piece no.: #01 TS no.: 258

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is partly recrystallized and shows undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	Sample is slightly altered. Primary clinopyroxene is moderately replaced by 2nd Cpx, and primary plagioclase by 2nd plagioclase. Olivine is slightly replaced by serpentine and talc.
Structure:	Undeformed, medium-grained olivine gabbro with plagioclase grains exhibiting minor tapered twinning and patchy undulose extinction. Olivine grains display minor kink banding.

Plane-polarized

33304401

Cross-polarized

33304421

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is in a subequant shape and commonly rimmed by orthopyroxene. Plagioclase is partly recrystallized and shows undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene shows a consertal intergrowth texture with orthopyroxene and occasionally overgrown by orthopyroxene. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			5	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	62		5	4	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	28		5	3	anhedral	poikilitic	with a consertal texture
Opaques	0.3						
Ilmenite	0.2						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Slightly altered sample. Olivine is replaced by serpentine and talc in mesh rims. Cpx is moderately replaced by 2nd Cpx and brown amphibole. Plagioclase is slightly replaced by 2nd plagioclase at grain rims.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	15	0	10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		10		
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic

Undeformed, medium-grained olivine gabbro with plagioclase grains exhibiting minor tapered twinning and patchy undulose extinction. Olivine grains display minor kink banding.

Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Texture: anhedral olivine grains with plagioclase inclusions
Plagioclase:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: patchy; Twinning: tapered; Texture: plagioclase grains with minor recrystallization, undulose extinction and tapered twinning
Clinopyroxene:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: poikilitic clinopyroxene with plagioclase inclusions

THIN SECTION LABEL ID: **360-U1473A-74R-5-W 74/77-TSB-TS_259** Piece no.: #01 TS no.: 259

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape and partly recrystallized. It displays undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or enclosed within clinopyroxene.
Metamorphic petrology:	Slightly altered olivine gabbro. Secondary phases observed are 2nd Cpx, brown amphibole, 2nd plagioclase, talc, serpentine, magnetite and green clay.
Structure:	Undeformed, medium-grained olivine gabbro with plagioclase grains exhibiting tapered twinning and patchy undulose extinction. Olivine grains display minor kink banding.

Plane-polarized

33304311

Cross-polarized

33304341

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Opaque minerals occasionally occur at the rim of olivine. Plagioclase is in a tabular to subequant shape and partly recrystallized. It displays undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or enclosed within clinopyroxene. Small olivine grains are also partly enclosed within clinopyroxene. Clinopyroxene shows a consertal intergrowth texture with orthopyroxene and contains brown amphibole blebs. Opaque minerals consist of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			2.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	57		8	2.4	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	34		6	4	anhedral	poikilitic	occasionally with a consertal texture
Amphibole	0.2		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.3						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): JL

Detailed description Sample is only slightly altered. Olivine is replaced by serpentine, talc and magnetite in mesh rims. Green clay overprint were observed. Primary Cpx is moderately replaced by 2nd Cpx, brown amphibole and pale green amphibole. Primary plagioclase is slightly replaced by 2nd plagioclase in rims.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	15		10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		
Clay minerals	10			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Undeformed, medium-grained olivine gabbro with plagioclase grains exhibiting minor tapered twinning and patchy undulose extinction. Olivine grains display minor kink banding. Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: regular; Subgrain: curved; Texture: anhedral olivine grains with minor king banding and subgrain formation.
Plagioclase:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: patchy; Twinning: tapered; Texture: anhedral plagioclase grains with tapered twinning, patchy undulose extinction and minor recrystallization.
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Texture: poikilitic clinopyroxene with plagioclase inclusions

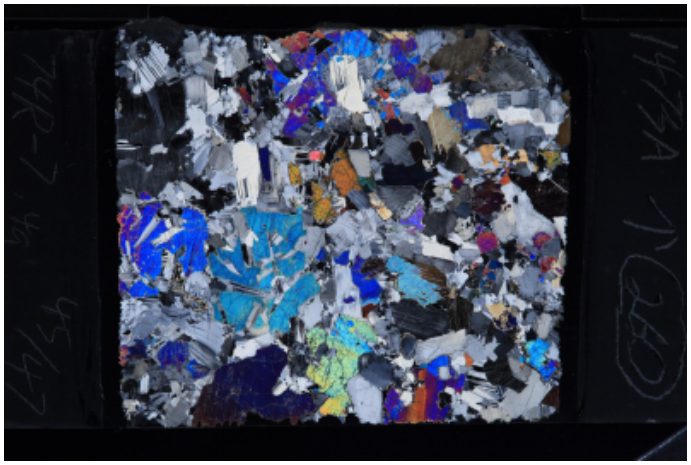
THIN SECTION LABEL ID: **360-U1473A-74R-7-W 45/47-TSB-TS_260** Piece no.: #04 TS no.: 260

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape and displays undulose extinction and occasionally deformation twins. Tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	Static alteration intensity is substantial. Secondary plagioclase network is significant. Coronitic amphibole + chlorite around olivine, and chlorite + amphibole microveins in plagioclase are conspicuous.
Structure:	Isotropic with a weak crystal plastic overprint.

Plane-polarized

33304231

Cross-polarized



33304291

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. The rim of olivine is commonly altered, but overgrowth of orthopyroxene can still be occasionally seen. Plagioclase is in a tabular to subequant shape and displays undulose extinction and occasionally deformation twins. Tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene commonly shows a consertal intergrowth texture with orthopyroxene. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	57		5	4	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	31		4	6	anhedral	poikilitic	with a consertal texture

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 35 Observer(s): TN

Detailed description Olivine is replaced by actinolite corona, by talc rim, and by serpentine/clay along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patches, blebs and fringes, and by clay along fractures and cleavage surfaces; plagioclase by secondary plagioclase network, by coronitic chlorite and by actinolite, chlorite and clay along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		50
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless	40			10
Chlorite				20
Clay minerals		15		5
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	65
Sulfide	1	1		n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

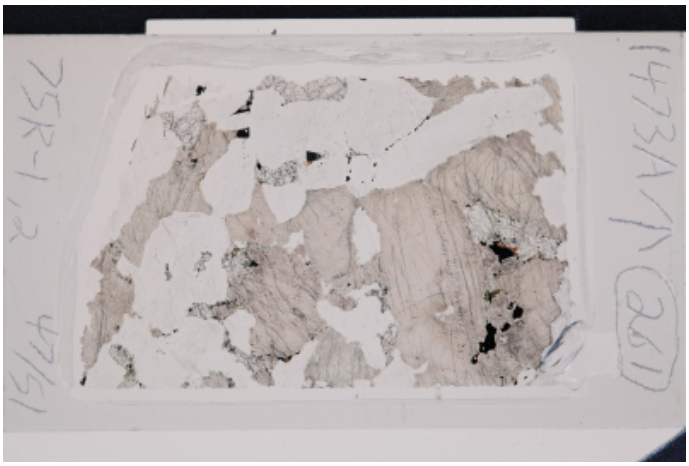
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Well developed rectilinear extinction indicating subgrain development.
Plagioclase:	Tapered twins, kinked crystals, and patchy extinction.
Clinopyroxene:	Magmatic.

THIN SECTION LABEL ID: **360-U1473A-75R-1-W 47/51-TSB-TS_261** Piece no.: #02 TS no.: 261

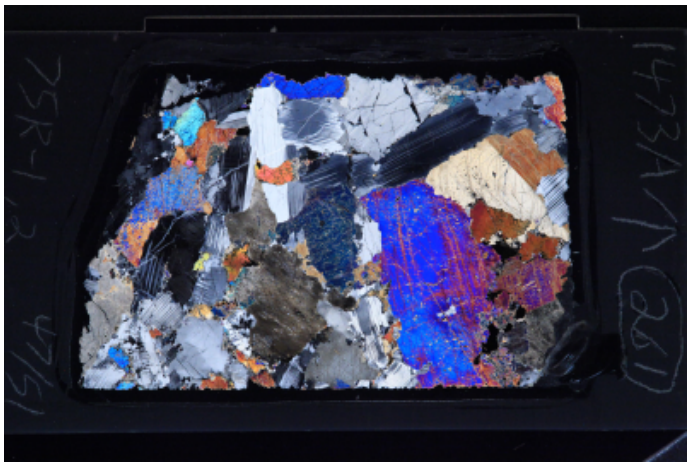
Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a granular texture. Plagioclase is commonly in a tabular shape and partly recrystallized. It shows undulose extinction and deformation twins.
Metamorphic petrology:	Moderately altered olivine gabbro. Cpx is the most altered phase and is partially replaced by 2nd Cpx and brown amphibole.
Structure:	Isotropic with a weak crystal plastic overprint.

Plane-polarized



33304131

Cross-polarized



33304171

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A coarse-grained olivine gabbro with a granular texture. Olivine is in a subequant shape and rimmed by clinopyroxene. The olivine rim is partly altered. Plagioclase is commonly in a tabular shape and partly recrystallized. It shows undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene. It contains small inclusions of plagioclase and olivine. Brown amphibole occur as blebs within clinopyroxene or occur, together with opaque minerals, at the clinopyroxne rim. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			3.6	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	38		11	5	anhedral	tabular	undulose extinction
Clinopyroxene	51		11	8	anhedral	subequant	with a consertal texture
Amphibole	0.2		0.2	0.1	anhedral	interstitial	
Opaques	0.8						
Ilmenite	0.5						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): JL

Detailed description Sample is moderately altered. Olivine is altered into talc, serpentine, magnetite and a late green clay overprint. Plagioclase is replaced by chlorite, actinolite and 2nd plagioclase. Cpx is replaced by 2nd Cpx, brown amphibole and colorless amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	30	10	10
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		20	100	20
Chlorite				40
Clay minerals	30			
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	40
Talc	30	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

Detailed description Isotropic olivine gabbro with a weak crystal plastic overprint defined by limited coarse grained recrystallization in plagioclase, and undulose extinction in plagioclase and undulose.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Magmatic. Undulose extinction.
Plagioclase:	Magmatic with a weak crystal plastic overprint shown by tapered twins, limited, coarse grained neoblasts (~0.15 mm), and patchy extinction.
Clinopyroxene:	Magmatic.

THIN SECTION LABEL ID: **360-U1473A-75R-4-W 80/86-TSB-TS_262** Piece no.: #01 TS no.: 262

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be subophitic, as subhedral plagioclase is still partly or fully enclosed within clinopyroxene porphyroclasts.
Metamorphic petrology:	The rock shows a widespread recrystallization of Pl, Ol and Cpx. The Cpx neoblasts are typically associated with minor amounts of brown Amp and opaque phases. The static alteration is slight and mainly confined to mafic minerals.
Structure:	medium to fine grained recrystallized, porphyroclastic texture developed in a olivine gabbro. Plag is completely recrystallized into a fine-grained matrix that contains the porphyroclasts of cpx and olivine.

Plane-polarized

33304701

Cross-polarized

33304741

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be subophitic, as subhedral plagioclase is still partly or fully enclosed within clinopyroxene porphyroclasts. Plagioclase is almost completely recrystallized to subhedral neoblasts with undulose extinction. The plagioclase porphyroclasts show undulose extinction and deformation twins. Olivine is completely recrystallized to subhedral to euhedral neoblasts, which commonly show triple junctions. Olivine neoblasts are commonly aggregated and distributed along the foliation. Clinopyroxene is partly recrystallized. The porphyroclasts show a consertal texture and the neoblasts associate with abundant tiny interstitial brown amphiboles. Opaque minerals are dominated by ilmenite. They commonly associate with brown amphibole and occur at the rim of olivine and clinopyroxene. Apatite rarely occurs together with the opaque minerals.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			0.6	anhedral	equant	with triple junctions
Plagioclase	55		6	0.8	anhedral	equant	undulose extinction
Clinopyroxene	36		12	5	anhedral	subequant	partly recrystallized
Amphibole	1		0.4	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description Pl and Ol are almost completely recrystallized into nearly polygonal neoblastic aggregates. Clinopyroxene recrystallization is common and the clinopyroxene neoblasts are associated with brown Amp and opaque phases. The static alteration is slight and mainly confined to mafic minerals.

Comment type	Comment
Alteration general comments:	The static alteration is slight mainly confined to mafic minerals.
Mylonite comments:	Pl and Ol are almost completely recrystallized into nearly polygonal neoblastic aggregates. Clinopyroxene recrystallization is common and the clinopyroxene neoblasts are associated with brown Amp and opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		2
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		20		50
Chlorite				50
Clay minerals	20			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description medium to fine grained recrystallized, porphyroclastic texture developed in a olivine gabbro. Olivine is observed as coarse porphyroclasts that gradually recrystallize into fine-grained ribbons in the direction of the foliation. Plag is completely recrystallized into a fine-grained matrix that contains the porphyroclasts of cpx and olivine. Cpx is recrystallized (and partially altered) at the grain boundaries into a fine-grained matrix that has mixed cpx and plag grains.

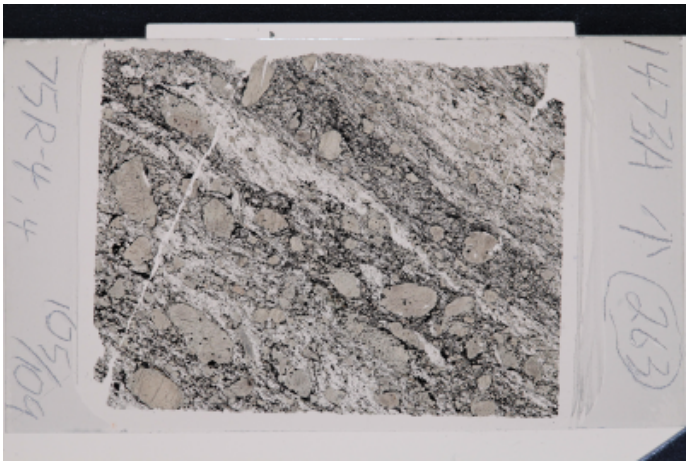
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular subgrains: curved boundaries texture: medium grains that may grade into fine recrystallized elongate ribbons.
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning; tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: fine-grained recrystallized aggregates forming the matrix of the rock.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: medium grains that display recrystallization at grain boundaries.
Oxide:	geometry: thin bands associated with recrystallized olivine grains.

THIN SECTION LABEL ID: **360-U1473A-75R-4-W 105/109-TSB-TS_263** Piece no.: #04 TS no.: 263

Group	Summary
Igneous petrology:	A highly mylonitized oxide gabbronorite. Plagioclase is completely recrystallized and shows undulose extinction. Clinopyroxene is in a round shape and distributed along the foliation. Some clinopyroxenes contain plagioclase inclusions. Orthopyroxene is elongated along the foliation. Opaque minerals are mainly composed of ilmenite, with minor sulfides. They are surrounding the pyroxene porphyroclasts.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Oxide-rich mylonite characterized by a polyphase mixture of recrystallized plagioclase, cpx and oxides that contain porphyroclasts of cpx, plag (locally) and orthopyroxene. Oxides may be oriented in the direction of the foliation and are also observed as irregular pods at cpx grain boundaries.

Plane-polarized



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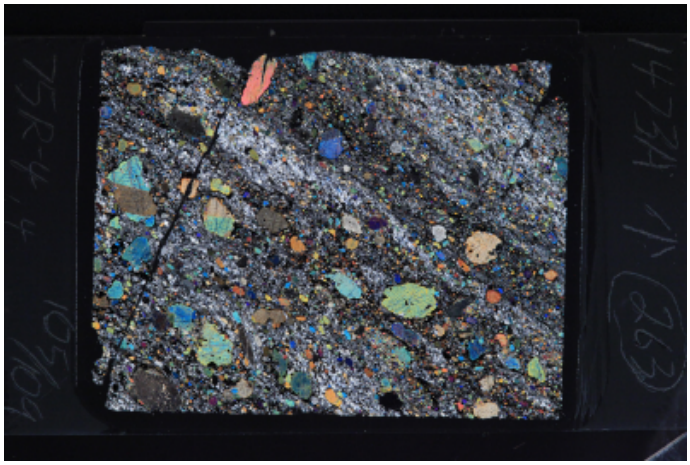
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **oxide gabbronorite** Observer: CL

Texture: mylonitic Ave. grain size: medium grained

Detailed description: A highly mylonitized oxide gabbronorite. Plagioclase is completely recrystallized and shows undulose extinction. Clinopyroxene is in a round shape and distributed along the foliation. Some clinopyroxenes contain plagioclase inclusions. Orthopyroxene is elongated along the foliation. Opaque minerals are mainly composed of ilmenite, with minor sulfides. They are surrounding the pyroxene porphyroclasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		0.4	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	29		2.4	1.2	anhedral	subequant	
Orthopyroxene	5		3.2	0.6	anhedral	elongate	
Opaques	11						
Ilmenite	10						
Sulfide	1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 12 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Cpx altered into brown amphibole, colorless amphibole and clay. The replacements of Opx were talc, colorless amphibole and clay. Pl were mostly replaced by secondary Pl with minor tiny colorless amphibole occurring in the cleavages.

Comment type	Comment
Mylonite comments:	Mylonitic oxide gabbronorite characterized by aggregates of recrystallization of Cpx, Opx and Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		10	5	15
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		40	25	5
Clay minerals		20	30	
Plagioclase, sec.	n/a	n/a	n/a	95
Talc		n/a	45	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description Oxide-rich mylonite characterized by a polyphase mixture of recrystallized plagioclase, cpx and oxides that contain porphyroclasts of cpx, plag (locally) and orthopyroxene. Oxides may be oriented in the direction of the foliation and are also observed as irregular pods at cpx grain boundaries.

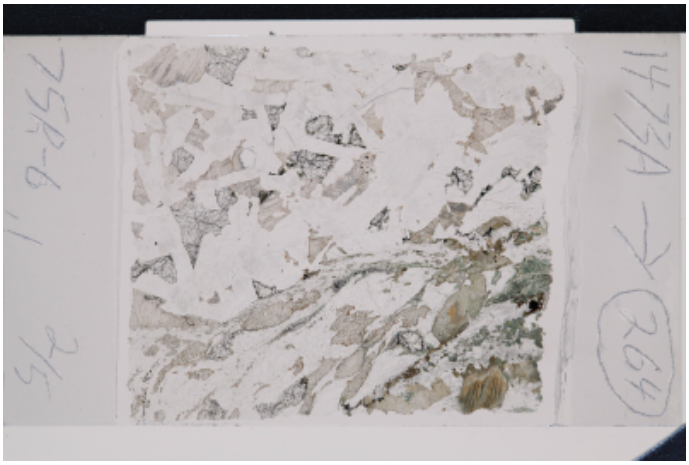
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: locally observed undulose extinction: irregular texture: fine recrystallized aggregates.
Clinopyroxene:	size: fine shape: anhedral boundaries: curved texture: fine recrystallized grains contained in the matrix.
Oxide:	geometry: elongated thin patches parallel to the mylonitic foliation, and also as irregular pods at the boundaries of coarser opx and cpx grains.

THIN SECTION LABEL ID: **360-U1473A-75R-6-W 2/5-TSB-TS_264** Piece no.: #01 TS no.: 264

Group	Summary
Igneous petrology:	There are two domains, i.e., a coarse-grained olivine crosscut by a mylonite. The olivine gabbro displays a subophitic texture, in which tabular plagioclase is partly or fully enclosed within clinopyroxene. All minerals within the mylonites are highly recrystallized.
Metamorphic petrology:	Static alteration intensity is substantial. Biotite formed at clinopyroxene rim in gabbro indicates metasomatic alteration by felsic vein.
Structure:	coarse olivine gabbro in contact with an oxide-bearing mylonite. The olivine gabbro is undeformed. The mylonite is characterized by Cpx fractured porphyroclasts immersed in a matrix of recrystallized plag, Cpx and olivine. Oxides are observed as thin bands parallel to the foliation and are commoly associated with alteraton of cpx to green amphibole.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. The olivine rim is partly altered. Plagioclase is commonly in a tabular shape, but is partly recrystallized and displays undulose extinction. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Opaque minerals are composed of ilmenite and sulfides. They mainly occur at the rim of olivine, but also occur at the clinopyroxene rim, together with brown amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			3.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		8	6	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	28		4.8	4	anhedral	poikilitic	
Opaques	0.3						
Ilmenite	0.1						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: vein

Lithology: **mylonite** Observer: CL

Texture: mylonitic Ave. grain size: fine grained

Detailed description: This domain is a mylonite, in which all minerals are highly recrystallized.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			0.2			
Plagioclase	70		5	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	24		1.6	0.2	anhedral	subequant	
Amphibole	2		0.2	0.1	anhedral	interstitial	
Opaques	2						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: Ol gabbro

Total rock alteration estimate (%): 40 Observer(s): TN

Detailed description Olivine is replaced by talc at rim and by serpentine along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patches, blebs and fringes, and by green amphibole fringes; plagioclase by secondary plagioclase network and by fracture-filling chlorite and clay.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	10		50
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, green		30		
Chlorite				5
Clay minerals		18		5
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	4	1		n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Sulfide	1	1		n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 30 Domain name: mylonitic Ol gabbro

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Olivine and pyroxene hahe green amphibole rim with local biotite. Amphibole forms pseudomprphs after clinopyroxene.

Comment type	Comment
Mylonite comments:	Ol, Cpx, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	60		50
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	10	18		5
Amphibole, green	10	30		
Chlorite				15
Clay minerals				5
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	1			n/a
Plagioclase, sec.	n/a	n/a	n/a	75
Sulfide	1			n/a
Talc	40	n/a		n/a
Other		2		
Subtotals replaced	100	100		100

Interval domain no: 3 Domain rel. abundance (%): 10 Domain name: dioritic vein

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Plagioclase is highly altered. Amp could be magmatic.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				80
Amphibole, green				5
Epidote/zoisite	n/a	n/a	n/a	10
Plagioclase, sec.	n/a	n/a	n/a	75
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description coarse olivine gabbro in contact with an oxide-bearing mylonite. The olivine gabbro is undeformed. The mylonite is characterized by Cpx fractured porphyroclasts immersed in a matrix of recrystallized plag, Cpx and olivine. Oxides are observed as thin bands parallel to the foliation and are commoly associated with alteraton of cpx to green amphibole.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular texture: fine recrystallized grains commonly associated with green amphibole and oxides.
Plagioclase:	size: fine shape: anhedral boundaries: curved tiwnning: tapered undulose extinction: irregular texture: fine recrystallized grains forming the matrix of the mylonite.
Clinopyroxene:	size: medium to fine shape: anhedral boundaries: curved fractures: observed in the coarser clasts. texture: fine recrystallized and altered grains forming the matrix. Medium-grained porphyroclasts are also observed.
Oxide:	geometry: thin pods located at cpx grain boundaries and associated with green amphibole.

Microstructure: submagmatic Observer: OP

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse shape: anhedral boundaries: curved undulose extinction: irregular texture: coarse grains in the undeformed domain.
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered (magmatic locally preserved) undulose extinction: irregular texture: coarse, locally strained grains.

THIN SECTION LABEL ID: **360-U1473A-75R-6-W 58/62-TSB-TS_265** Piece no.: #01 TS no.: 265

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape and shows magmatic twins. It is partly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly or entirely enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	Sample is only slightly altered.
Structure:	Well-preserved magmatic texture with isotropic magmatic fabric.

Plane-polarized

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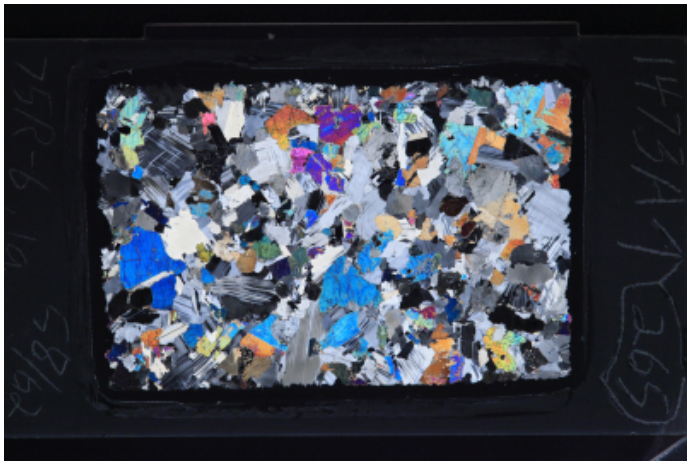
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is commonly in a tabular shape and shows magmatic twins. It is partly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly or entirely enclosed within both clinopyroxene and olivine. Clinopyroxene commonly shows a consertal intergrowth texture and contains brown amphibole blebs. Brown amphibole also occurs at the clinopyroxene rim. Opaque minerals are solely composed of sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			2.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	56		6.8	3.6	anhedral	tabular	undulose extinction
Clinopyroxene	37		6	4	anhedral	poikilitic	with a consertal texture
Opaques	0.4						
Sulfide	0.4						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Alteration is only slight. Only Cpx is moderately replaced into mostly 2nd Cpx and brown amphibole.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	15	0	3
Amphibole, brown	n/a	50	n/a	n/a
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

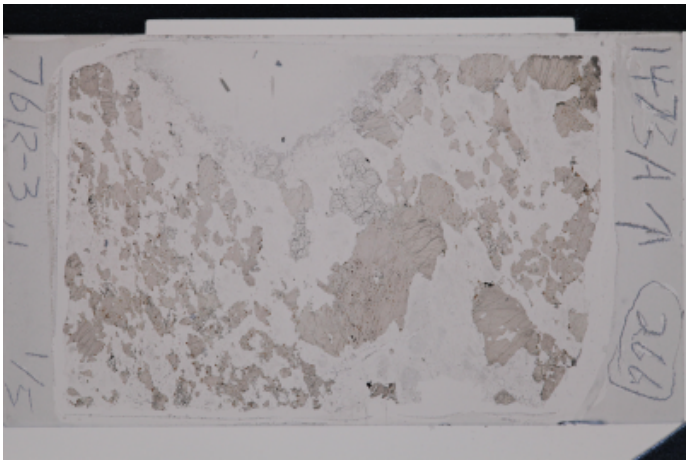
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse to medium Grain shape: subhedral to anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: fractured and partially and weakly altered
Plagioclase:	Grain size: coarse Grain shape: subhedral to anhedral Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: irregular Texture: well-preserved magmatic texture with localized deformation
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight to curved Texture:preserved primary texture with plg chadacrysts included in cpx oikocryst

THIN SECTION LABEL ID: **360-U1473A-76R-3-W 1/5-TSB-TS_266** Piece no.: #01 TS no.: 266

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be, as subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Slightly altered olivine gabbro. Common alteration phases are 2nd Cpx and brown amphibole after primary Cpx.
Structure:	Moderately deformed with a weakly developed foliation defined by plagioclase and olivine neoblasts, overprinting a pre-existing weak magmatic fabric. The crystal-plastic foliation overprint is subparallel to the magmatic fabric.

Plane-polarized



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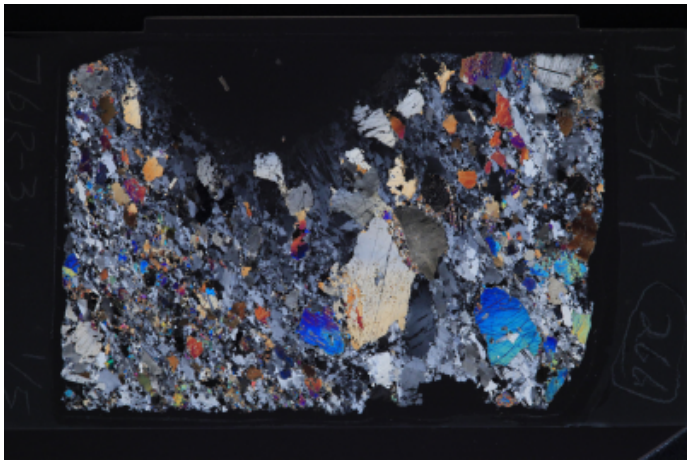
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be, as subhedral plagioclase is partly or fully enclosed within clinopyroxene. Olivine is rimmed by orthopyroxene. Plagioclase is strongly recrystallized and shows undulose extinction and deformation twins. Clinopyroxene is partly rerystallized and the porphyroclasts display a consertal intergrowth texture. It also contains blebs of brown amphiboles. The clinopyroxene neoblasts are associated with abundant interstitial brown amphiboles. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1.2	anhedral	subequant	rimmed by orthopryoxene
Plagioclase	56		6.4	0.6	anhedral	elongate	undulose extinction and deformation twins
Clinopyroxene	36		10	2.4	anhedral	subequant	with a consertal texture
Amphibole	0.6		0.2	0.1	anhedral	interstitial	
Opaques	0.4						
Ilmenite	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 8 Observer(s): JL

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	10		3
Amphibole, brown	n/a	60	n/a	n/a
Amphibole, colorless		10		
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name:

Microstructure: crystal-plastic Observer: CF

Detailed description Magamtic fabric defined by subhedral elongated plagioclase, and weak crystal-plastic foliation defined by neoblasts along grain boundaries

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium to fine Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: fractured and partially altered; partially recrystallized
Plagioclase:	Grain size: coarse Grain shape: subhedral and anhedral Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: irregular Subgrains: curved Texture: deformed porphyroclasts partially recrystallized along grain boundaries
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: weak Texture: preserved magmatic texture with plg included in oikocryst; partially recrystallized along grain boundary

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name:

Microstructure: crystal-plastic Observer: CF

Detailed description Magamtic fabric defined by subhedral elongated plagioclase, and weak crystal-plastic foliation defined by neoblasts along grain boundaries

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
Magmatic fabric intensity:	weak	1
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	r	n/a

Type	Comment
Olivine:	Grain size: fine Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: fractured and partially altered; partially recrystallized
Plagioclase:	Grain size: medium to fine Grain shape: subhedral and anhedral Grain boundary: curved Twinnings: igneous and tapered Undulose extinction: irregular Subgrains: curved Texture: deformed porphyroclasts partially recrystallized along grain boundaries
Clinopyroxene:	Grain size: fine to medium Grain shape: anhedral Grain boundary: straight to curved Undulose extinction: weak Texture: preserved magmatic texture with plg included in oikocryst; partially recrystallized along grain boundary

THIN SECTION LABEL ID: **360-U1473A-76R-3-W 38/42-TSB-TS_267** Piece no.: #01 TS no.: 267

Group	Summary
Igneous petrology:	A fine-grained olivine gabbro with a granular texture. All minerals are partly recrystallized.
Metamorphic petrology:	Sample is only slightly altered.
Structure:	Fine-grained olivine gabbro with weak foliation defined by the preferred orientation of plag and cpx.

Plane-polarized

33321551

Cross-polarized

33303851

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: fine grained

Detailed description: A fine-grained olivine gabbro with a granular texture. All minerals are partly recrystallized. Olivine is rimmed by orthopyroxene. Plagioclase displays undulose extinction. Clinopyroxene occasionally shows a consertal intergrowth texture. Brown amphibole is interstitial among plagioclase, olivine and clinopyroxene. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			0.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	51		1.6	0.8	anhedral	elongate	undulose extinction
Clinopyroxene	41		3	1.2	anhedral	subequant	with a consertal texture
Amphibole	1		0.1	0.05	anhedral	interstitial	
Opaques	0.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 8 Observer(s): JL

Detailed description Slightly altered olivine gabbro. Most of the replacement is associated by brown amphibole and 2nd Cpx after primary Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	15		3
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		20		
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100		

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description Fine-grained olivine gabbro with weak foliation defined by the preferred orientation of plag and cpx.

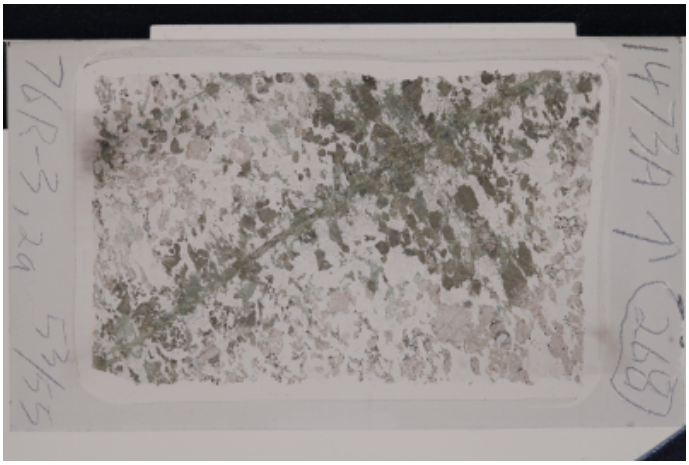
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	size: fine shape: anhedral boundaries: curved undulose extinction: irregular texture: fine grains with curved contacts with other phases. Associated with oxides.
Plagioclase:	size: fine shape: anhedral boundaries: curved twinning: tapered undulose extinction: irregular texture: fine recrystallized grains weakly oriented.
Clinopyroxene:	size: fine shape: anhedral boundaries: curved fractures: common texture: fine grains weakly oriented and in curved to straight contacts with other phases.

THIN SECTION LABEL ID: **360-U1473A-76R-3-W 53/55-TSB-TS_268** Piece no.: #02 TS no.: 268

Group	Summary
Igneous petrology:	A deformed medium-grained olivine gabbro with a porphyroclastic texture, crosscut by an amphibole vein. The primary magmatic texture is not preserved. A weak foliation is defined by the preferred orientation of plagioclase and clinopyroxene.
Metamorphic petrology:	Sample is a substantially replaced by greenschist assemblages. An actinolite vein was observed and alteration is more intense near the vein.
Structure:	Weakly foliated olivine gabbro with porphyroclastic plagioclase exhibiting undulose extinction and tapered twinning. A planar amphibole vein cross-cuts the long axis of the thin section. Alteration of wall rock is increased around the vein.

Plane-polarized



33321511

Cross-polarized

33321531

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A deformed medium-grained olivine gabbro with a porphyroclastic texture, crosscut by an amphibole vein. The primary magmatic texture is not preserved. A weak foliation is defined by the preferred orientation of plagioclase and clinopyroxene. Olivine is recrystallized and distributed along the foliation. It is partly rimmed by orthopyroxene. Plagioclase is recrystallized and shows undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture and contains brown amphibole. Some clinopyroxenes also contain plagioclase inclusions. Clinopyroxene is moderately altered; in particular, clinopyroxene close to the crosscutting amphibole vein is completely altered. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			0.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		2	1.2	anhedral	elongate	undulose extinction and deformation twins
Clinopyroxene	40		4	1.4	anhedral	subequant	
Amphibole	0.3		0.8	0.1	anhedral	interstitial	
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 50 Observer(s):

Detailed description Sample is substantially replaced by greenshcist assembages. Olivine is extensively altered into mostly talc and tremolite. Plagioclase exhibits numerous microfractures filled by chlorite, actinolite and minor epidote. Some plagioclase grains are totally altered into chlorite. Cpx substantially replaced by actinolite, especially near the vein. Calcite was observed. Calcite seem to occur together with the greenschist assemblages.

Comment type	Comment
Vein 1 minerals:	Actinolite vein cutting through the host rocks. Vein produces a halo of extensively altered grains. Local occurrence of calcite within the vein and in the halo. Calcite and actinolite seems to occur synchronously.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	80	60		30
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	55	70		30
Chlorite				65
Clinopyroxene, sec.	n/a	20	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	5
Oxide	5			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Weakly foliated olivine gabbro with porphyroclastic plagioclase exhibiting undulose extinction and tapered twinning. An amphibole vein cross-cuts the long axis of the thin section. Alteration of wall rock is increased around the vein. Observer: OP

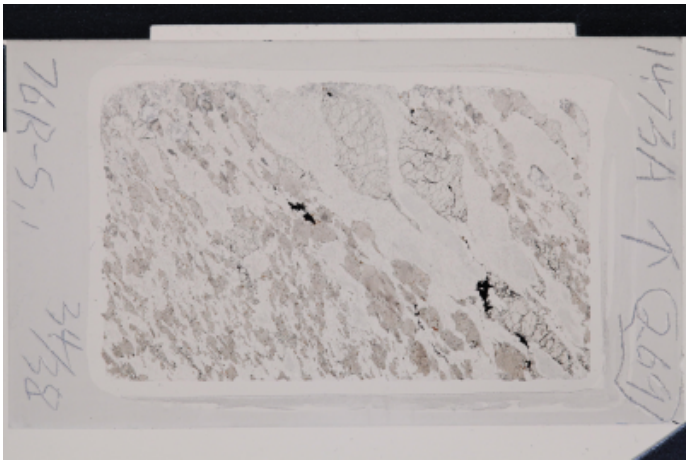
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Subgrain: straight; Texture: anhedral olivine grains with kink banding and minor recrystallization
Plagioclase:	Grain size: medium-grained porphyroclasts, fine-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: plagioclase porphyroclasts exhibiting tapered twinning and neoblasts at grain boundaries
Clinopyroxene:	Grain size: medium-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: magmatic texture, poikilitic clinopyroxene with plagioclase inclusions
Vein:	Planar, clear-cut vein cross-cutting long axis of thin section. Vein minerals exhibit a preferred orientation and are frequently overgrown by coarser grained minerals. Wall rock alteration is increased around the vein.

THIN SECTION LABEL ID: **360-U1473A-76R-5-W 34/38-TSB-TS_269** Piece no.: #01 TS no.: 269

Group	Summary
Igneous petrology:	A disseminated oxide olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. A strongly foliation is defined by the preferred orientation of the elongated olivine, clinopyroxene and plagioclase.
Metamorphic petrology:	The alteration intensity of this thin section is fresh.
Structure:	Strongly deformed with porphyroclastic foliation developed in the corser-grained material, and mylonitic in the finer-grained.

Plane-polarized



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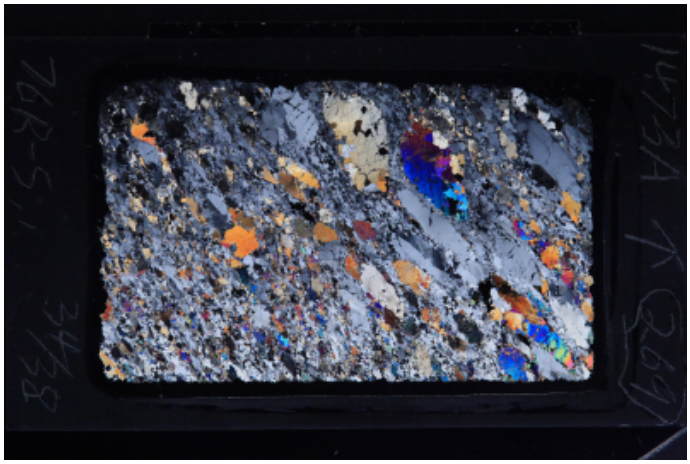
Cross-polarized



33321451

IGNEOUS PETROLOGY

Lithology: **disseminated oxide olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A disseminated oxide olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. A strongly foliation is defined by the preferred orientation of the elongated olivine, clinopyroxene and plagioclase. Olivine is weakly recrystallized and occurs as big porphyroclasts. Plagioclase is strongly recrystallized and displays undulose extinction and deformation twins. Small plagioclase grains occur as inclusions within clinopyroxene. Clinopyroxene is partly recrystallized and shows a consertal intergrowth texture, in which tiny brown amphiboles are present. Brown amphibole also occurs at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	16			5	anhedral	elongate	partly recrystallized
Plagioclase	60		10	0.6	anhedral	elongate	undulose extinction
Clinopyroxene	23		5	1.2	anhedral	subequant	
Amphibole	0.2		0.4	0.1	anhedral	interstitial	
Opaques	1						
Ilmenite	0.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 6 Observer(s): QM

Detailed description The alteration intensity of this thin section is fresh. Ol developed typical mesh texture with talc, green clay and oxide formation. Px altered into colorless amphibole, brown amphibole and clay. Pl were mostly replaced by secondary Pl with minor colorless amphibole occurring in the cleavages.

Comment type	Comment
Mylonite comments:	Mylonitic olivine gabbro characterized by aggregates of recrystallization of Pland Cpx. Cpx neoblasts were associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	7	5	5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		55	50	10
Clay minerals	15	15	25	
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	80	n/a	10	n/a
Other			15	15
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation is defined by plagioclase neoblasts and elongated aggregates of clinopyroxene and olivine.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Texture: fractured and partially altered; partially recrystallized allong grain boundaries and in elongated aggregates in association with cpx
Plagioclase:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Twinnings: tapered Grain boundary: curved Undulose extinction: regular Subgrains: curved Texture: strongly recrystallized
Clinopyroxene:	Grain size: medium porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: weak Subgrains: straight to curved Texture: weakly deformed porphyroclasts partially recrystallized along grain boundaries and in elongated aggregates with ol

Microstructure: crystal-plastic Observer: CF

Detailed description Foliation is defined by plagioclase neoblasts and elongated aggregates of clinopyroxene and olivine. Porphyroclasts are parallel to the foliation.

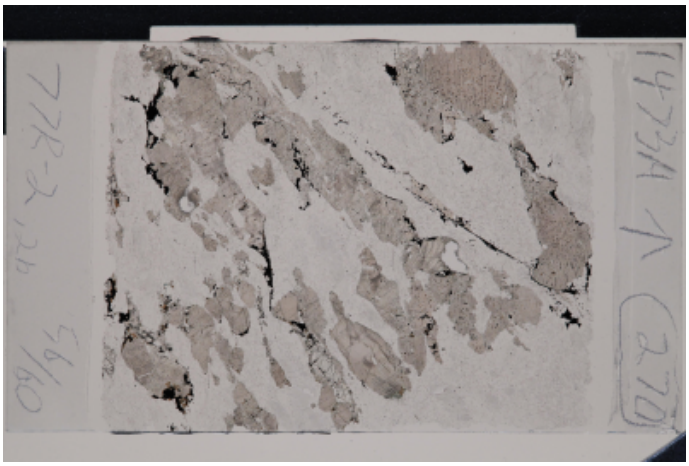
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: regular Subgrains: straight Texture: fractured and partially altered; partially recrystallized allong grain boundaries and in elongated aggregates in association with cpx
Plagioclase:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Twinnings: tapered Grain boundary: curved Undulose extinction: regular Subgrains: curved Texture: strongly recrystallized
Clinopyroxene:	Grain size: coarse porphyroclasts and fine recrystallized Grain shape: anhedral Grain boundary: curved Undulose extinction: weak Subgrains: straight to curved Texture: weakly deformed porphyroclasts partially recrystallized along grain boundaries and in elongated aggregates with ol

THIN SECTION LABEL ID: **360-U1473A-77R-2-W 56/60-TSB-TS_270** Piece no.: #02 TS no.: 270

Group	Summary
Igneous petrology:	An oxide-bearing gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved. Small amount of olivine is present and commonly recrystallized.
Metamorphic petrology:	Sample is moderately altered.
Structure:	Inclined porphyroclastic fabric crosscut by steeply dipping plagioclase-rich mylonite.

Plane-polarized



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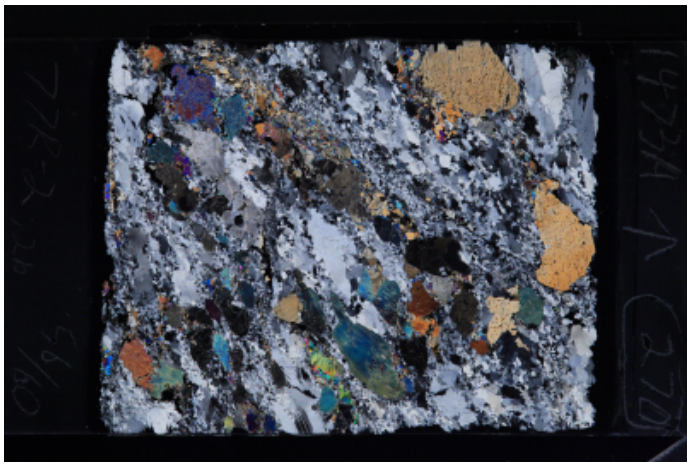
Cross-polarized



33321371

IGNEOUS PETROLOGY

Lithology: **oxide-bearing gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: An oxide-bearing gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved. Small amount of olivine is present and commonly recrystallized. Plagioclase is mostly recrystallized and shows undulose extinction and deformation twins. Small anhedral plagioclase occurs as inclusion within both clinopyroxene and clinopyroxene. Clinopyroxene is partly recrystallized and the porphyroclasts occasionally shows a consertal texture. Clinopyroxene porphyroclasts also contain abundant brown amphibole blebs, which commonly crosscut the exsolution lamellae. Tiny ilmneite commonly occur along the exsolution within clinopyroxene. Orthopyroxene also contains tiny brown amphibole and ilmenite. Brown amphibole also occurs at the rim of clinopyroxene, sometimes together with opaque oxides. Opaque minerals are dominated by magnetite and ilmenite, with minor sulfides. Intergrowth between ilmenite and magnetite is very common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1			1.2			partly recrystallized
Plagioclase	63		6.8	0.4	anhedral	elongate	undulose extinction and deformation twins
Clinopyroxene	28		8.4	6	anhedral	subequant	with inclusions of plagioclase and brown amphibole
Orthopyroxene	5		10	10	anhedral	elongate	with inclusions of plagioclase and brown amphibole
Amphibole	0.5		0.4	0.1	anhedral	interstitial	
Opaques	3						
Magnetite	1.8						
Ilmenite	1						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): JL

Detailed description Sample is moderately altered. Most olivine grains are extensively replaced by talc anf temolite

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	70	25	5	15
Amphibole, brown	n/a	60	n/a	n/a
Amphibole, colorless			70	
Amphibole, green		10	30	
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	60	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Detailed description Inclined porphyroclastic fabric crosscut by steeply dipping plagioclase-rich mylonite. The porphyroclastic shear zone has elongated plagioclase, pyroxene, and olivine. The plagioclase and olivine have core and mantle structures. The steep crosscutting mylonite has a normal sense of shear and is 2.5 mm thick. Fe-Ti oxide pods are parallel to both sets of fabrics.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: 4 mm. neoblasts: ~0.3 mm. Grain shape: anhedral. Grain boundary: irregular to curved. Undulose extinction: patchy. Texture: core and mantle structure.
Plagioclase:	Grain size: porphyroclasts: 1-5 mm. neoblasts: 0.01-0.15 mm. Grain shape: anhedral. Grain boundary: curved, serrate for porphyroclasts. Twinning: tapered. Undulose extinction: patchy. Subgrains: curved. Texture: Porphyroclastic core and mantle structure.
Clinopyroxene:	Grain size: porphyroclasts: 1-5 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular. Undulose extinction: patchy, related to kinked crystals. Texture: elongated parallel to the foliation with limited recrystallization.
Oxide:	Elongated pods of oxide parallel to the foliation near mafic porphyroclasts.

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

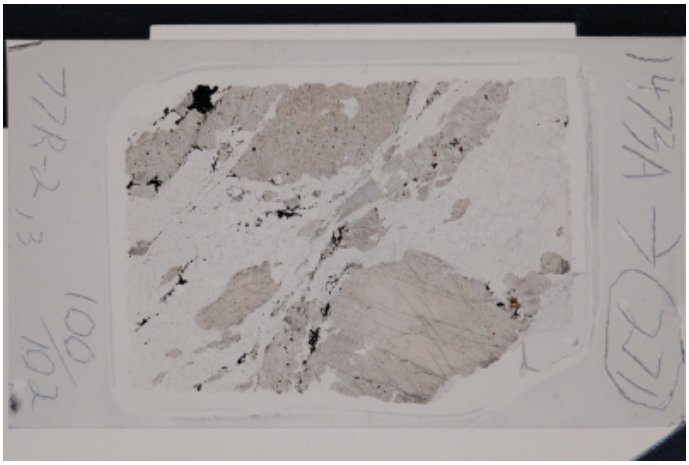
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	rare	n/a
Fault sense of shear:	normal-sinistral	n/a

Type	Comment
Olivine:	Grain size: neoblasts: ~0.15 mm. Grain shape: equigranular. Grain boundary: irregular to curved. Undulose extinction: patchy. Texture: aggregate of olivine and pyroxene neoblasts.
Plagioclase:	Grain size: neoblasts: 0.01-0.15 mm. Grain shape: anhedral. Grain boundary: irregular to curved. Twinning: tapered to absent. Undulose extinction: patchy. Texture: Very fine grained zone of almost pure plagioclase neoblasts.
Clinopyroxene:	Grain size: porphyroclasts: ~1 mm. neoblasts: ~0.15 mm. Grain shape: equigranular. Grain boundary: curved. Texture: aggregate of recrystallized pyroxene and olivine.
Oxide:	Elongate patchy oxide veins parallel to the foliation.

THIN SECTION LABEL ID: **360-U1473A-77R-2-W 100/102-TSB-TS_271** Piece no.: #03 TS no.: 271

Group	Summary
Igneous petrology:	An oxide-bearing gabbronorite with a porphyroclastic texture. A strongly foliation is defined by the preferred orientation of the recrystallized plagioclase, which commonly shows undulose extinction and deformation twins.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Porphyroclastic texture defined by cpx and plagioclase clasts immersed in a fully recrystallized plag matrix.

Plane-polarized



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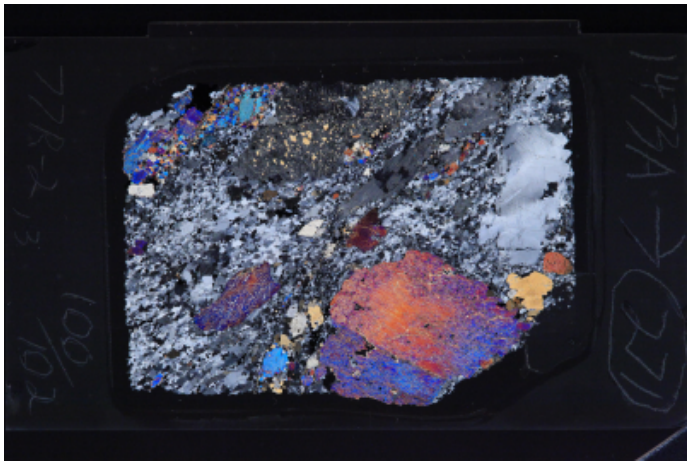
Cross-polarized



33321311

IGNEOUS PETROLOGY

Lithology: **oxide-bearing gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: An oxide-bearing gabbronorite with a porphyroclastic texture. A strongly foliation is defined by the preferred orientation of the recrystallized plagioclase, which commonly shows undulose extinction and deformation twins. Clinopyroxene is partly recrystallized and shows a consertal intergrowth texture with orthopyroxene. It contain abundant blebs of brown amphibole and ilmenite, which commonly crosscut the exsolution lamellae. Clinopyroxene neoblasts are in a subhedral shape and associate with abundant interstitial brown amphibole and ilmenite. Orthopyroxene is elongated along the foliation. Opaque minerals are dominated by ilmenite, with minor magnetite and sulfides. They are distributed along the foliation and commonly together with brown amphibole occur at the rim of clinopyroxene. Intergrowth between ilmenite and sulfide is very common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	58		11	1	anhedral	elongate	undulose extinction and deformation twins
Clinopyroxene	32		12	12	anhedral	subequant	with a consertal intergrowth texture
Orthopyroxene	8		9	9	anhedral	elongate	
Amphibole	0.5		0.4	0.1	anhedral	interstitial	
Opaques	2						
Magnetite	0.2						
Ilmenite	1.6						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 12 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Px altered into colorless amphibole and clay. The replacements of Cpx also contained brown amphibole. Pl were mostly replaced by secondary Pl with minor colorless amphibole and clay occurring in the cleavages.

Comment type	Comment
Mylonite comments:	Mylonitic gabbro characterized by aggregates of recrystallization of Pl and Cpx. Cpx neoblasts were associated with brown amphibole and oxides.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		15	5	15
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless		50	65	5
Clay minerals		15	25	15
Plagioclase, sec.	n/a	n/a	n/a	80
Talc		n/a	10	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description Porphyroclastic texture defined by cpx and plagioclase clasts immersed in a fully recrystallized plag matrix.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: few porphyroclasts contained in a fine-grained recrystallized matrix.
Clinopyroxene:	size: coarse shape: subhedral boundaries: straight fractures: common texture: coarse porphyroclasts, partially altered at the grain boundaries.
Oxide:	geometry: thin bands at the edges of elongated cpx grains.

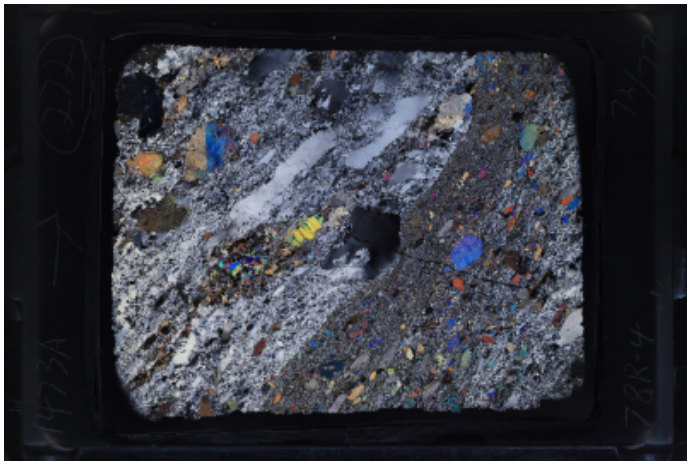
THIN SECTION LABEL ID: **360-U1473A-78R-4-W 72/77-TSB-TS_272** Piece no.: #01 TS no.: 272

Group	Summary
Igneous petrology:	There are two domains in the thin section, an olivine-bearing gabbronorite and an oxide gabbronorite. Both domains shows a porphyroclastic texture, but with different grain sizes and deformation degrees.
Metamorphic petrology:	Dynamically recrystallized neoblastic minerals are clinopyroxene, plagioclase and olivine. Static alteration intensity is moderate in finer-grained domain and substantial in coarser grained domain. Secondary plagioclase abundance was estimated using a highly contrasted thin-section image.
Structure:	contact between a fine-grained oxide gabbro and a coarse grained olivine gabbro. The fine-grained rock has a porphyroclastic texture defined by recrystallized plag and cpx small clasts, which may also be partially recrystallized. The coarse olivine gabbro is weakly deformed and shows no preferred orientation.

Plane-polarized

33321751

Cross-polarized



33321651

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1

Lithology: **olivine-bearing gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine-bearing gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved, but could be subophitic, as subhedral plagioclase occurs as inclusion within clinopyroxene. Olivine is highly recrystallized and the neoblasts with triple junctions are aggregated. Plagioclase is strongly recrystallized and foliated. Clinopyroxene contains abundant brown amphibole blebs. Orthopyroxene are distributed along the foliation, commonly together with clinopyroxene and opaque minerals. Brown amphibole associates with the opaque minerals along the foliation. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	4			1.2	subhedral	subequant	
Plagioclase	79		24	0.2	anhedral	elongate	undulose extinction
Clinopyroxene	15		8	6	anhedral	subequant	with abundant brown amphibole
Amphibole	1		1	0.1	anhedral	interstitial	
Opaques	1						
Ilmenite	0.9						
Sulfide	0.1						

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology domain 2

Lithology: **oxide gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is an oxide gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved. Plagioclase is completely recrystallized and foliated. Orthopyroxene is elongated and sometimes deformed. It is distributed along the foliation and occasionally contains plagioclase inclusions. Clinopyroxene is partly recrystallized and the porphyroclasts contain abundant brown amphibole blebs. Brown amphibole together with opaque minerals either associate with both clinopyroxene and orthopyroxene along the foliation or disseminate among the plagioclase neoblasts. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		2	0.2	anhedral	subequant	undulose extinction
Clinopyroxene	21		5	2.4	anhedral	subequant	with abundant brown amphibole
Orthopyroxene	19		6.8	2.4	anhedral	elongate	with plagioclase inclusions
Amphibole	0.5		0.4	0.1	anhedral	interstitial	
Opaques	5						
Ilmenite	4.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 60 Domain name: coarse-grained mylonitic baggro

Total rock alteration estimate (%): 50 Observer(s): TN

Detailed description Olivine is replaced by clay along fractures; clinopyroxene by brown amphibole patches, blebs and fringes, by green amphibole fringes, and by clay along cleavage surfaces; orthopyroxene by talc and amphibole along fractures; plagioclase by mostly secondary plagioclase whose volume proportion was estimated with highly contrasted image.

Comment type	Comment
Mylonite comments:	Cpx, Ol, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	20	5	70
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless			30	
Amphibole, green		10		
Clay minerals	95	70	20	
Oxide	4			n/a
Plagioclase, sec.	n/a	n/a	n/a	90
Sulfide	1			n/a
Talc		n/a	50	n/a
Subtotals replaced	100	100	100	100

Interval domain no: 2 Domain rel. abundance (%): 40 Domain name: fine-grained mylonitic gabbro

Total rock alteration estimate (%): 20 Observer(s): TN

Detailed description Fresher than corser-grained domain.

Comment type	Comment
Mylonite comments:	Cpx, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		5	5	20
Amphibole, brown	n/a	50	n/a	n/a
Clay minerals		50	100	
Plagioclase, sec.	n/a	n/a	n/a	80
Subtotals replaced		100	100	100

MICROSTRUCTURES

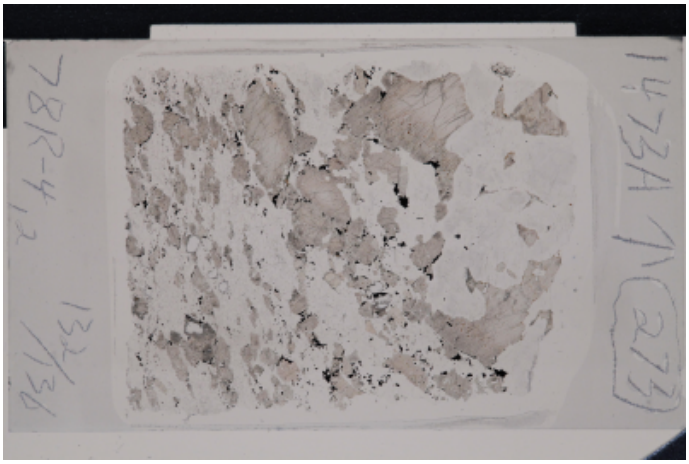
Microstructure: crystal-plastic Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

THIN SECTION LABEL ID: **360-U1473A-78R-4-W 132/136-TSB-TS_273** Piece no.: #02 TS no.: 273

Group	Summary
Igneous petrology:	There are two domains in the thin section. A coarse-grained oxide-bearing gabbro with a granular texture and a disseminated oxide gabbronorite with a porphyroclastic texture.
Metamorphic petrology:	The fine grained domain of the rock shows dynamic recrystallization of Pl and, locally, Cpx. The static alteration is overall slight.
Structure:	contact between a fine-grained oxide gabbro and a coarse grained olivine gabbro. The fine-grained rock has a porphyroclastic texture defined by recrystallized plag and cpx small clasts, which may also be partially recrystallized. The coarse olivine gabbro is weakly deformed and shows no preferred orientation.

Plane-polarized



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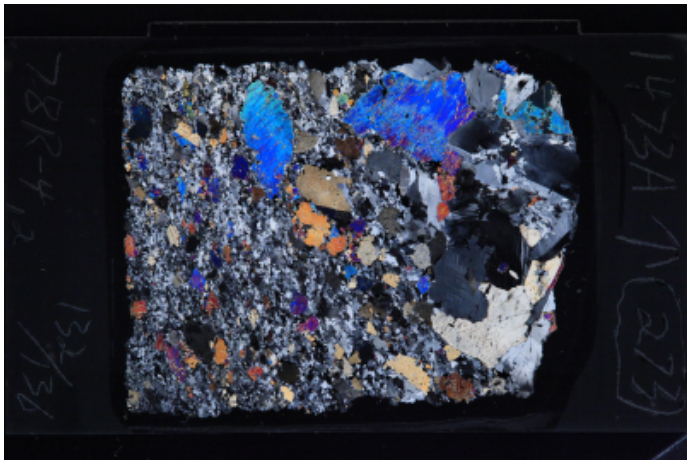
Cross-polarized



33321231

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 55 Domain name: lithology domain 1

Lithology: **oxide-bearing gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: This domain is an oxide-bearing gabbro with a granular texture. Small amount of olivine is present, which is interstitial between plagioclase. Plagioclase is partly recrystallized and show undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene and contains abundant brown amphibole blebs. It is weakly recrystallized and the associates with tiny brown amphibole together with opaque oxides. Brown amphibole also occurs at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite, with minor magnetite and sulfides. Intergrowth texture between magnetite and ilmenite is very common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.7			1.8	anhedral	interstitial	rimmed by orthopyroxene
Plagioclase	64		6.8	5.6	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	33		11	11	anhedral	subequant	with a consertal texture
Amphibole	0.3		0.2	0.1	anhedral	interstitial	
Opaques	2						
Magnetite	0.3						
Ilmenite	1.5						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 45 Domain name: lithology domain 2

Lithology: **oxide-bearing gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: This domain is a disseminated oxide gabbronorite with a porphyroclastic texture. A strong foliation is defined by the preferred orientation of the recrystallized plagioclase. Plagioclase shows undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene and contains abundant brown amphibole blebs. Opaque minerals are dominated by ilmenite, with minor magnetite and sulfides. They are distributed along the foliation, mostly occurring at the rim of clinopyroxene. Intergrowth texture between magnetite and ilmenite is common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	70		1	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	24		3.6	2	anhedral	subequant	with a consertal texture
Orthopyroxene	5		2	1.6	anhedral	elongate	
Amphibole	0.2		0.2	0.1	anhedral	interstitial	
Opaques	1						
Magnetite	0.2						
Ilmenite	0.7						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): RT

Detailed description The rock shows the dynamic recrystallization of Pl and, locally, Cpx. The static alteration is overall slight.

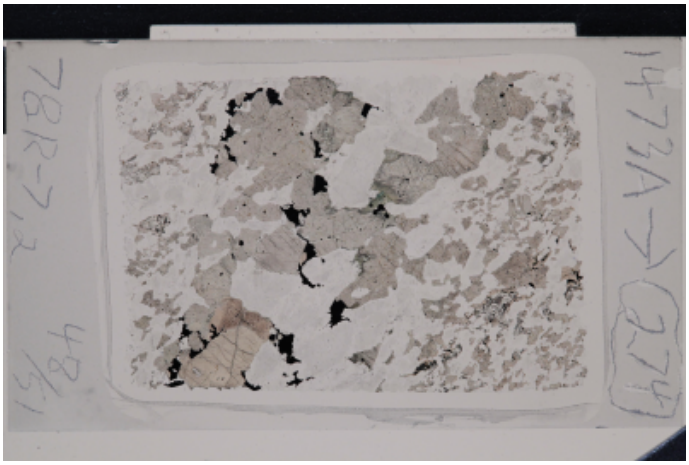
Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	Overall, Pl is extensively recrystallized and clinopyroxene is also locally recrystallized.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		3	5	2
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		50	50	40
Chlorite			50	60
Subtotals replaced		100	100	100

THIN SECTION LABEL ID: **360-U1473A-78R-7-W 48/51-TSB-TS_274** Piece no.: #02 TS no.: 274

Group	Summary
Igneous petrology:	There are two domains in the thin section. A coarse-grained gabbro with a granular texture is intervened between olivine gabbro with a subophitic texture.
Metamorphic petrology:	Static alteration intensity is moderate. Clinopyroxene is more altered but plagioclase is less altered in oxide gabbro intrusion than in host olivine gabbro.
Structure:	coarse grained olivine gabbro, undeformed, that grades into a weakly foliated rock of same composition. Plagioclase is recrystallized into medium-grained aggregates that define the foliation. Olivine is observed as fine grains associated with oxides, and cpx is present as both coarse grains and medium, fractured clasts in the foliated rock.

Plane-polarized



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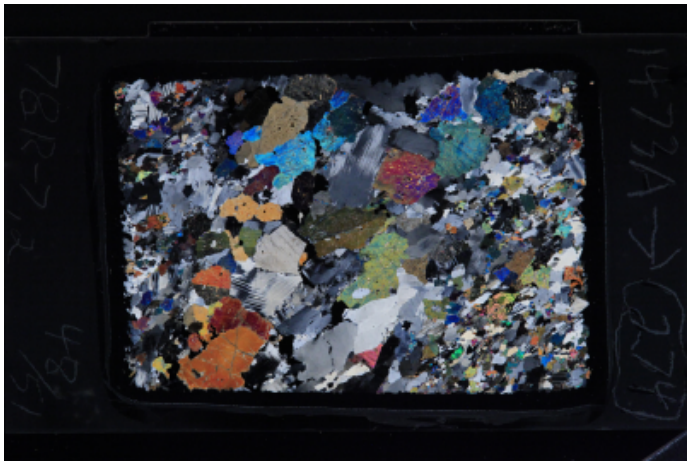
Cross-polarized



33321191

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: lithology domain 1

Lithology: **oxide gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: A coarse-grained oxide gabbro with a granular texture. Plagioclase is partly recrystallized and displays undulose extinction and deformation twins. Clinopyroxene contains abundant blebs of brown amphibole and opaque oxides. Occasionally, it shows a consertal intergrowth texture with orthopyroxene. Opaque minerals are interstitial between clinopyroxene and plagioclase. They are dominated by ilmenite and magnetite, with very few sulfides. Intergrowth texture between ilmenite and magnetite is very common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	48		8	6	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	46		7	6	anhedral	subequant	with abundant brown amphibole blebs
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	5						
Magnetite	3						
Ilmenite	2						

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and clinopyroxene. Plagioclase commonly display undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine. Clinopyroxene displays a consertal intergrowth texture and occasionally rimmed by brown amphibole and opaque oxides. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		3.2	1.2	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	31		2.4	1.2	anhedral	poikilitic	
Amphibole	0.3		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 50 Domain name: Ol gabbro

Total rock alteration estimate (%): 25 Observer(s): TN

Detailed description Olivine is replaced by serpentine/clay along fractures; clinopyroxene vy secondary clinopyroxene patches, by brown amphibole patches, blebs and fringes, and clay along cleavage surfaces; plagioclase by secondary plagioclase at rims and clay along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		40
Amphibole, brown	n/a	50	n/a	n/a
Clay minerals		15		5
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4	4		n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Sulfide	1	1		n/a
Subtotals replaced	100	100		100

Interval domain no: 2 Domain rel. abundance (%): 50 Domain name: gabbro

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Clinopyroxene is more altered and secondary plagioclase is less abundant than host olivine gabbro. Secondary clinopyroxene is absent.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		10		10
Amphibole, brown	n/a	85	n/a	n/a
Amphibole, green		10		
Clay minerals				5
Oxide		4		n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Sulfide		1		n/a
Subtotals replaced		100		100

MICROSTRUCTURES

Microstructure: metamorphic

coarse grained olivine gabbro, undeformed, that grades into a weakly foliated rock of same composition. Plagioclase is recrystallized into medium-grained aggregates that define the foliation. Olivine is observed as fine grains associated with oxides, and cpx is present as both coarse grains and medium, fractured clasts in the foliated rock.

Observer: GV

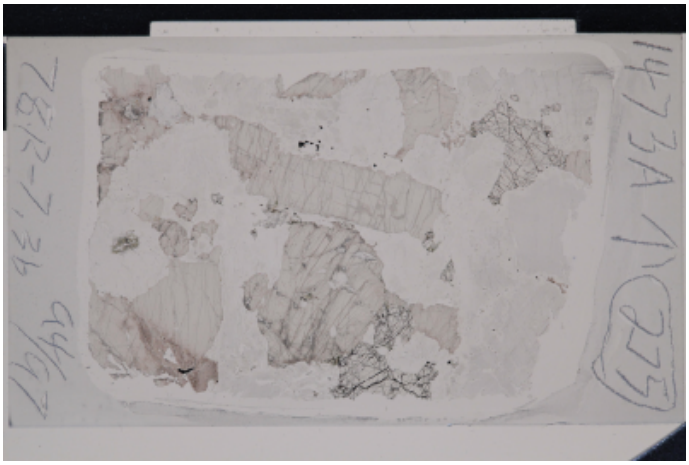
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular texture:medium to fine grains commnoly associated with oxides.
Plagioclase:	size:coarse to medium shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse grains with straight contacts and weakly oriented, fine recrystallized grains.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains in the undeformed rock.
Oxide:	geometry: medium-size pods at the boundaries of cpx, and partially oriented in the foliation of the weakly foliated domain.

THIN SECTION LABEL ID: **360-U1473A-78R-7-W 94/97-TSB-TS_275** Piece no.: #03 TS no.: 275

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a granular texture. Plagioclase is commonly in a tabular shape and shows magmatic twins. It is partly recrystallized and displays undulose extinction and deformation twins.
Metamorphic petrology:	Static background alteration intensity is negligible.
Structure:	coarse-grained olivine gabbro, undeformed. Limited crystal-plastic strain is restricted to tapered twins in plagioclase.

Plane-polarized



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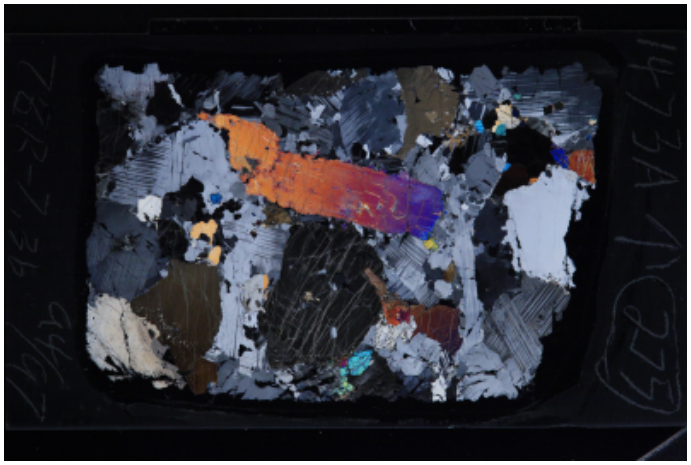
Cross-polarized



33321111

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a granular texture. Olivine is commonly in a subequant shape and small olivine grains are interstitial between plagioclase. Plagioclase is commonly in a tabular shape and shows magmatic twins. It is partly recrystallized and displays undulose extinction and deformation twins. Clinopyroxene commonly displays a consertal intergrowth texture and contains abundant tiny brown amphiboles. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			3.6	anhedral	subequant	
Plagioclase	62		8	8	anhedral	tabular	undulose extinction
Clinopyroxene	21		13	10	anhedral	subequant	with plagioclase inclusions
Opaques	0.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Static background alteration intensity is negligible.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	5		3
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		10		
Chlorite	5			
Clay minerals	10			
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	25	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro, undeformed. Limited crystal-plastic strain is restricted to tapered twins in plagioclase.

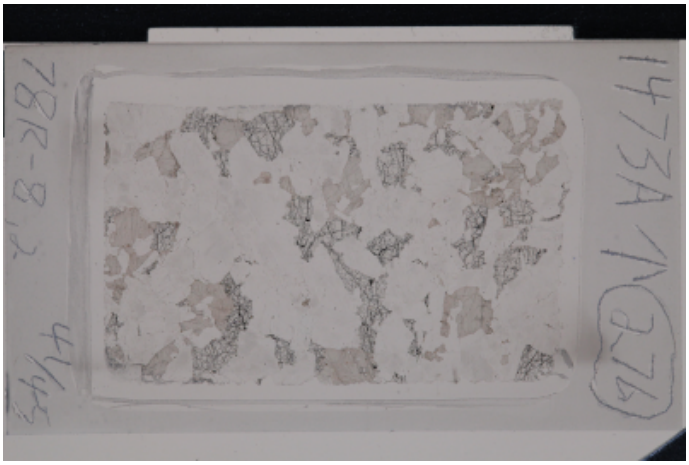
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	size: coarse shape: anhedral boundaries: curved texture: coarse grains with curved contacts.
Plagioclase:	size: coarse shape:subhedral boundaries: straight tiwnning: tapered (magmatic locally preserved) texture: coarse grains with a granular texture
Clinopyroxene:	size: coarse shape: subhedral boundaries: straight fractures: common texture: coarse grains with no apparent SPO.
Oxide:	geometry: few thin pods dispersed in the rock.

THIN SECTION LABEL ID: **360-U1473A-78R-8-W 41/45-TSB-TS_276** Piece no.: #02 TS no.: 276

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Occasionally, subhedral tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	coarse-grained olivine gabbro with a submagmatic texture, mainly characterized by minor strain in plagioclase grains.

Plane-polarized



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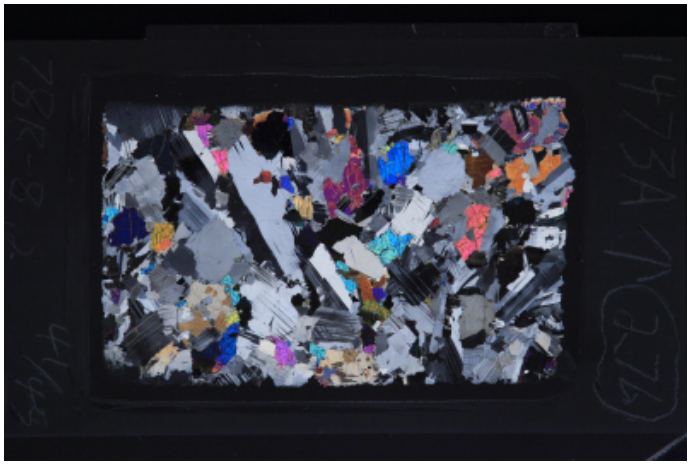
Cross-polarized



33321071

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape, and shows undulose extinction deformation twins. Some plagioclase grains preserve magmatic twins. Occasionally, subhedral tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is rimmed by orthopyroxene and occasionally contains clinopyroxene inclusions. Clinopyroxene commonly shows a consertal texture. Opaque minerals are dominated by sulfides, and exsolution of chalcopyrite from pyrite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	16			2.8	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	70		8	4	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	14		4	3	anhedral	poikilitic	with a consertal texture
Opaques	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol developed typical mesh texture with talc, clay and minor oxide formation. Cpx mainly altered into colorless amphibole with occurrence of clay and brown amphibole. Pl were mostly replaced by secondary Pl with minor chlorite occurring in the micro-fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	8	8		5
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless		85		
Chlorite				5
Clay minerals	15	10		
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	95
Talc	70	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic — coarse-grained olivine gabbro with a submagmatic texture, mainly characterized by minor strain in plagioclase grains. Observer: GV

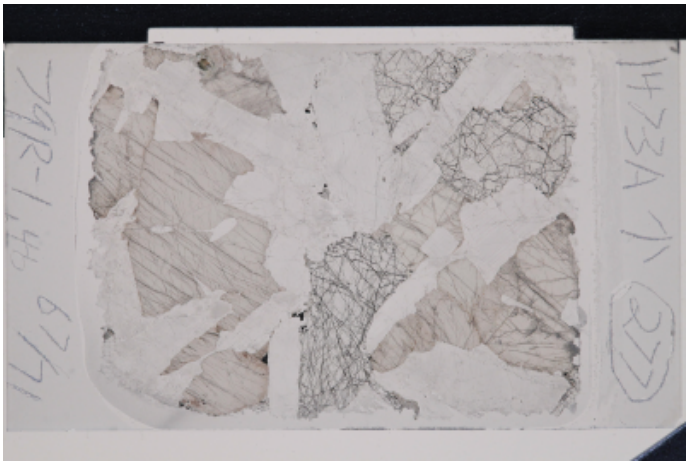
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved texture: medium grains with curved contacts.
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered (magmatic locally preserved) undulose extinction: irregular (weak) subgrains: curved boundaries texture: coarse grains dispersed in a granular texture.
Clinopyroxene:	size: medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: fractured grains with curved contacts.

THIN SECTION LABEL ID: **360-U1473A-79R-1-W 67/71-TSB-TS_277** Piece no.: #04 TS no.: 277

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Subhedral plagioclase is partly or fully enclosed within both olivine and clinopyroxene.
Metamorphic petrology:	Static alteration intensity is slight. Most of alteration minerals are fracture fillings at subgreenschist facies except for secondary clinopyroxene and brown amphibole.
Structure:	Undeformed, coarse-grained olivine gabbro. Plagioclase exhibits tapered twinning and olivine shows kink banding.

Plane-polarized



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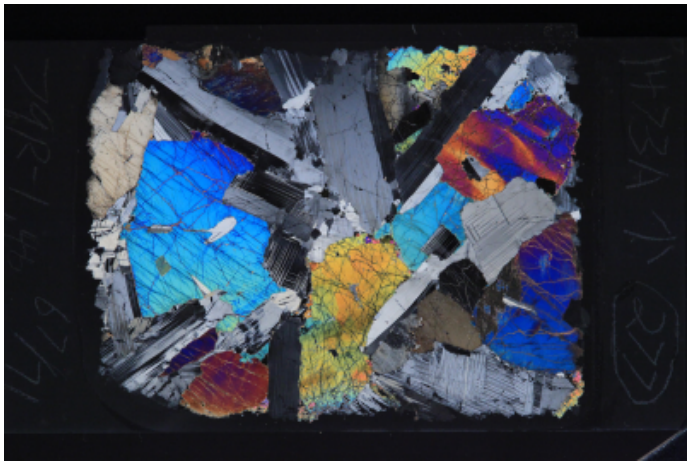
Cross-polarized



33321011

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and commonly shows magmatic twins, although undulose extinction and deformation twins can also be seen. Subhedral plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is locally rimmed by clinopyroxene and occasionally contains clinopyroxene inclusion. Clinopyroxene shows a consertal intergrowth texture. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	20			8	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	45		10	8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	35		12	10	anhedral	poikilitic	with a consertal texture
Opaques	0.2						
Ilmenite	0.1						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): TN

Detailed description Olivine is replaced by serpentine/clay along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole blebs and by clay along cleavage surfaces; plagioclase by secondary plagioclase at rims, by chlorite and minor carbonate along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		5
Amphibole, brown	n/a	30	n/a	n/a
Chlorite				40
Clay minerals		30		
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	2			n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Sulfide	1			n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: straight to curved; Undulose extinction: regular; Subgrain: straight Texture: olivine grains exhibiting pronounced kink banding
Plagioclase:	Grain size: coarse-grained; Grain shape: subhedral to anhedral, tabular; Grain boundary: straight to curved; Undulose extinction: regular; Twinning: tapered and magmatic; Texture: tabular plagioclase grains with magmatic and tapered twinning
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Texture: poikilitic clinopyroxene with plagioclase inclusions

THIN SECTION LABEL ID: **360-U1473A-79R-1-W 81/87-TSB-TS_278** Piece no.: #05 TS no.: 278

Group	Summary
Igneous petrology:	There are two domains of olivine gabbro in the thin section. Both domains show a subophitic texture, but with different grain sizes.
Metamorphic petrology:	Static background alteration intensity is only slight.
Structure:	Well-preserved igneous texture displaying isotropic magmatic fabric in both medium and coarse-grained domains.

Plane-polarized

33321711

Cross-polarized

33321731

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 60 Domain name: lithology domain 1 major

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a subophitic texture. Plagioclase commonly shows undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Olivine is rimmed by both clinopyroxene and orthopyroxene. Clinopyroxene commonly displays a consertal intergrowth texture. Very little brown amphibole and opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	12			4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	60		8	4	anhedral	tabular	undulose extinction
Clinopyroxene	28		5	3.6	anhedral	poikilitic	with a consertal texture

Interval domain no: **2** Domain rel. abundance (%): 40 Domain name: lithology domain 2 minor

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Tabular plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Plagioclase commonly shows magmatic twins. Olivine is rimmed by clinopyroxene. Clinopyroxene occasionally displays a consertal texture. Brown amphibole is almost absent, but very little ilmenite is present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			6	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	65		10	8	anhedral	tabular	
Clinopyroxene	30		20	8	anhedral	poikilitic	with a consertal texture
Opaques	0.1						
Ilmenite	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Static background alteration is only slight. Alteration phases observed are serpentine, talc and magnetite after olivine; 2nd Cpx and brown amphibole after primary Cpx; and minor 2nd plagioclase after primary plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		5
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		10		
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Detailed description Preserved igneous texture with isotropic magmatic fabric.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	absent	n/a

Type	Comment
Olivine:	Grain size: coarse to medium Grain shape: anhedral Grain boundaries: straight to lobate Undulose extinction: weak Texture: preserved primary texture
Plagioclase:	Grain size: coarse to medium Grain shape: euhedral to subhedral Grain boundarie: straight Twinnings: igneous and rare tapered Undulose extinction: weak Texture: preserved igneous texture with slightly deformed crystals
Clinopyroxene:	Grain size: coarse Grain shape: anhedral and poikilitic Grain boundary: straight Texture: preserved primary texture with included euhedral plg chadacrysts

THIN SECTION LABEL ID: **360-U1473A-79R-2-W 24/27-TSB-TS_279** Piece no.: #01 TS no.: 279

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a granular texture. Plagioclase is in a tabular to subequant shape and shows undulose extinction and deformation twins. Small anhedral plagioclase grains occur as inclusions within both clinopyroxene and olivine.
Metamorphic petrology:	Static alteration intensity is slight. Most of minerals are microfracture-filling subgreenschist facies products except for secondary clinopyroxene and brown amphibole.
Structure:	Undeformed rock with a submagmatic texture. Localized strain is observed in tapered twins and weak undulose extinction in plagioclase.

Plane-polarized

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Cross-polarized

33320951

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a granular texture. Olivine is commonly rimmed by orthopyroxene. Small olivine grains are interstitial between plagioclase. Plagioclase is in a tabular to subequant shape and shows undulose extinction and deformation twins. Some tabular plagioclases preserve the magmatic twins. Small anhedral plagioclase grains occur as inclusions within both clinopyroxene and olivine. Clinopyroxene commonly shows a consertal intergrowth texture with orthopyroxene. Opaque minerals are solely composed of tiny sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1.2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	54		5	2.4	anhedral	tabular	undulose extinction and deformaiton twins
Clinopyroxene	38		2	1.2	anhedral	subequant	with a consertal texture
Opaques	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): TN

Detailed description Olivine is replaced by serpentine/clay along fractures; clinopyroxene by secondary clinopyroxene patches, by brown amphibole patches, blebs and fringes, and by clay (?) along cleavage surfaces; plagioclase has fractures filled by clay-like mineral.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		1
Amphibole, brown	n/a	45	n/a	n/a
Clay minerals		10		100
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	4			n/a
Sulfide	1	5		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic — Undeformed rock with a submagmatic texture. Localized strain is observed in tapered twins and weak undulose extinction in plagioclase. Observer: GV

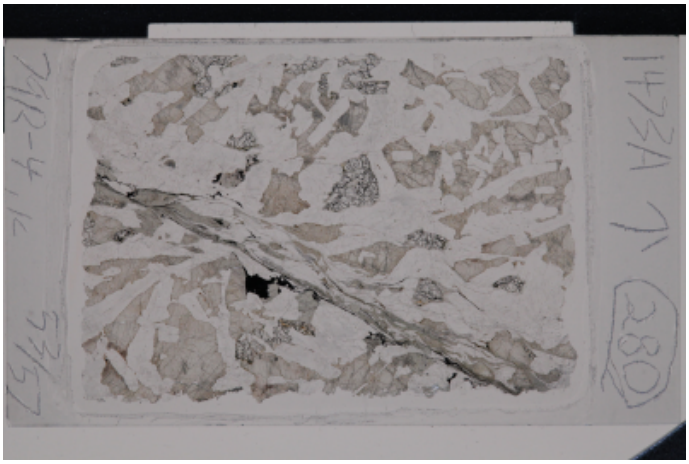
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved texture: dispersed grains in a granular texture.
Plagioclase:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular texture: medium to fine grains with straight to curved contacts
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: medium to fine grains in a granular texture.

THIN SECTION LABEL ID: **360-U1473A-79R-4-W 53/57-TSB-TS_280** Piece no.: #01 TS no.: 280

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Subhedral plagioclase is partly or fully enclosed within both olivine and clinopyroxene. The gabbro is crosscut by a mylonite vein, in which olivine, clinopyroxene and plagioclase are highly recrystallized. Tiny opaque oxides are disseminated among the neoblasts.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	coarse grained olivine gabbro crosscut by an ultramylonite. Olivine, plag and cpx in the coarse grained rock dislay straight to curved contacts and are not deformed, except for tapered twins in plagioclase. In the ultramylonite, the phases are recrystallized into an ultrafine-grained matrix of plag, cpx, olivine and oxides, possibly containing alteration products (amphibole?).

Plane-polarized



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Cross-polarized

33320911

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and commonly displays undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within both olivine and clinopyroxene. Olivine is rimmed by clinopyroxene, but the rim is commonly altered. Clinopyroxene is partly recrystallized and shows a consertal intergrowth texture with orhtopyroxene. Small clinopyroxene neoblasts associate with tiny brown amphiboles. Opaque minerals are dominated by ilmenite. The gabbro is crosscut by a mylonite vein, in which olivine, clinopyroxene and plagioclase are highly recrystallized. Tiny opaque oxides are disseminated among the neoblasts.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			3.6	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	60		9	6	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	34		6	5	anhedral	poikilitic	partly recrystallized and with a consertal texture
Amphibole	0.3		0.2	0.05	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 18 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol developed typical mesh texture with talc, clay, serpentine and minor oxide formation. Cpx mainly altered into colorless amphibole with clay. Pl were mostly replaced by secondary Pl with colorless amphibole occurring in the micro-fractures.

Comment type	Comment
Mylonite comments:	Mylonite characterized by aggregates of recrystallization of Cpx and Pl.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	20		20
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless	15	75		15
Clay minerals	15	20		5
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	55	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic coarse grained olivine gabbro crosscut by an ultramylonite. Olivine, plag and cpx in the coarse grained rock dislay straight to curved contacts and are not deformed, except for tapered twins in plagioclase. In the ultramylonite, the phases are recrystallized into an ultrafine-grained matrix of plag, cpx, olivine and oxides, possibly containing alteration products (amphibole?). Observer: GV

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	ultramylonitic [CPF_fabric]	5
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved texture: grains with curved contacts in the coarse olivine gabbro.
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains; curved boundaries texture: observed as coarse grains in the olivine gabbro, and also as fine-grained recrystallized aggregates in the ultramylonite.
Clinopyroxene:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common in the coarse grains texture: observed as coarse grains in the olivine gabbro and also as fine recrystallized aggregates in the ultramylonite.
Oxide:	geometry: thin bands associated with the shear zone.

THIN SECTION LABEL ID: **360-U1473A-79R-5-W 76/79-TSB-TS_281** Piece no.: #04 TS no.: 281

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Both olivine and clinopyroxene displays a poikilitic texture, and both partly or fully enclose tabular plagioclase.
Metamorphic petrology:	Sample is only slightly altered and static background alteration is negligible.
Structure:	coarse, undeformed olivine gabbro. Limited plastic strain is observed in mechanical twins in plagioclase crystals.

Plane-polarized

33320771

Cross-polarized

33320851

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Both olivine and clinopyroxene displays a poikilitic texture, and both partly or fully enclose tabular plagioclase. Olivine is partly rimmed by orthopyroxene. Plagioclase is in a tabular shape and commonly shows an oscillatory zoning. Clinopyroxene commonly displays a consertal intergrowth texture and contains small amount of tiny brown amphiboles. Opaque minerals are dominated by magnetite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			2.8	anhedral	poikilitic	occasionally rimmed by orthopyroxene
Plagioclase	72		7	5	anhedral	tabular	
Clinopyroxene	20		7	4	anhedral	poikilitic	with a consertal texture
Opaques	0.4						
Magnetite	0.3						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Static alteration is only slight. Common alteration phases are serpentine, magnetite and talc after olivine in mesh rims. 2nd Cpx and brown amphibole after primary Cpx. Plagioclase is rather fresh but characterized by numerous thin microfractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		5
Amphibole, brown	n/a	30	n/a	n/a
Clinopyroxene, sec.	n/a	70	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse, undeformed olivine gabbro. Limited plastic strain is observed in mechanical twins in plagioclase crystals.

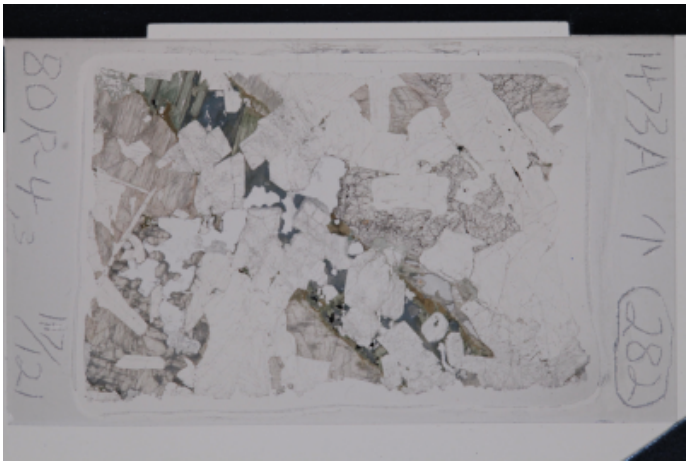
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved texture: locally associated with oxides.
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered (magmatic locally preserved) texture: coarse grains in a granular texture.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: fractured grains with straight to curved contacts.
Oxide:	geometry: few pods dispersed in the texture.

THIN SECTION LABEL ID: **360-U1473A-80R-4-W 117/121-TSB-TS_282** Piece no.: #03 TS no.: 282

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape and shows magmatic twins. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	Amphibole and plagioclase in vein show textures indicative of replacement of and overgrowth on the primary phases in host olivine gabbro. Intense lower temperature alteration occurs near within or near vein to from talc after olivine and third generation of plagioclase with chlorite, epidote and actinolite.
Structure:	Undeformed, coarse-grained olivine gabbro with tabular plagioclase grains exhibiting magmatic and tapered twinning.

Plane-polarized



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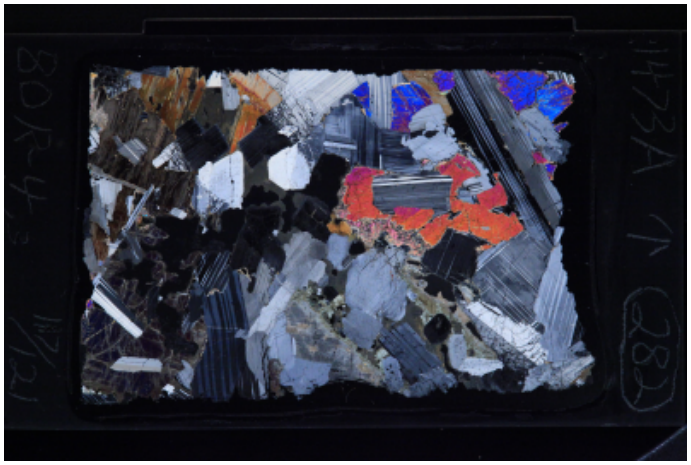
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. The rim of olivine is commonly altered, but an overgrowth of orthopyroxene can be occasionally seen. Plagioclase is in a tabular to subequant shape and shows magmatic twins. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene is moderately altered and replaced by light brown amphibole at the rim. Occasionally, it shows a consertal intergrowth texture. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			4.4	anhedral	poikilitic	
Plagioclase	62		10	5	subhedral	tabular	
Clinopyroxene	29		8	6	anhedral	poikilitic	moderately altered

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 80 Domain name: coarse-grained Ol gabbro

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Intensely altered near vein. Olivine is replaced by talc at rim and by serpentine along fractures; clinopyroxene by secondary clinopyroxene patches, brown amphibole bleb and rim, by green amphibole rim, and by clay alomg cleavage; plagioclase by secondary plagioclase, chlorite, actinolite and epidote along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	20	10	50	10
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	5		50	20
Amphibole, green		30		
Chlorite				20
Clay minerals		30		
Clinopyroxene, sec.	n/a	20	n/a	n/a
Epidote/zoisite	n/a	n/a	n/a	10
Oxide	4			n/a
Plagioclase, sec.	n/a	n/a	n/a	50
Sulfide	1			n/a
Talc	80	n/a	50	n/a
Subtotals replaced	100	100	100	100

Interval domain no: 2 Domain rel. abundance (%): 20 Domain name: white vein

Total rock alteration estimate (%): 95 Observer(s): TN

Detailed description Overgrowth of amphibole and plagioclase on primary phases in host gabbro. Network-forming plagioclase with epidote (?) is the third generation at a low-temperature.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		90		100
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, green		80		
Epidote/zoisite	n/a	n/a	n/a	5
Plagioclase, sec.	n/a	n/a	n/a	95
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Undeformed, coarse-grained olivine gabbro with tabular plagioclase grains exhibiting magmatic and tapered twinning. Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: straight to curved; Texture: partly altered and fractured olivine grains
Plagioclase:	Grain size: coarse-grained; Grain shape: subhedral to anhedral, tabular; Grain boundary: straight to curved; Undulose extinction: regular; Twinning: tapered and magmatic; Texture: tabular plagioclase exhibiting tapered and magmatic twinning
Clinopyroxene:	Grain size: coarse-grained; Grain shape: subhedral to anhedral; Grain boundary: straight to curved; Texture: poikilitic clinopyroxene with plagioclase inclusions

THIN SECTION LABEL ID: **360-U1473A-80R-5-W 68/71-TSB-TS_283** Piece no.: #02 TS no.: 283

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape and shows magmatic twins. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	A coarse-grained, undeformed olivine gabbro with subophitic texture. Plagioclase exhibits magmatic and tapered twinning. Olivine shows no undulose extinction. Small vein cross-cutting thin section. No reaction with wall-rock observed.

Plane-polarized

33327131

Cross-polarized

33327151

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. The rim of olivine is commonly altered, but an overgrowth of brown amphibole can be occasionally seen. Plagioclase is in a tabular to subequant shape and shows magmatic twins. Sometimes, it preserves an oscillatory zoning. Subhedral tabular plagioclase is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene is moderately altered and replaced by light brown amphibole at the rim. Occasionally, it shows a consertal intergrowth texture. Very few opaque minerals are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			3.2	anhedral	poikilitic	moderately altered
Plagioclase	58		9	5	subhedral	tabular	
Clinopyroxene	35		8	5	anhedral	poikilitic	moderately altered

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Ol developed mesh and pseudomorph texture with talc, colorless amphibole, green clay and oxides formation. Cpx mainly altered into colorless amphibole. Brown amphibole and clay were observed. The replacements of Pl were secondary Pl, chlorite and colorless amphibole. Near the chlorite vein, Pl was completely replaced by chlorite and colorless amphibole.

Comment type	Comment
Vein 1 minerals:	Chlorite vein is observed.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	25	20		15
Amphibole, brown	n/a	5	n/a	n/a
Amphibole, colorless	15	75		20
Chlorite				35
Clay minerals	15	20		
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	45
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Undeformed olivine gabbro with nearly planar vein Observer: OP

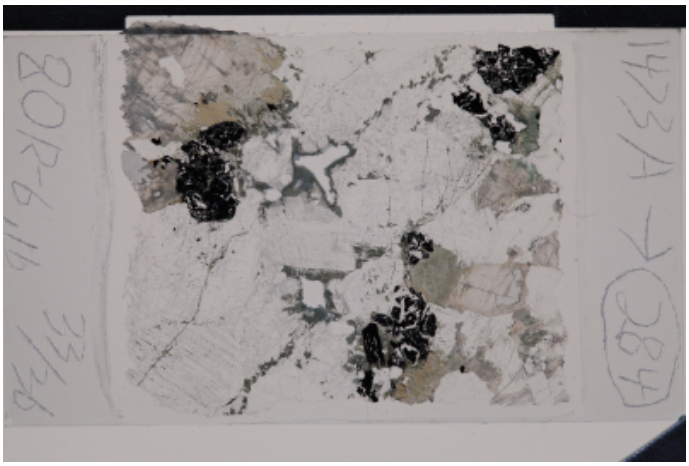
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	Grain size: coarse-grained; Grain shape: anhedral; Grain boundary: curved; Undulose extinction; Texture: primary magmatic
Plagioclase:	Grain size: coarse-grained; Grain shape: subhedral; Grain boundary: straight to curved; Undulose extinction: regular; Twinning: magmatic, minor tapered; Texture: primary magmatic
Clinopyroxene:	Grain size: coarse- to medium-grained; Grain shape: anhedral; Grain boundary: curved; Texture: primary magmatic
Vein:	Sub-planar vein cross-cutting thin section. No reaction with wall-rock observed.

THIN SECTION LABEL ID: **360-U1473A-80R-6-W 33/36-TSB-TS_284** Piece no.: #01 TS no.: 284

Group	Summary
Igneous petrology:	This is a hybrid rock, in which an olivine gabbro is intruded by a trondhjemite vein. Clinopyroxene in the olivine gabbro has been replaced by a corona of brown amphibole.
Metamorphic petrology:	The felsic vein and the host rock are substantially altered. The felsic vein includes two veins filled with pale-green Amp and chlorite.
Structure:	Isotropic.

Plane-polarized



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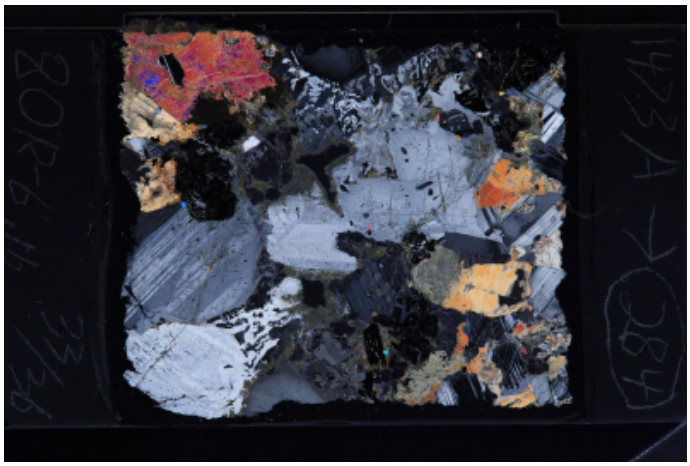
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 40 Domain name: lithology

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Olivine is completely altered and occasionally occurs as inclusion within plagioclase. Plagioclase is in a tabular shape and shows magmatic twins. Occasionally, it displays a oscillatory zoning. Subhedral plagioclase occurs as inclusion within clinopyroxene. Clinopyroxene is moderately altered. In particular, it is overgrown by a brown amphibole corona at the boundary with the trondhjemite vein. Occasionally, clinopyroxene shows a consertal intergrowth texture.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			1.6	anhedral	subequant	completely altered
Plagioclase	45		6.8	6	anhedral	tabular	
Clinopyroxene	50		12	6	anhedral	poikilitic	with brown amphibole corona

Interval domain no: **2** Domain rel. abundance (%): 60 Domain name: vein

Lithology: **trondhjemite** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: This domain is a trondhjemite vein with a granular texture. It is mainly consist of subhedral plagioclase, with minor opaque oxides and quartz. Plagioclase shows an oscillatory zoning and contain inclusions of both zircon and apatite. Opaque oxides consist of ilmenite and magnetite, showing an intergrowth texture. Quartz displays a graphic texture with the plagioclase.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	75		14	11	subhedral	subequant	
Opaques	20						
Magnetite	13						
Ilmenite	7						
Quartz	5		2	1.2	anhedral	interstitial	showing a graphic texture with plagioclase

METAMORPHIC PETROLOGY

Interval domain no: 1 Domain rel. abundance (%): 40 Domain name: host gabbro

Total rock alteration estimate (%): 30 Observer(s): RT

Detailed description The felsic vein and the host rock are substantially altered. The felsic vein includes two veins filled with pale-green Amp and chlorite.

Comment type	Comment
Alteration general comments:	The host rock is substantially altered.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		30		30
Amphibole, brown	n/a	70	n/a	n/a
Amphibole, colorless		30		30
Chlorite				30
Plagioclase, sec.	n/a	n/a	n/a	40
Subtotals replaced		100		100

Interval domain no: 2 Domain rel. abundance (%): 60 Domain name: felsic vein

Comment type	Comment
Vein 1 minerals:	The felsic vein includes two veins filled with pale-green Amp and chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)				30
Amphibole, colorless				30
Chlorite				30
Plagioclase, sec.	n/a	n/a	n/a	40
Subtotals replaced				100

MICROSTRUCTURES

Microstructure: magmatic Observer: JD

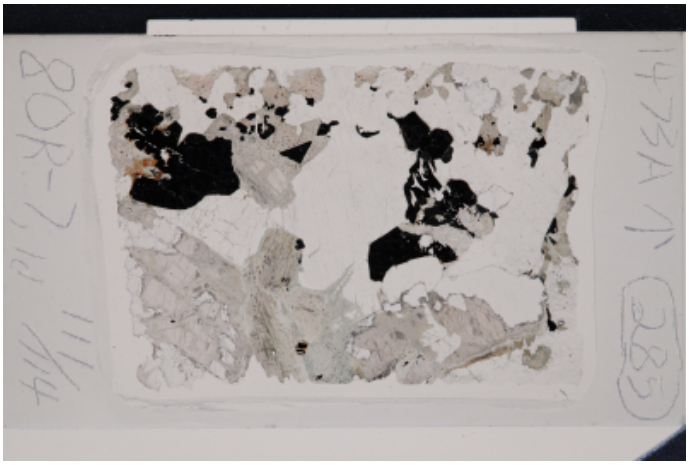
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Magmatic.
Clinopyroxene:	Magmatic.

THIN SECTION LABEL ID: **360-U1473A-80R-7-W 111/114-TSB-TS_285** Piece no.: #01 TS no.: 285

Group	Summary
Igneous petrology:	A coarse-grained oxide gabbronorite with a subophitic texture. Plagioclase is in a tabular to subequant shape and commonly show undulose extinction. Subhedral plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	The rock shows substantial background static alteration.
Structure:	Undeformed oxide gabbronorite. Plagioclase exhibits some undulose extinction and tapered twinning.

Plane-polarized



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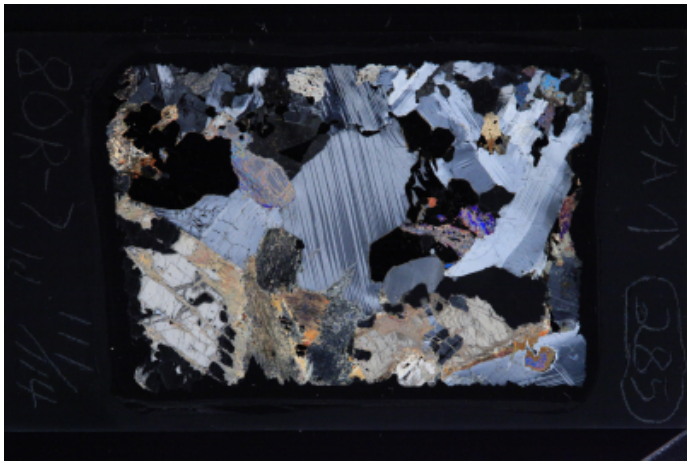
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **oxide gabbronorite** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained oxide gabbronorite with a subophitic texture. Plagioclase is in a tabular to subequant shape and commonly show undulose extinction. Subhedral plagioclase is partly enclosed within clinopyroxene. Both clinopyroxene and orthopyroxene are strongly altered and replaced by amphibole. Brown amphibole either occurs as blebs within clinopyroxene or associates with opaque minerals. Opaque minerals are dominated by ilmenite and magnetite, with minor sulfides. Intergrowth texture between ilmenite and magnetite is very common. Small amount of biotite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	46		12	10	anhedral	tabular	undulose extinction
Clinopyroxene	22		10	7	anhedral	poikilitic	strongly altered
Orthopyroxene	17		8	6	anhedral	subequant	moderately altered
Amphibole	1		1.2	0.4	subhedral	subequant	
Opaques	14						
Magnetite	7						
Ilmenite	5						
Sulfide	2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): RT

Detailed description The static background alteration is substantial.

Comment type	Comment
Alteration general comments:	The static alteration is substantial.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		30	60	20
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30	50	40
Amphibole, green		10	20	
Chlorite			20	60
Oxide		30	10	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

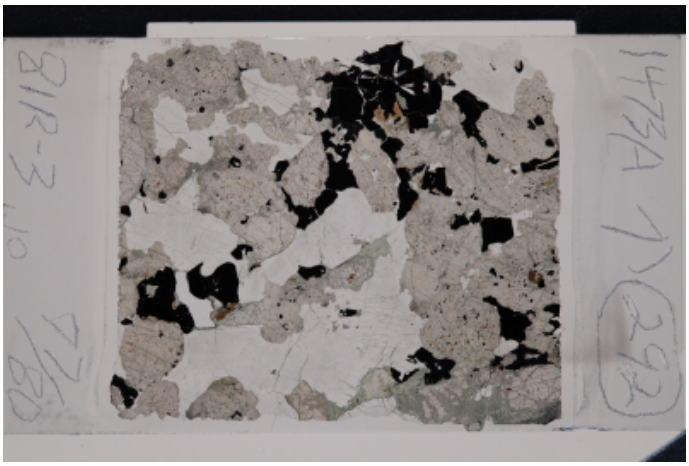
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Plagioclase:	undulose extinction; tapered twinning

THIN SECTION LABEL ID: **360-U1473A-81R-3-W 77/80-TSB-TS_292** Piece no.: #10 TS no.: 292

Group	Summary
Igneous petrology:	A coarse-grained oxide gabbronorite with a granular texture. Plagioclase is commonly in a tabular shape and shows magmatic twins. Small plagioclase is interstitial between clinopyroxene and orthopyroxene.
Metamorphic petrology:	Static background alteration is moderate and mainly confined to pyroxenes.
Structure:	Undeformed with interstitial anhedral oxides.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **oxide gabbronorite** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: A coarse-grained oxide gabbronorite with a granular texture. Plagioclase is commonly in a tabular shape and shows magmatic twins. Small plagioclase is interstitial between clinopyroxene and orthopyroxene. Clinopyroxene is highly altered and contains abundant brown amphibole blebs and occasionally displays a consertal intergrowth texture with orthopyroxene. Small clinopyroxene grains occur as inclusion within plagioclase. Orthopyroxene is highly altered and occasionally shows a graphic texture with opaque minerals. Subhedral brown amphibole associate with opaque minerals. Opaque minerals are dominated by ilmenite and magnetite, with minor sulfides. Intergrowth between ilmenite and magnetite is very common. A few apatite and biotite are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	40		16	10	anhedral	tabular	
Clinopyroxene	34		14	6	anhedral	subequant	with abundant brown amphibole
Orthopyroxene	13		8	5	anhedral	subequant	moderately altered
Amphibole	1		2	0.2	anhedral	subequant	
Opaques	12						
Magnetite	7						
Ilmenite	3						
Sulfide	2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): RT

Detailed description Static background alteration is moderate and confined to pyroxenes.

Comment type	Comment
Alteration general comments:	Static background alteration is moderate and confined to pyroxenes.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		20	50	5
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless			70	50
Amphibole, green		70		
Chlorite			30	50
Oxide		10		n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: magmatic Observer: CF

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Grain size: coarse Grain shape: euhedral to subhedral Grain boundary: straight to lobate Twinnings: igneous and tapered Undulose extinction: weak Texture: well-preserved coarse grains with obate grain boundary against oxide
Clinopyroxene:	Grain size: coarse Grain shape: anhedral Grain boundary: straight to curved Texture: fractured and partially altered, often in association with oxide
Oxide:	interstitial, often forming pods between cpx grains; shows lobate contacts with plg

THIN SECTION LABEL ID: **360-U1473A-81R-5-W 77/80-TSB-TS_293** Piece no.: #03 TS no.: 293

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape, and shows undulose extinction and deformation twins. It is commonly weakly recrystallized, but is strongly recrystallized in the mylonite vein. Subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock shows slight static background alteration. The thin section encloses a thin mylonitic band made up of extremly fine-grained Pl, Cpx and opaques.
Structure:	Coarse-grained olivine gabbro with a submagmatic texture. Local plastic strain is observed in tapered twins and incipient subgrain development in plag. There is a fine-grained shear zone crosscutting the rock. This shear zone is mainly composed of ultrafine-grained recrystallized plag, cpx and oxides (?).

Plane-polarized

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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is commonly rimmed by both clinopyroxene and orthopyroxene, but the rims is also partly altered. Plagioclase is commonly in a tabular shape, and shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene, and contains abundant brown amphibole blebs. Opaque minerals are dominated by ilmenite, with minor sulfides. Plagioclase is commonly weakly recrystallized, but is strongly recrystallized in the mylonite vein.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by pyroxenes
Plagioclase	55		11	7	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	40		6	5	anhedral	poikilitic	with a consertal texture
Amphibole	0.2		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 3 Observer(s): RT

Detailed description The rock shows slight static background alteration. The thin section encloses a thin mylonitic band made up of extremly fine-grained Pl, Cpx and opaques.

Comment type	Comment
Alteration general comments:	The rock shows a negligible static background alteration.
Mylonite comments:	The thin section encloses a thin mylonitic band made up of ectremly fine-grained Pl, Cpx and opaques.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	50		2
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		20		50
Chlorite				50
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic There is a thin shear zone composed of ultrafine-grained recrystallized plag, cpx and oxides. Observer: GV

Detailed description Coarse-grained olivine gabbro with a submagmatic texture. Local plastic strain is observed in tapered twins and incipient subgrain development in plag. There is a fine-grained shear zone crosscutting the rock. This shear zone is mainly composed of ultrafine-grained recrystallized plag, cpx and oxides (?).

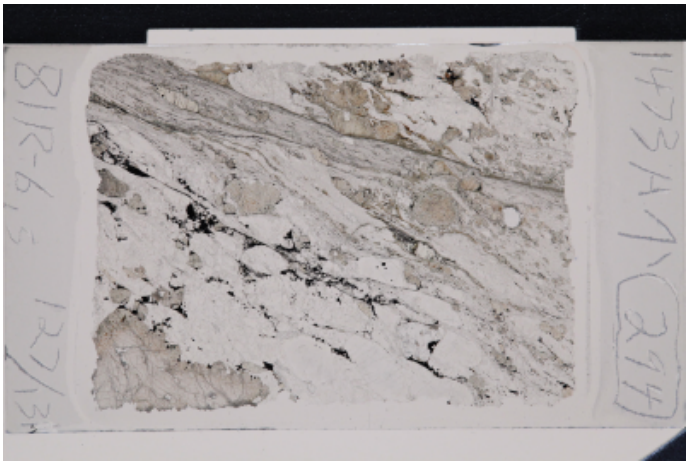
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved undulose extinction: beautiful! subgrains: straight contacts texture: medium grains with curved contacts.
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered undulose extinction: irregular subgrains: straight to curved contacts texture: coarse grains dispersed in the texture
Clinopyroxene:	size: medium shape: anhedral boundaries: curved fractures: common texture: medium grains with curved boundaries.

THIN SECTION LABEL ID: **360-U1473A-81R-6-W 127/131-TSB-TS_294** Piece no.: #05 TS no.: 294

Group	Summary
Igneous petrology:	There are three domains, an oxide gabbro, an oxide-bearing gabbro and an oxide-bearing gabbronorite. The gabbroic domains show a porphyroclastic texture, and the gabbronorite domain displays a mylonitic texture.
Metamorphic petrology:	The thin section includes an ultramylonite made up of very fine-grained Pl and Px, locally associated with opaque phases and/or brown Amp. The host porphyroclastic rock shows the same synkinematic mineral assemblage. The overall static alteration is slight.
Structure:	coarse grained mylonite crosscut by an ultramylonite shear zone. The mylonite is characterized by cpx, olivine and plag porphyroclasts in a fine-grained recrystallized plag matrix. The ultramylonite is marked by a plag+olivine+cpx mixtures.

Plane-polarized



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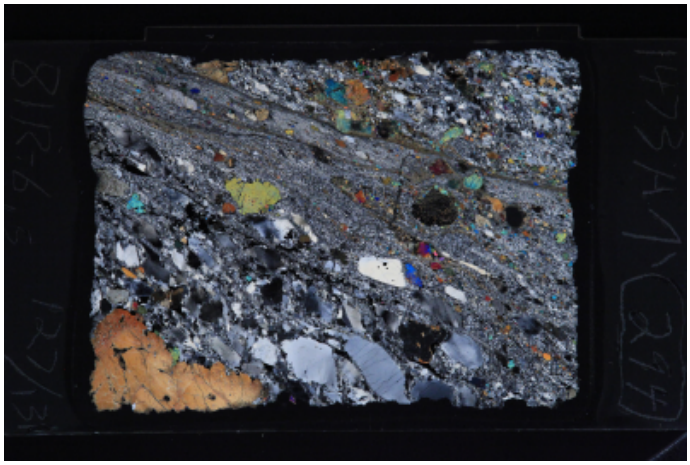
Cross-polarized



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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 40 Domain name: lithology domain 1

Lithology: **oxide gabbro** Observer: CL

Texture: pophyroclastic Ave. grain size: coarse grained

Detailed description: This domain is a medium-grained oxide gabbro with a porphyroclastic texture. Plagioclase is partly recrystallized and displays undulose extinction. The plagioclase porphyroclasts commonly contain needle-like exsolution of ilmenite. Clinopyroxene is partly recrystallized and the neoblasts are distributed along the foliation. The clinopyroxene porphyroclasts contain abundant brown amphibole blebs. Opaque minerals are dominated by ilmenite and magnetite, with minor sulfides. They are commonly distributed along the foliation and associate with the plagioclase neoblasts. Intergrowth between magnetite and ilmenite is very common. Anhedral apatites associate with the opaque minerals.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	64		8	2.4	anhedral	elongate	undulose extinction
Clinopyroxene	30		11	11	anhedral	subequant	with brown amphibole blebs
Opaques	6						
Magnetite	3						
Ilmenite	2.5						
Sulfide	0.5						

Interval domain no: **2** Domain rel. abundance (%): 20 Domain name: lithology domain 2

Lithology: **oxide-bearing gabbro** Observer: CL

Texture: pophyroclastic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained oxide-bearing gabbro with a porphyroclastic texture. Small amount of olivine are present at the rim and is moderately altered. Plagioclase is highly recrystallized and foliated. Clinopyroxene is partly recrystallized and contain abundant brown amphibole blebs. Opaque minerals are dominated by ilmenite, with minor magnetite and sulfides. They are distributed along the foliation and associates with clinopyroxene. Intergrowth between ilmenite and magnetite is very common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1			0.8	anhedral	subequant	altered
Plagioclase	57		1.2	0.4	anhedral	elongate	undulose extinction
Clinopyroxene	40		2.8	2.4	anhedral	subequant	with brown amphibole blebs
Opaques	2						
Magnetite	0.4						
Ilmenite	1.5						
Sulfide	0.1						

Interval domain no: **3** Domain rel. abundance (%): 40 Domain name: vein

Lithology: **oxide-bearing gabbronorite** Observer: CL

Texture: mylonitic Ave. grain size: fine grained

Detailed description: This domain is an oxide-bearing gabbronorite mylonite. Plagioclase is highly recrystallized and shows undulose extinction. Orthopyroxene is distributed along the foliation and contains plagioclase inclusions. Clinopyroxene contains abundant brown amphibole blebs. Opaque minerals are dominated by ilmenite and sulfides. Sulfides are coarser than ilmenite. They are distributed along the foliation or occur at the pressure shadows of clinopyroxene porphyroclasts. Symplectite between ilmenite and clinopyroxene can be seen. Few zircons are present.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	68		1.8	0.05	anhedral	elongate	highly recrystallized
Clinopyroxene	15		3.6	1.6	anhedral	subequant	
Orthopyroxene	15		4	2	anhedral	elongate	
Opaques	2						
Ilmenite	1.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): RT

Detailed description The thin section includes an ultramylonite made up of very fine-grained Pl and Px, locally associated with opaque phases and/or brown Amp. The host porphyroclastic rock shows the same synkinematic mineral assemblage. The overall static alteration is slight.

Comment type	Comment
Alteration general comments:	The static alteration is slight.
Mylonite comments:	The thin section includes an ultramylonite made up of very fine-grained Pl and Px, locally associated with opaque phases and/or brown Amp. The host porphyroclastic rock shows the same synkinematic mineral assemblage.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	30	5	5	3
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless			80	70
Amphibole, green		50		
Chlorite	30		20	30
Oxide	30			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description coarse grained mylonite crosscut by an ultramylonite shear zone. The mylonite is characterized by cpx, olivine and plag porphyroclasts in a fine-grained recrystallized plag matrix. The ultramylonite is marked by a plag+olivine+cpx mixtures.

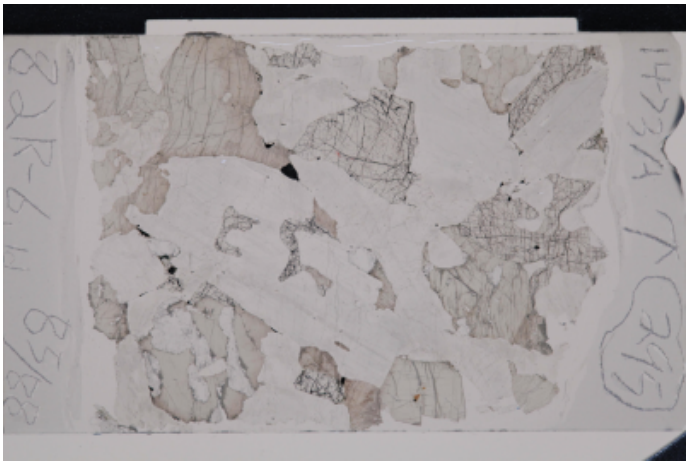
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: coarse to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse grains in the oxide gabbro, fully recrystallized fine-grained aggregates in the mylonite.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture; coarse grains as porphyroclasts; fine recrystallized grains also observed in the matrix.
Oxide:	geometry: thin bands mostly concentrated in the boundaries of the shear zone.

THIN SECTION LABEL ID: **360-U1473A-82R-6-W 85/88-TSB-TS_295** Piece no.: #01 TS no.: 295

Group	Summary
Igneous petrology:	A coarse-grained disseminated oxide olivine gabbro with a subophitic texture. The tabular plagioclase shows undulose extinction. Subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock shows a slight static background alteration
Structure:	coarse-grained olivine gabbro with a submagmatic texture. Local plastic strain is observed in tapered twins, undulose extinction and incipient subgrain development in plag.

Plane-polarized



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Cross-polarized

33326531

IGNEOUS PETROLOGY

Lithology: **disseminated oxide olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained disseminated oxide olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and clinopyroxene. Occasionally, irregular olivine grains are enclosed within plagioclase. The tabular plagioclase shows undulose extinction. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene commonly contains tiny brown amphibole along the exsoluation lamellae. It occasionally displays a consertal texture. Patches of brown amphibole sulfides within clinopyroxene can be seen. Opaque minerals are dominated by ilmenite and sulfides. They commonly occur at the rim of olivine and clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			7	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	53		19	18	anhedral	tabular	
Clinopyroxene	31		8	7	anhedral	poikilitic	
Amphibole	0.5		0.8	0.05	anhedral		
Opaques	1						
Ilmenite	0.4						
Sulfide	0.6						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description The rock shows a slight static background alteration.

Comment type	Comment
Alteration general comments:	The rock shows a slight static background alteration.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		2
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		80		60
Chlorite				40
Oxide	20			n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro with a submagmatic texture. Local plastic strain is observed in tapered twins, undulose extinction and incipient subgrain development in plag.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved texture: coarse grains with curved contacts.
Plagioclase:	size: coarse shape: subhedral boundaries; straight to curved twinning: tapered undulose extinction: irregular subgrains: curved boundaries texture: coarse grains with straight contacts.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains with straight to curved boundaries.
Oxide:	geometry: few pods at cpx and olivine grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-82R-7-W 90/94-TSB-TS_296** Piece no.: #02 TS no.: 296

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and show magmatic twins, although undulose extinction and deformation twins are also common. Subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock shows negligible static background alteration.
Structure:	medium grained olivine gabbro with a submagmatic texture. Deformation microstructures comprise tapered twins, undulose extinction and local subgrain developlment in plag.

Plane-polarized

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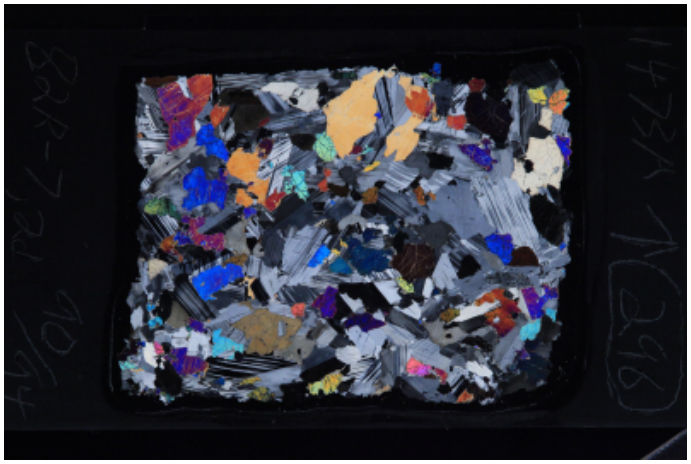
Cross-polarized



33326411

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is commonly in a subequant shape and rimmed by both clinopyroxene and orthopyroxene. Small olivine grains occur as inclusions within both plagioclase and clinopyroxene. Plagioclase is in a tabular shape and show magmatic twins, although undulose extinction and deformation twins are also common. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Locally, clinopyroxene shows a consertal texture and contains tiny brown amphibole. Opaque minerals are dominated by sulfides and commonly occur at the rim of clinopyroxene and olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			2.8	anhedral	subequant	rimmed by orthopyroxene and clinopyroxene
Plagioclase	68		7	4	anhedral	tabular	undulose extinction
Clinopyroxene	23		8	4	anhedral	poikilitic	
Opaques	0.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description The rock is fresh.

Comment type	Comment
Alteration general comments:	The rock is fresh.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	3		1
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless		80		60
Chlorite				40
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description medium grained olivine gabbro with a submagmatic texture. Deformation microstructures comprise tapered twins, undulose extinction and local subgrain developlment in plag.

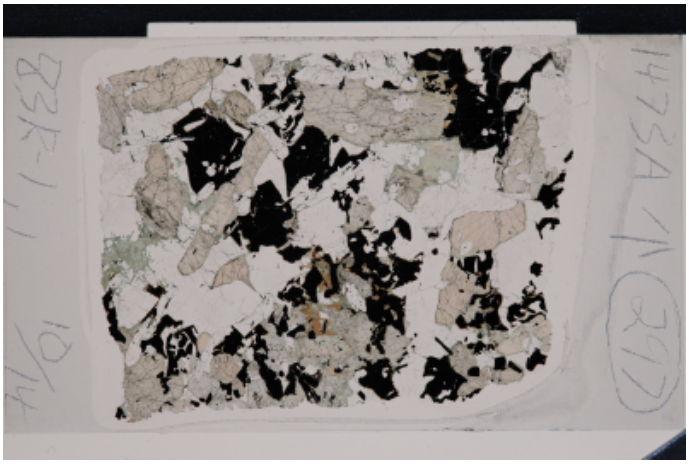
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight contacts texture: medium to fine grains with curved contacts.
Plagioclase:	size: coarse to medium shape: subhedral boundaries: straight twinning: tapered (magmatic locally preserved) undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse to medium grains dispersed in the submagmatic texture.
Clinopyroxene:	size: medium shape: anhedral boundaries: curved fractures: common texture: medium grains with curved contacts.

THIN SECTION LABEL ID: **360-U1473A-83R-1-W 10/14-TSB-TS_297** Piece no.: #01, #02 TS no.: 297

Group	Summary
Igneous petrology:	A coarse-grained oxide gabbronorite with a granular texture. It contains ca 5% euhedral apatite. The tabular plagioclase commonly displays magmatic twins and occasionally shows undulose extinction. Both clinopyroxene and orthopyroxene are moderately altered and replaced by amphibole.
Metamorphic petrology:	The rock shows moderate static background alteration, mainly confined to pyroxenes.
Structure:	undeformed oxide-gabbro. Few deformation microstructures are observed as tapered twins, undulose extinction and local subgrain development in plag.

Plane-polarized



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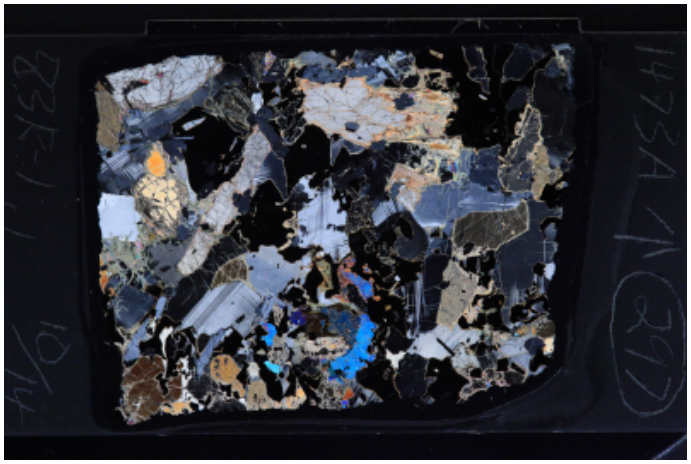
Cross-polarized



33345921

IGNEOUS PETROLOGY

Lithology: **oxide gabbronorite** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: A coarse-grained oxide gabbronorite with a granular texture. It contains ca 5% euhedral apatite. The tabular plagioclase commonly displays magmatic twins and occasionally shows undulose extinction. It contains tiny ilmenite exsolutions. Both clinopyroxene and orthopyroxene are moderately altered and replaced by amphibole. They contain euhedral apatite inclusions. Clinopyroxene is commonly in a subequant shape, whereas orthopyroxene is in a tabular shape. Opaque minerals are dominated by magnetite and ilmenite, with minor euhedral sulfides. They are commonly rimmed by tiny brown amphibole. Intergrowth texture between ilmenite and magnetite is very common. Subhedral brown amphibole occurs at the rim of altered clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	31		8	7	anhedral	tabular	undulose extinction
Clinopyroxene	20		6	4	anhedral	subequant	moderately altered
Orthopyroxene	18		10	8	anhedral	tabular	moderately altered
Amphibole	1		1.5	1.2	subhedral	subequant	
Opaques	25						
Magnetite	14						
Ilmenite	7						
Sulfide	3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 18 Observer(s): 297

Detailed description The rock shows moderate static background alteration, mainly confined to pyroxenes.

Comment type	Comment
Alteration general comments:	The rock shows moderate static background alteration.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		20	30	10
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		60	50	70
Amphibole, green		20	30	
Chlorite			20	30
Oxide		10		n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description undeformed oxide-gabbro. Few deformation microstructures are observed as tapered twins, undulose extinction and local subgrain development in plag.

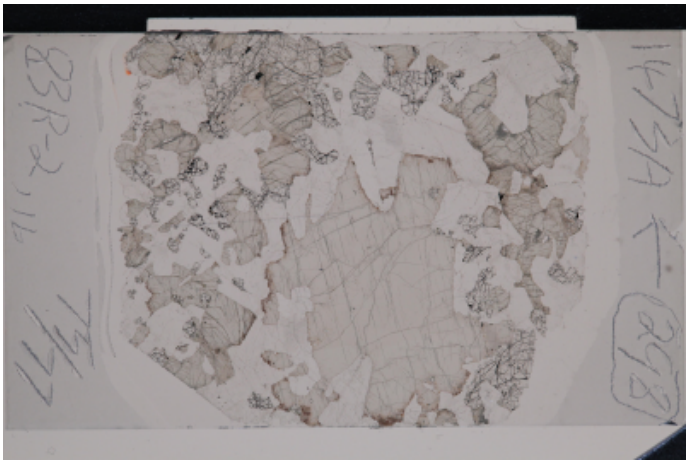
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Plagioclase:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved twinning: tapered (magmatic locally preserved) undulose extinction: irregular subgrains: striaght to curved boundaries texture: coarse grains with straight to curved contacts.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains with curved contacts
Oxide:	geometry: large pods with complex morphological shapes.

THIN SECTION LABEL ID: **360-U1473A-83R-2-W 75/77-TSB-TS_298** Piece no.: #01 TS no.: 298

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and show undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	The rock shows a slight static background alteration, which is mostly confined to olivine and pyroxene.
Structure:	coarse-grained olivine gabbro with a submagmatic texture. Tapered twins, undulose extinction and local subgrain development are the few deformation microstructures observed in plag.

Plane-polarized



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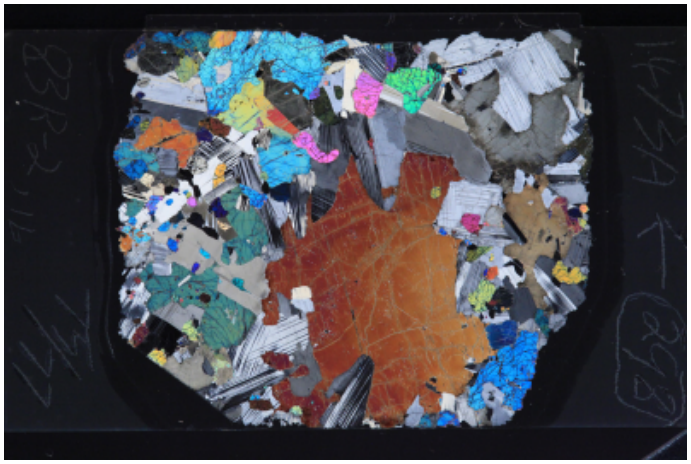
Cross-polarized



33345841

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is in a subequant shape and occasionally rimmed by orthopyroxene. Small anhedral olivine grains occur as inclusion within plagioclase and clinopyroxene. Plagioclase is in a tabular shape and show undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within both clinopyroxene and olivine. Clinopyroxene occasionally shows a consertal texture and contains a few tiny brown amphibole. Opaque minerals are mainly composed of sulfides and ilmenite and show an intergrowth texture with each other.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	15			6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	41		10	7	anhedral	tabular	undulose extinction
Clinopyroxene	44		18	8	anhedral	poikilitic	with a consertal texture
Opaques	0.5						
Ilmenite	0.2						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description The rock shows a slight static background alteration, which is mostly confined to olivine and pyroxene.

Comment type	Comment
Alteration general comments:	The rock shows a slight static background alteration, which is mostly confined to olivine and pyroxene.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		1
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		100
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	90		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro with a submagmatic texture. Tapered twins, undulose extinction and local subgrain development are the few deformation microstructures observed in plag.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	size: coarse shape: anhedral boundaries: curved texture: coarse grains with curved contacts.
Plagioclase:	size: coarse shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: striaght to curved boundaries texture: coarse grains with straight to curved boundaries.
Clinopyroxene:	size: coarse shape: anhedral boundaries: curved fractures: common texture: coarse grains with curved boundaries.
Oxide:	geometry: few pods at olivine grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-83R-5-W 89/95-TSB-TS_299** Piece no.: #03 TS no.: 299

Group	Summary
Igneous petrology:	An olivine-bearing gabbro with a porphyroclastic texture. Plagioclase is highly recrystallized and foliated. The neoblast is subhedral and displays undulose extinction. Olivine is partly recrystallized and elongated along the foliation. Clinopyroxene is partly recrystallized, and the porphyroclastic contains abundant brown amphibole blebs. Brown amphibole, commonly together with opaque minerals, also occur at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite.
Metamorphic petrology:	Pl and Ol are almost completely recrystallized into nearly polygonal neoblastic aggregates. Cpx is locally recrystallized and the Cpx neoblasts are associated with minor brown Amp and opaque phases. The rock shows a slight static background alteration.
Structure:	Steep leucocratic porphyroclastic fabric.

Plane-polarized

33346041

Cross-polarized

33346101

IGNEOUS PETROLOGY

Lithology: **olivine-bearing gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: An olivine-bearing gabbro with a porphyroclastic texture. Plagioclase is highly recrystallized and foliated. The neoblast is subhedral and displays undulose extinction. Olivine is partly recrystallized and elongated along the foliation. Clinopyroxene is partly recrystallized, and the porphyroclastic contains abundant brown amphibole blebs. Brown amphibole, commonly together with opaque minerals, also occur at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			3.6	anhedral	subequant	highly recrystallized
Plagioclase	76		8	0.6	anhedral	subequant	undulose extinction
Clinopyroxene	21		20	12	anhedral	subequant	with abundant brown amphibole blebs
Amphibole	0.5		0.8	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): RT

Detailed description Pl and Ol are almost completely recrystallized into nearly polygonal neoblastic aggregates. Cpx is locally recrystallized and the Cpx neoblasts are associated with minor brown Amp and opaque phases. The rock shows a slight static background alteration.

Comment type	Comment
Alteration general comments:	The rock shows a slight static background alteration.
Mylonite comments:	Pl and Ol are almost completely recrystallized into nearly polygonal neoblastic aggregates. Cpx is locally recrystallized and the Cpx neoblasts are associated with minor brown Amp and opaque phases.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	10		2
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		70		60
Chlorite		10		40
Clinopyroxene, sec.	n/a	10	n/a	n/a
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

Detailed description Steep leucocratic porphyroclastic fabric. There is a band that is almost pure plagioclase, which has the most recrystallization, The plagioclase neoblasts are equigranular. Pyroxene is very coarse grained and kinked. Olivine has core and mantle structures.

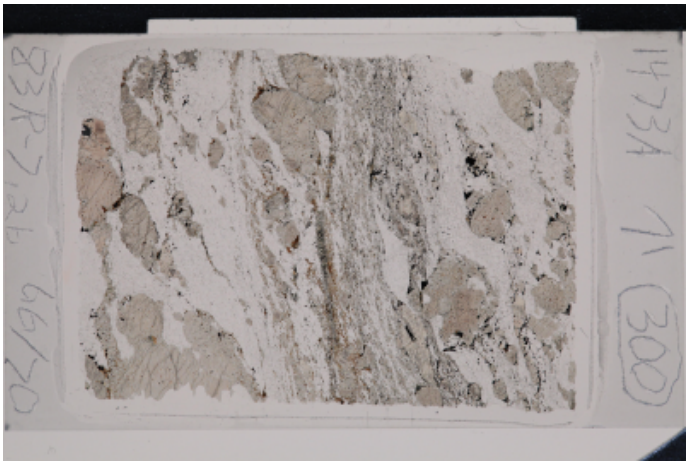
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	strong	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~3 mm. neobasts: ~0.15 mm. Grain shape: anhedral. Grain boundary: curved. Undulose extinction: complete. Texture: porphyroclastic.
Plagioclase:	Grain size: porphyroclasts: ~5 mm. neoblasts: ~0.1 mm. Grain shape: equigranular to elongated. Grain boundary: straight to curved. Twinning: larger crystals have tapered twins. Undulose extinction: better in larger crystals. Subgrains: better developed in larger crystals. Texture: porphyroclastic with a band of almost pure plagioclase neoblast aggregate.
Clinopyroxene:	Grain size: porphyroclasts: ~1.2 cm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular. Undulose extinction: patchy. Texture: very coarse grained with some kinks and some recrystallization.
Oxide:	Low abundance. Near pyroxene.

THIN SECTION LABEL ID: **360-U1473A-83R-7-W 66/70-TSB-TS_300** Piece no.: #02 TS no.: 300

Group	Summary
Igneous petrology:	A coarse-grained oxide gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved. Small amount of olivine are present, which are recrystallized. Plagioclase is highly recrystallized and foliated. Some big plagioclase porphyroclasts contain tiny ilmenite inclusions.
Metamorphic petrology:	Pl is recrystallized into nearly polygonal aggregates. The neoblastic Cpx aggregates include minor brown Amp and opaque phases. The thin section includes two ultramylonitic bands with relatively high modal amounts of brown Amp. The static background alteration is negligible.
Structure:	This is a mylonite characterized by a fine-grained polyphase mixture consisting of recrystallized plag, cpx and amphibole grains. Cpx is observed as coarse porphyroclasts that are partially replaced by amphibole.

Plane-polarized



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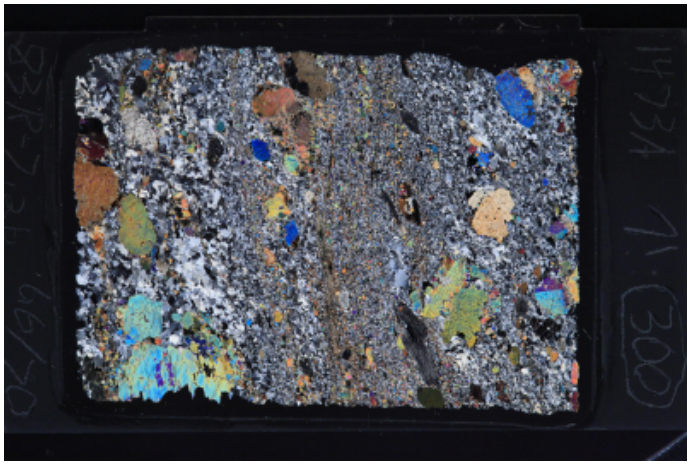
Cross-polarized



33345801

IGNEOUS PETROLOGY

Lithology: **oxide gabbronorite** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: A coarse-grained oxide gabbronorite with a porphyroclastic texture. The primary magmatic texture is not preserved. Small amount of olivine are present, which are recrystallized. Plagioclase is highly recrystallized and foliated. Some big plagioclase porphyroclasts contain tiny ilmenite inclusions. Orthopyroxene is elongated along the foliation and sometimes is folded. It contains inclusions of both clinopyroxene and plagioclase. Clinopyroxene is strongly recrystallized and the neoblasts are distributed along the foliation. The clinopyroxene porphyroclasts show a consertal intergrowth texture and contain abundant brown amphibole blebs, together with ilmenite. It also contains small anhedral plagioclase inclusions. Opaque minerals are dominated by ilmenite, with minor magnetite and sulfides. They are distributed along the foliation and mostly occur at the pressure shadows of pyroxenes. Intergrowth texture between ilmenite and magnetite is very common.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	1			0.4	anhedral	subequant	
Plagioclase	55		1.4	0.4	anhedral	subequant	undulose extinction
Clinopyroxene	29		9	5	anhedral	subequant	with a consertal texture
Orthopyroxene	9		7	1.2	anhedral	elongate	wiht plagioclase and amphibole inclusions
Amphibole	1		1.2	0.2	anhedral	interstitial	
Opaques	5						
Magnetite	1.5						
Ilmenite	3						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 2 Observer(s): RT

Detailed description Pl is recrystallized into nearly polygonal aggregates. The neoblastic Cpx aggregates include minor brown Amp and opaque phases. The thin section includes two ultramylonitic bands with relatively high modal amounts of brown Amp. The static background alteration is negligible.

Comment type	Comment
Alteration general comments:	The rock is fresh.
Mylonite comments:	Pl is recrystallized into nearly polygonal aggregates. The neoblastic Cpx aggregates include minor brown Amp and opaque phases. The thin section includes two ultramylonitic bands with relatively high modal amounts of brown Amp.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		3	2	2
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		60	100	80
Chlorite				20
Oxide		10		n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description This is a mylonite characterized by a fine-grained polyphase mixture consisting of recrystallized plag, cpx and amphibole grains. Cpx is observed as coarse porphyroclasts that are partially replaced by amphibole.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	mylonitic [CPF_fabric]	4
Fracture abundance:	common	n/a

Type	Comment
Plagioclase:	size: medium to fine shape: anhhedral boundaries: curved twinning: tapered undulose extinction: irregular texture: fine-grained recrystallized aggregates forming the foliation.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse porphyroclasts commonly altered to amphibole; also observed as fine recrystallized grains in the matrix.
Oxide:	geometry: pods observed at the tips of cpx porphyroclasts and also as thin bands oriented parallel to the foliation.

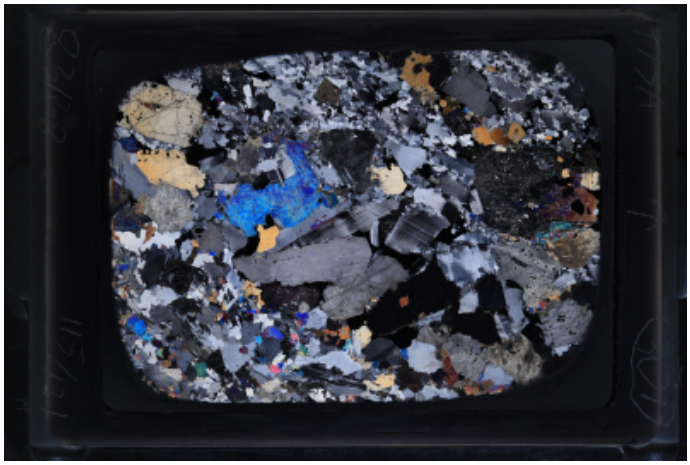
THIN SECTION LABEL ID: **360-U1473A-83R-8-W 115/121-TSB-TS_301** Piece no.: #03 TS no.: 301

Group	Summary
Igneous petrology:	There are two domains in the thin section, a coarse-grained oxide gabbronorite and a medium-grained olivine gabbro. Both domains show a subophitic texture, in which subhedral plagioclase is partly enclosed within clinopyroxene. A gradational boundary exists between two domains.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Inclined layering with porphyroclastic fine grained fabric and oxide rich isotropic coarse grained gabbro.

Plane-polarized

33345961

Cross-polarized



33345981

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 15 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a subophitic texture. Olivine is commonly in a subequant shape, and some small grains are enclosed within plagioclase. Plagioclase is in a subequant to tabular shape and shows undulose extinction. Subhedral plagioclase is partly or fully enclosed within clinopyroxene, which contains tiny brown amphibole blebs. Brown amphibole also occurs at the rim of clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			1.2	anhedral	subequant	
Plagioclase	76		10	4	anhedral	tabular	
Clinopyroxene	18		4	3	anhedral	poikilitic	
Amphibole	0.2		0.2	0.1	anhedral	interstitial	occurs at the rim of clinopyroxene

Interval domain no: **2** Domain rel. abundance (%): 85 Domain name: lithology domain 2

Lithology: **oxide gabbronorite** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained oxide gabbronorite with a subophitic texture. Plagioclase is commonly in a tabular shape and shows magmatic twins. It is partly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within clinopyroxene. Clinopyroxene displays a consertal texture, and contain abundant brown amphibole blebs and a few ilmenite inclusions. Orthopyroxene is in a tabular to subequant shape and sometimes is folded. Opaque minerals are interstitial clinopyroxene and orthopyroxene. They are mainly composed of ilmenite and magnetite, with minor sulfides. Intergrowth texture between ilmenite and magnetite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	44		16	5	anhedral	tabular	undulose extinction
Clinopyroxene	31		14	10	anhedral	poikilitic	
Orthopyroxene	17		14	8	anhedral	tabular	
Amphibole	0.4		0.2	0.1	anhedral	interstitial	occurs as blebs within clinopyroxene
Opaques	8						
Magnetite	2.5						
Ilmenite	5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 13 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Px altered into brown amphibole, colorless amphibole and clay. Pl were mostly replaced by secondary Pl with colorless amphibole occurring in the micro-fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		12	12	15
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		35	40	10
Clay minerals		35	25	
Plagioclase, sec.	n/a	n/a	n/a	90
Other			35	35
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Observer: JD

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	absent	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~1.5 mm. Grain shape: sub to anhedral. Grain boundary: curved to straight. Undulose extinction: patchy. Texture: Magmatic.
Plagioclase:	Grain size: porphyroclasts: ~1.75 mm. neoblasts: ~0.15 mm. Grain shape: equigranular. Grain boundary: straight to curved. Twinning: tapered. Undulose extinction: patchy, better in larger crystals. Subgrains: curved. Texture: porphyroclastic with aggregates of plagioclase neoblasts.
Clinopyroxene:	Grain size: porphyroclasts: ~2 mm. Grain shape: subhedral. Grain boundary: curved to straight. Texture: magmatic.

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: OP

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0
Fracture abundance:	rare	n/a

Type	Comment
Plagioclase:	Magmatic. Tapered twins, patchy extinction.
Clinopyroxene:	Magmatic. Patchy extinction.
Oxide:	Large pods in interstitial space between clinopyroxene and olivine.

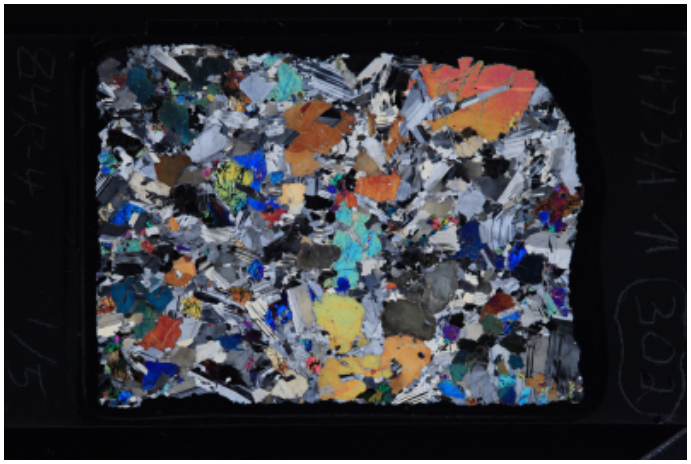
THIN SECTION LABEL ID: **360-U1473A-84R-4-W 1/5-TSB-TS_302** Piece no.: #01 TS no.: 302

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape and shows undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Sample is only slightly altered.
Structure:	Undeformed coarse-grained oxide gabbronorite and medium-grained olivine gabbro. Plagioclase shows tapered twinning and undulose extinction. Olivine exhibits kink banding.

Plane-polarized

33345661

Cross-polarized



33345721

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is commonly rimmed by clinopyroxene. Plagioclase is in a tabular to subequant shape and shows undulose extinction and deformation twins. Tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally displays a consertal texture and contain tiny brown amphiboles. Brown amphibole also occurs at the rim of clinopyroxene. Opaque minerals are composed of ilmenite and tiny sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			2.8	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	61		6.8	3.2	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	33		6	4	anhedral	poikilitic	with a consertal texture
Amphibole	0.2		0.1	0.05	anhedral	interstitial	
Opaques	0.4						
Ilmenite	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 8 Observer(s): JL

Detailed description Sample is only slightly altered. Olivine is characterized by microfractures filled by serpentine, talc and magnetite. Some rims are altered into talc. Cpx is slightly replaced by 2nd Cpx and brown amphibole. Colorless amphibole occurs at grain rims. Plagioclase is characterized by numerous microfractures that are too small to determine fracture filling mineralogy. 2nd Plagioclase occurs at grain edges as seen in a high contrast PPL image.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	8		8
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30		
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Undeformed coarse-grained oxide gabbronorite and medium-grained olivine gabbro. Plagioclase shows tapered twinning and undulose extinction. Olivine exhibits kink banding. Observer: OP

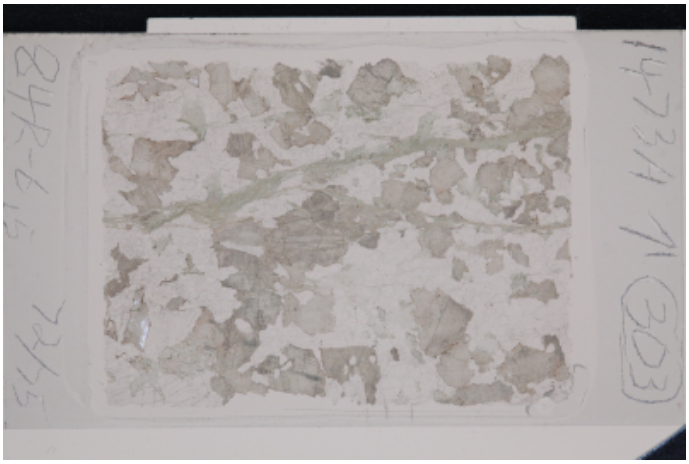
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	kink bands; straight subgrains
Plagioclase:	undulose extinction; tapered twinning
Clinopyroxene:	primary magmatic

THIN SECTION LABEL ID: **360-U1473A-84R-6-W 72/75-TSB-TS_303** Piece no.: #05 TS no.: 303

Group	Summary
Igneous petrology:	A coarse-grained gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape and shows magmatic texture. It has been subjected to brittle deformation and displays undulose extinction and deformation twins. Tabular plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	Sample is substantially altered into greenschist assemblages dominated by chlorite and actinolite. Actinolite veins were observed.
Structure:	Weakly deformed gabbro with branched veins. Plagioclase exhibits undulose extinction, tapered twinning and recrystallization.

Plane-polarized



33345601

Cross-polarized

33345621

IGNEOUS PETROLOGY

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape and shows magmatic texture. It has been subjected to brittle deformation and displays undulose extinction and deformation twins. Tabular plagioclase is partly enclosed within clinopyroxene. Clinopyroxene is strongly altered and occasionally folded. It displays a consertal texture and contains brown amphibole blebs. Very few opaque minerals are present. Small titanite is present in the crack filled with amphibole.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		5.6	5	anhedral	tabular	undulose extinction
Clinopyroxene	45		5	4	anhedral	subequant	with a consertal texture
Amphibole	0.1		0.1	0.05	anhedral	interstitial	

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 40 Observer(s): JL

Detailed description Sample is substantially altered into greenschist assemblages. No olivine pseudomorph was observed. Cpx is extensively altered into mostly actinolite and tremolite. Evidence of higher temperature processes (2nd Cpx and brown amphibole) were observed. Some Cpx grains are completely replaced by actinolite and chlorite. Chlorite rims were frequently observed near contacts with Cpx grains. This assemblage is likely a result of Cpx and plagioclase reactions. Plagioclase is marked by numerous microfractures filled by chlorite and actinolite. 2nd plagioclase seems to occur near the microfractures.

Comment type	Comment
Vein 1 minerals:	mm-scale vein primarily composed of actinolite with minor chlorite
Vein 2 minerals:	minor veins, subparallel to the mm-scale actinolite veins. Composition of these microveins depends on the grain they are cross-cutting, e.g., chlorite after plagioclase, and actinolite after clinopyroxene.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		70		35
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		60		30
Chlorite		20		50
Clinopyroxene, sec.	n/a	10	n/a	n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Subtotals replaced		100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: metamorphic Weakly deformed gabbro with branched veins. Plagioclase exhibits undulose extinction, tapered twinning and recrystallization. Observer: OP

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	altered
Plagioclase:	irregular undulose extinction; tapered twinning; weak recrystallization
Clinopyroxene:	partly altered
Vein:	Branched vein cross-cuts thin section. Grains within vein exhibit alignment. No reaction halo with wall-rock observed.

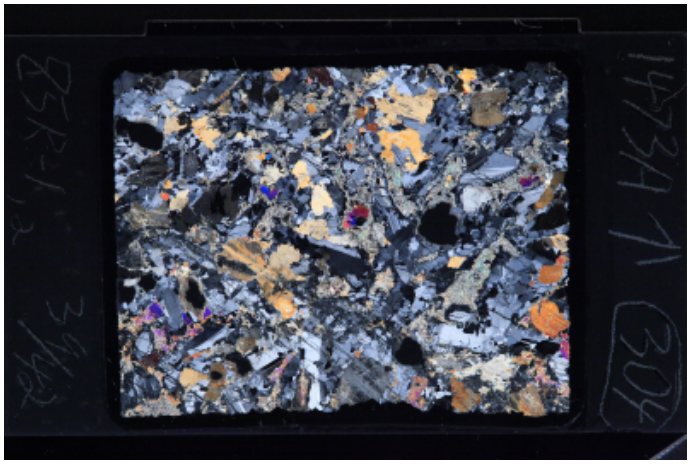
THIN SECTION LABEL ID: **360-U1473A-85R-1-W 39/42-TSB-TS_304** Piece no.: #02 TS no.: 304

Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is recrystallized and shows magmatic twins, but it still can be seen that subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is substantial.
Structure:	Weakly foliated olivine gabbro with plagioclaser exhibiting undulose extinction, tapered twinning and extensive recrystallization.

Plane-polarized

33345541

Cross-polarized



33345561

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Plagioclase is strongly recrystallized and shows magmatic twins, but it still can be seen that subhedral plagioclase is partly or fully enclosed within clinopyroxene. Both olivine and clinopyroxene are strongly altered. Opaque minerals are dominated by sulfides, with minor ilmenite. They commonly occur within the altered olivine.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			1	anhedral	subequant	strongly altered
Plagioclase	59		5.6	2.8	anhedral	subequant	undulose extinction
Clinopyroxene	33		5.6	3.2	anhedral	subequant	strongly altered
Opaques	0.3						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 55 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Ol was replaced by talc, colorless amphibole, oxides and green clay. Pl mainly altered into colorless amphibole, clay, chlorite and brown amphibole. Cpx pseudomorph replaced by colorless amphibole and chlorite was observed. The replacements of Pl were secondary Pl, chlorite and colorless amphibole.

Comment type	Comment
Vein 1 minerals:	Chlorite veins are pervasive.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	80	40		50
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	30	60		20
Chlorite		10		40
Clay minerals	10	20		
Oxide	20			n/a
Plagioclase, sec.	n/a	n/a	n/a	40
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: crystal-plastic Weakly foliated olivine gabbro with plagioclaser exhibiting undulose extinction, tapered twinning and extensive recrystallization. Observer: OP

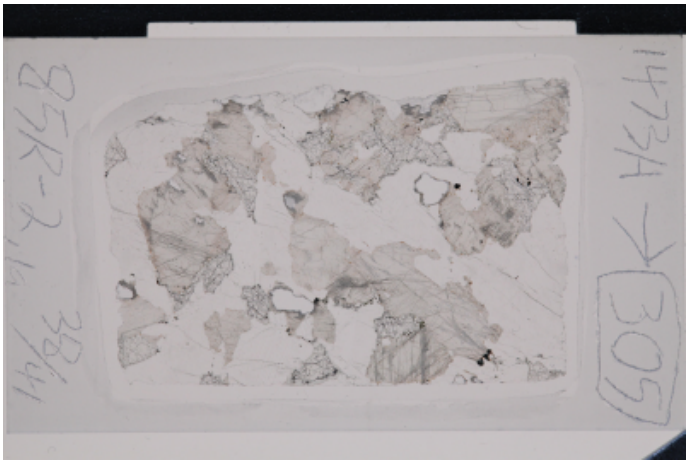
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	common	n/a

Type	Comment
Olivine:	altered
Plagioclase:	irregular undulose extinction; tapered twinning; extensive recrystallization

THIN SECTION LABEL ID: **360-U1473A-85R-2-W 38/41-TSB-TS_305** Piece no.: #01 TS no.: 305

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular to subequant shape and shows magmatic twins. It has also been weakly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	Slight to moderate alteration mostly associated with corona forming reactions between olivine and plagioclase.
Structure:	Nearly isotropic olivine gabbro with a subophitic texture. Plagioclase shows weak recrystallization, undulose extinction and tapered twinning. Olivine exhibits minor kink banding and subgrain formation.

Plane-polarized



33345461

Cross-polarized

33345501

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is highly recrystallized and aggregates at the rim of clinopyroxene. It is rimmed by orthopyroxene and sometimes occurs as small inclusion within clinopyroxene. The rim of olivine is occasionally altered. Plagioclase is in a tabular to subequant shape and shows magmatic twins. It has also been weakly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within clinopyroxene. Clinopyroxene commonly shows a consertal intergrowth texture and contains abundant brown amphibole blebs. Brown amphibole also associates with the clinopyroxene neoblasts and occurs at the rim of clinopyroxene. Opaque minerals are dominated by sulfides, with minor ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			2.8	anhedral	subequant	highly recrystallized
Plagioclase	51		8	5	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	38		14	8	anhedral	subequant	with a consertal texture
Amphibole	0.2		0.3	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.1						
Sulfide	0.4						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 12 Observer(s): JL

Detailed description Sample is slightly to moderately altered. Olivine shows initial corona forming reaction with plagioclase. Secondary phases observed after olivine are mostly tremolite/actinolite, talc, serpentine (in mesh) and minor magnetite and sulfides. Replacing minerals after Cpx are mostly brown amphibole, 2nd Cpx and pale green/colorless amphibole. Plagioclase alteration is mostly associated with chlorite rims near olivine contacts and chlorite/actinolite-filled microfractures. Opx rimming Cpx grains are mostly altered into talc and the adjacent plagioclase is rimmed by chlorite.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	10	15	10
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless	40	30		20
Chlorite				60
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	9			n/a
Plagioclase, sec.	n/a	n/a	n/a	20
Sulfide	1			n/a
Talc	30	n/a	100	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: submagmatic Nearly isotropic olivine gabbro with a subophitic texture. Plagioclase shows weak recrystallization, undulose extinction and tapered twinning. Olivine exhibits minor kink banding and subgrain formation. Observer: OP

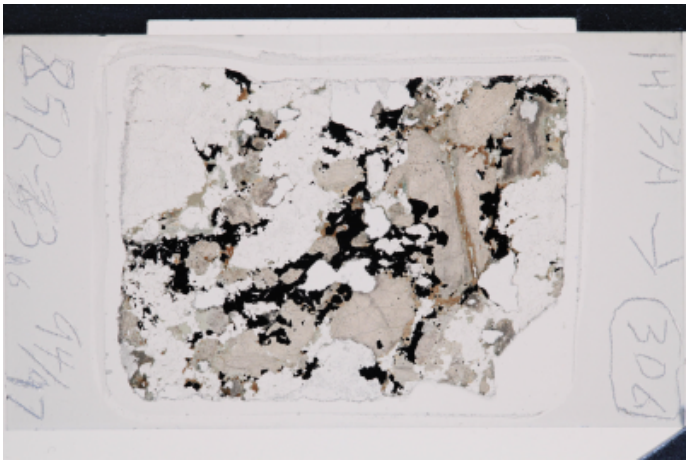
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF fabric intensity:	undeformed [CPF_fabric]	0

Type	Comment
Olivine:	kink banding; minor subgrain formation
Plagioclase:	undulose extinction; tapered twinning; minor recrystallization at grain boundaries

THIN SECTION LABEL ID: **360-U1473A-85R-3-W 94/97-TSB-TS_306** Piece no.: #06 TS no.: 306

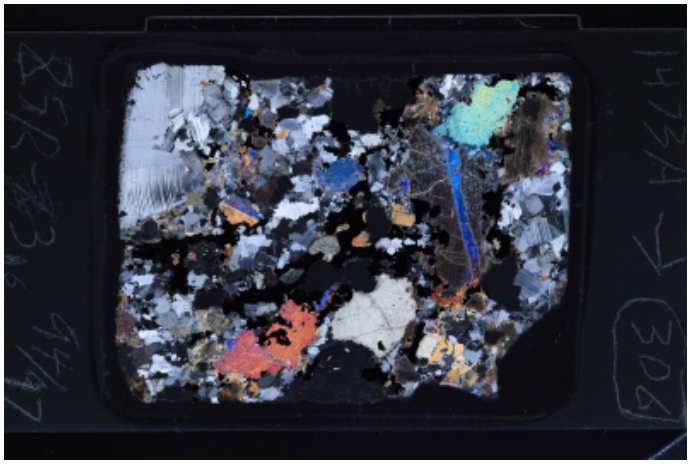
Group	Summary
Igneous petrology:	A coarse-grained amphibole-bearing oxide gabbro with a granular texture. Plagioclase is commonly in a subequant shape and shows magmatic twins. Occasionally, big plagioclase grains show undulose extinction and deformation twins.
Metamorphic petrology:	The alteration intensity of this thin section is substantial.
Structure:	Coarse-grained amphibole-bearing oxide gabbro with a granular texture. Large plagioclase grains show undulose extinction and tapered twinning

Plane-polarized



33345401

Cross-polarized



33345421

IGNEOUS PETROLOGY

Lithology: **oxide gabbro** Observer: CL

Texture: granular Ave. grain size: coarse grained

Detailed description: A coarse-grained amphibole-bearing oxide gabbro with a granular texture. Plagioclase is commonly in a subequant shape and shows magmatic twins. Occasionally, big plagioclase grains show undulose extinction and deformation twins. Clinopyroxene shows an intergrowth texture with ilmenite and commonly replaced by brown at the rim. It also contains abundant brown amphibole blebs and some ilmenite inclusions. Tiny ilmenite is distributed along the exsolution lamellae. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	54		12	2.8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	32		10	5	anhedral	subequant	moderately altered and replaced by brown amphibole
Amphibole	2		1	0.4	anhedral	subequant	
Opaques	12						
Ilmenite	11.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 45 Observer(s): QM

Detailed description The alteration intensity of this thin section is substantial. Cpx altered into brown amphibole, colorless amphibole and clay. The replacements of Opx were talc, colorless amphibole and clay. Pl were mostly replaced by secondary Pl with chlorite occurring in the micro-fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		35	60	40
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		40	20	
Chlorite				10
Clay minerals		30	10	5
Plagioclase, sec.	n/a	n/a	n/a	85
Talc		n/a	70	n/a
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic

A coarse-grained amphibole-bearing oxide gabbro with a granular texture. Plagioclase is commonly in a subequant shape and shows magmatic twins. Occasionally, big plagioclase grains show undulose extinction and deformation twins.

Observer: OP

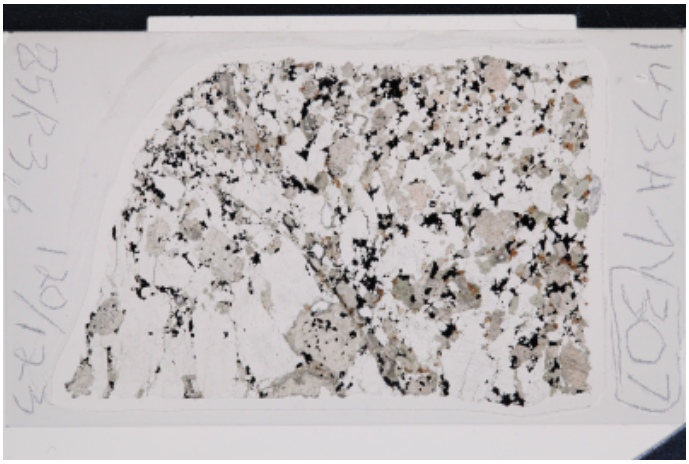
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Plagioclase:	coarse-grained plagioclase exhibits undulose extinction and tapered twinning.

THIN SECTION LABEL ID: **360-U1473A-85R-3-W 120/123-TSB-TS_307** Piece no.: #06 TS no.: 307

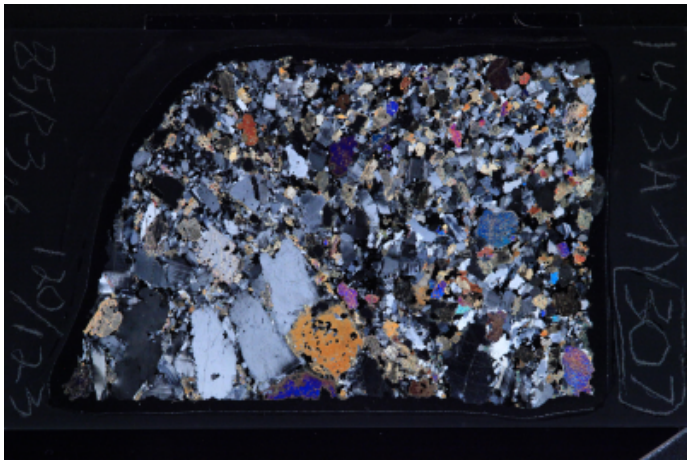
Group	Summary
Igneous petrology:	A medium-grained oxide gabbronorite with a granular texture. Most plagioclases are in a subequant shape and displays magmatic twins, but a few tabular plagioclase shows undulose extinction and deformation twins.
Metamorphic petrology:	The rock shows a substantial background static alteration.
Structure:	Largely undeformed, medium-grained, granular oxide gabbronorite. Some tabular plagioclase exhibits undulose extinction and deformation twins.

Plane-polarized



33345341

Cross-polarized



33345361

IGNEOUS PETROLOGY

Lithology: **oxide gabbronorite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained oxide gabbronorite with a granular texture. It contains ca 3% apatite. Most plagioclases are in a subequant shape and displays magmatic twins, but a few tabular plagioclase shows undulose extinction and deformation twins. Clinopyroxene is moderately altered and contains inclusions of apatite and ilmenite. Occasionally, subhedral plagioclase occurs as inclusions within clinopyroxene. Orthopyroxene is in a subequant shape and contains inclusions of apatite and ilmenite. Opaque minerals are dominated by ilmenite and magnetite, with minor sulfides. They are interstitial between plagioclase and pyroxenes. Exsolution of ilmenite from magnetite can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	52		8.8	2	anhedral	subequant	undulose extinction
Clinopyroxene	19		5.6	2.8	anhedral	subequant	with inclusions of apatite and ilmenite
Orthopyroxene	12		4	1.6	anhedral	subequant	with inclusions of apatite and ilmenite
Amphibole	2		1	0.8	subhedral	subequant	
Opaques	12						
Magnetite	4						
Ilmenite	6						
Sulfide	2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 25 Observer(s): RT

Detailed description The background static alteration is substantial.

Comment type	Comment
Alteration general comments:	The background static alteration is substantial.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		30	60	10
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless		80	80	60
Chlorite		10	20	40
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic A medium-grained oxide gabbronorite with a granular texture. Most plagioclases are in a subequant shape and displays magmatic twins, but a few tabular plagioclase shows undulose extinction and deformation twins. Observer: OP

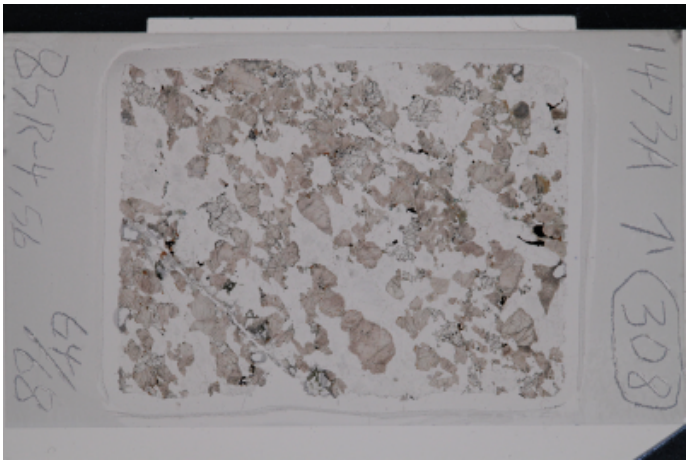
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Plagioclase:	A view tabular plagioclase grains exhibit undulose extinction and tapered twinning.
Oxide:	interstitial oxide

THIN SECTION LABEL ID: **360-U1473A-85R-4-W 64/68-TSB-TS_308** Piece no.: #05 TS no.: 308

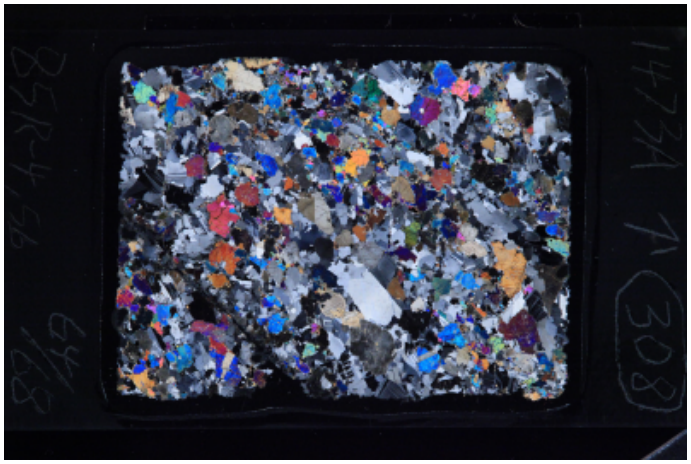
Group	Summary
Igneous petrology:	A medium-grained olivine gabbro with a subophitic texture. Plagioclase is in a subequant shape, and displays undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	Static alteration intensity is slight. Minerals indicate amphibolite to subgreenschist facies alteration.
Structure:	Subophitic olivine gabbro with weak magmatic foliation. Plagioclase exhibits undulose extinction, magmatic twinning and minor tapered twinning. Olivine displays minor kink banding.

Plane-polarized



33345281

Cross-polarized



33345321

IGNEOUS PETROLOGY

Lithology: **disseminated oxide olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and occasionally contains small plagioclase inclusions. It is partly recrystallized and the subhedral neoblasts are aggregated, showing triple junctions. Plagioclase is in a subequant shape, and displays undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within clinopyroxene. Clinopyroxene commonly shows a consertal intergrowth texture with orthopyroxene and contains abundant brown amphibole blebs. Brown amphibole also occur at the rim of clinopyroxene, sometimes together with opaque minerals. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	8			2.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	53		5	2	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	37		4.8	2.4	anhedral	subequant	with a consertal texture
Amphibole	1		1.2	0.2	anhedral	interstitial	blebs within clinopyroxene or at the clinopyroxene rims
Opaques	1						
Ilmenite	0.8						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): TN

Detailed description Olivine is replaced by talc and actinolite at rims and serpentine/clay along fractures; clinopyroxene by secondary clinopyrooxene patches, brown amphibole patches, belbs and fringes, by green amphibole fringes, and by clay along cleavage surfaces; plagioclase by sesondary plagioclase, chlorite, amphibole and clay along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	5	5		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	15			
Amphibole, green		20		10
Chlorite				20
Clay minerals		20		10
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	4			n/a
Plagioclase, sec.	n/a	n/a	n/a	60
Sulfide	1			n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Subophitic olivine gabbro with weak magmatic foliation. Plagioclase exhibits undulose extinction, magmatic twinning and minor tapered twinning. Olivine displays minor kink banding. Observer: OP

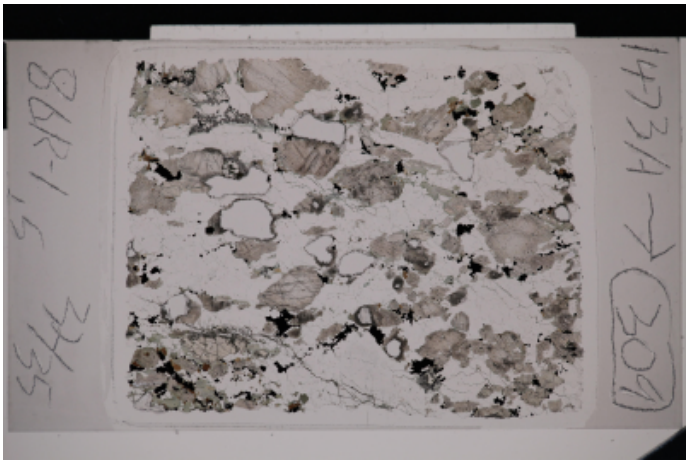
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	weak	1

Type	Comment
Olivine:	minor kink bands
Plagioclase:	undulose extinction; magmatic and tapered twinning

THIN SECTION LABEL ID: **360-U1473A-86R-1-W 32/35-TSB-TS_309** Piece no.: #05 TS no.: 309

Group	Summary
Igneous petrology:	A medium-grained oxide- and olivine-bearing gabbronorite with a granular texture. Plagioclase is commonly in a subequant shape and show magmatic twins, although undulose extinction can also be seen. Locally, subhedral plagioclase is partly enclosed within clinopyroxene.
Metamorphic petrology:	Static alteration intensity is moderate. Minerals indicate amphibolite to subgreenschist facies alteration.
Structure:	Medium-grained oxide- and olivine-bearing gabbronorite with moderate magmatic fabric. Some plagioclase grains exhibit undulose extinction and tapered twinning.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **oxide-and olivine-bearing gabbronorite** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: A medium-grained oxide- and olivine-bearing gabbronorite with a granular texture. Olivine is moderately altered and occasionally occurs as inclusion within both plagioclase and clinopyroxene. Plagioclase is commonly in a subequant shape and show magmatic twins, although undulose extinction can also be seen. Locally, subhedral plagioclase is partly enclosed within clinopyroxene. Clinopyroxene contains abundant brown amphibole blebs and sometimes is rimmed by brown amphibole. Primary orthopyroxene is in a subequant shape and contains plagioclase inclusions. It occasionally displays a consertal texture with clinopyroxene. Opaque minerals are dominated by ilmenite, with minor magnetite and sulifdes. Subhedral subequant amphibole is associated with opaque minerals.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	2			2	anhedral	subequant	strongly altered
Plagioclase	52		5	2.8	anhedral	tabular	
Clinopyroxene	37		7	5	anhedral	subequant	
Orthopyroxene	5		5	2	anhedral	subequant	
Amphibole	1		1.2	0.6	subhedral	subequant	
Opaques	3						
Magnetite	0.7						
Ilmenite	2						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 15 Observer(s): TN

Detailed description Olivine is replaced by talc at rims or pseudomorphically, and by serpentine along fractures; clinopyroxene is replaced by brown amphibole patches, blebs and fringes, by green amphibole fringes or pseudomorphs, and by clay along cleavage surfaces; orthopyroxene by talc and amphibole at rims and along fractures; plagioclase by amphibole and chlorite along fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	70	20	40	3
Amphibole, brown	n/a	20	n/a	n/a
Amphibole, colorless	5		40	20
Amphibole, green		30	10	50
Chlorite				30
Clay minerals		50		
Oxide	4			n/a
Sulfide	1			n/a
Talc	80	n/a	50	n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Medium-grained oxide- and olivine-bearing gabbronorite with moderate magmatic fabric. Some plagioclase grains exhibit undulose extinction and tapered twinning. Observer: OP

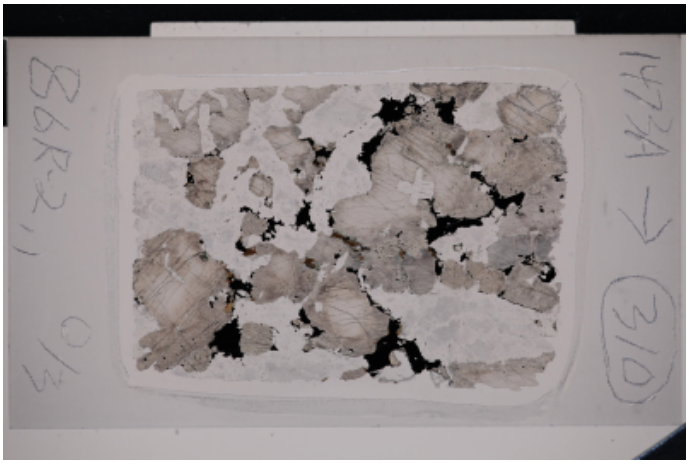
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2

Type	Comment
Olivine:	primary magmatic
Plagioclase:	minor undulose extinction and tapered twinning
Clinopyroxene:	primary magmatic

THIN SECTION LABEL ID: **360-U1473A-86R-2-W 0/3-TSB-TS_310** Piece no.: #01 TS no.: 310

Group	Summary
Igneous petrology:	A coarse-grained orthopyroxene-bearing oxide gabbro with a subophitic texture. Very few olivine is present. Plagioclase is commonly in a tabular shape and shows undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The alteration intensity of this thin section is moderate.
Structure:	Coarse-grained orthopyroxene-bearing oxide gabbro with plagioclase exhibiting undulose extinction, tapered twinning and some recrystallization.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing oxide gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained orthopyroxene-bearing oxide gabbro with a subophitic texture. Very few olivine is present. Plagioclase is commonly in a tabular shape and shows undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene contains abundant brown amphibole blebs and opaque inclusions. It occasionally displays a consertal intergrowth texture with orthopyroxene. Orthopyroxene with tight exsolution lamellae contains a few opaque inclusions. Opaque minerals are dominated by ilmenite and magnetite, with minor sulfides. Intergrowth texture between ilmenite and magnetite is quite common. Subhedral brown amphibole commonly associates with opaque minerals.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	0.5			0.8	anhedral	subequant	
Plagioclase	49		5.6	3.2	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	40		8	6	anhedral	subequant	with a consertal texture
Orthopyroxene	2		7	8	anhedral	tabular	
Amphibole	1		1.2	1	subhedral	subequant	
Opaques	8						
Magnetite	2.5						
Ilmenite	5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 13 Observer(s): QM

Detailed description The alteration intensity of this thin section is moderate. Px was replaced by colorless amphibole, brown amphibole and clay. Pl was mostly replaced by secondary Pl with colorless amphibole and minor clay occurring in the micro-fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)		15	10	15
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless		30	35	10
Clay minerals		35	20	5
Plagioclase, sec.	n/a	n/a	n/a	85
Other			45	45
Subtotals replaced		100	100	100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Coarse-grained orthopyroxene-bearing oxide gabbro with plagioclase exhibiting undulose extinction, tapered twinning and some recrystallization. Observer: OP

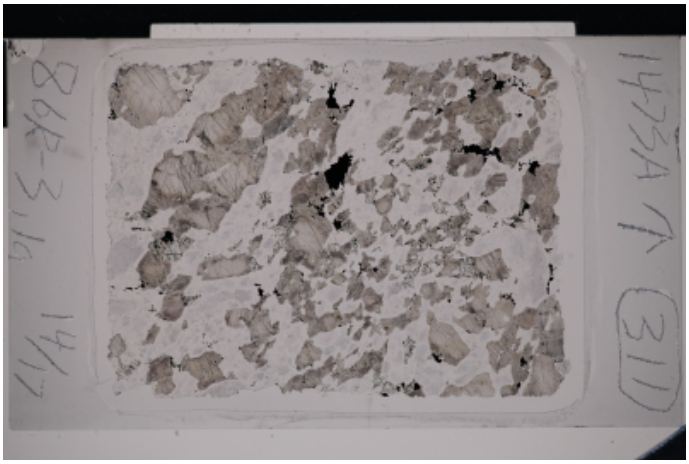
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Magmatic fabric intensity:	isotropic	0

Type	Comment
Plagioclase:	undulose extinction; tapered twinning; recrystallization

THIN SECTION LABEL ID: **360-U1473A-86R-3-W 14/17-TSB-TS_311** Piece no.: #01 TS no.: 311

Group	Summary
Igneous petrology:	A medium-grained oxide- and orthopyroxene-bearing olivine gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape and show undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	The rock shows a slight static background alteration, which is mainly confined to mafic minerals.
Structure:	Medium-grained, subophitic oxide- and orthopyroxene-bearing olivine gabbro. Plagioclase exhibits some undulose extinction and tapered twinning, olivine shows minor kink banding.

Plane-polarized



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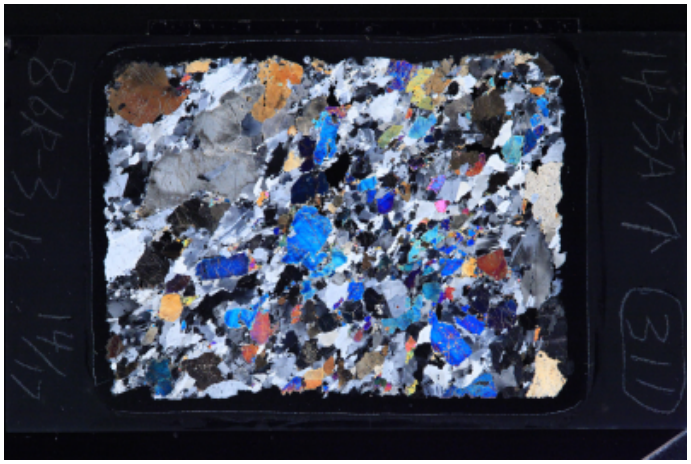
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **orthopyroxene- and oxide-bearing olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained oxide- and orthopyroxene-bearing olivine gabbro with a subophitic texture. Olivine is commonly rimmed by orthopyroxene. Plagioclase is commonly in a tabular shape and show undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene occasionally shows a consertal texture and contain brown amphibole blebs. Orthopyroxene shows tight exsolution lamellae and contains tiny ilmenite along the lamellae, Brown amphibole also occurs at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			1.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	56		7	2.6	anhedral	tabular	undulose extinction
Clinopyroxene	32		8	4	anhedral	poikilitic	with a consertal texture
Orthopyroxene	3		5	5	anhedral	tabular	with ilmenite exsolution along the lamellae
Opaques	2						
Ilmenite	1.7						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description The rock shows a slight static background alteration, which is mainly confined to mafic minerals.

Comment type	Comment
Alteration general comments:	The rock shows a slight static background alteration, which is mainly confined to mafic minerals.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5	10	1
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		50	80	50
Chlorite			20	50
Oxide	20			n/a
Talc	80	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Interval domain no: Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Plagioclase exhibits some undulose extinction and tapered twinning, olivine shows minor kink banding. Observer: OP

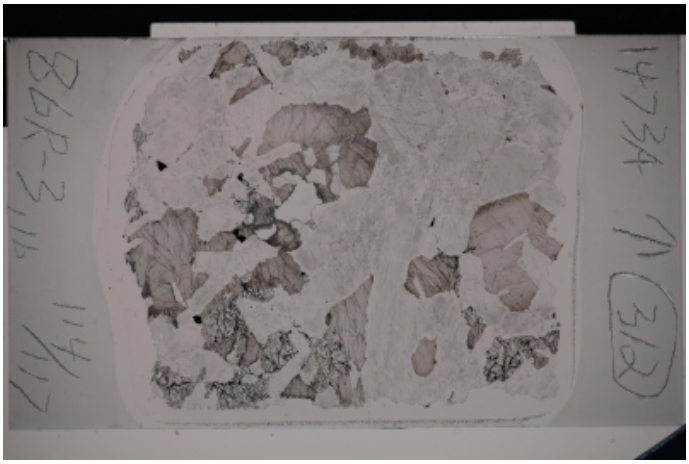
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2

Type	Comment
Olivine:	minor kink banding
Plagioclase:	undulose extinction; tapered twinning

THIN SECTION LABEL ID: **360-U1473A-86R-3-W 114/117-TSB-TS_312** Piece no.: #01 TS no.: 312

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Subhedral plagioclase is partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	Slightly to moderately altered olivine gabbro.
Structure:	coarse grained olivine gabbro with incipient crystal-plastic deformation, which is mainly observed in tapered twins, undulose extincion and local recrystallization of coarse plag grains into fine-grained aggregates.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is commonly rimmed by orthopyroxene. Plagioclase is in a tabular shape and shows undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene and occasionally contains abundant brown amphibole blebs. Opaque minerals are dominated by ilmenite, with minor tiny sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	7			1.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	71		14	8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	22		8	6	anhedral	poikilitic	with a consertal texture
Amphibole	0.1		0.2	0.1	anhedral		
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 12 Observer(s): JL

Detailed description Slightly to moderately altered sample. Olivine is moderately altered into talc, serpentine and magnetite. Cpx is moderately altered into 2nd Cpx, brown amphibole and colorless amphibole. Plagioclase is slightly replaced by 2nd plagioclase along grain edges. Minor chlorite in contacts with mafic minerals.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	15	15		10
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		20		
Chlorite				20
Clinopyroxene, sec.	n/a	50	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	80
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description coarse grained olivine gabbro with incipient crystal-plastic deformation, which is mainly observed in tapered twins, undulose extincion and local recrystallization of coarse plag grains into fine-grained aggregates.

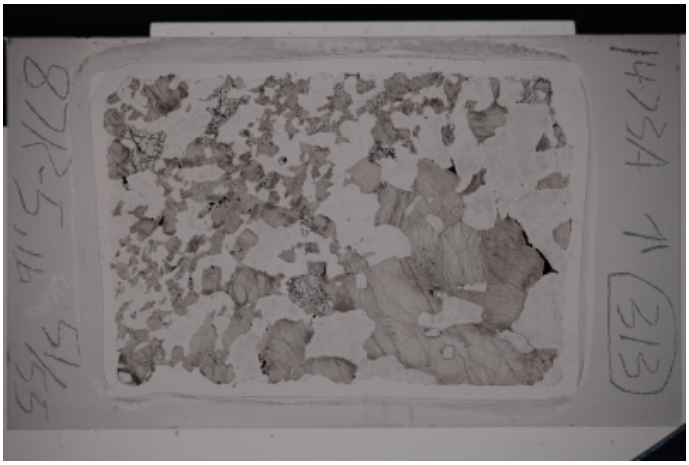
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: medium grains with curved contacts.
Plagioclase:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse grains with straight boundaries and locally fine-recrystallized aggregates.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse to medium grains with curved contacts.
Oxide:	geometry: thin pods at cpx and olivine grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-87R-5-W 51/55-TSB-TS_313** Piece no.: #01 TS no.: 313

Group	Summary
Igneous petrology:	There are two domains, a coarse-grained gabbro with a subophitic texture and a medium-grained olivine gabbro.
Metamorphic petrology:	The static background alteration is slight and mainly confined to Ol and Cpx.
Structure:	coarse-grained olivine gabbro grading to a medium grained, weakly foliated gabbro. Deformation is mainly observed in tapered twins, undulose extinction and subgrains in plagioclase.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 50 Domain name: top

Lithology: **gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained gabbro with a subophitic texture. Plagioclase is commonly in a subequant shape and shows undulose extinction. Subhedral plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene displays a consertal texture and contains abundant brown amphibole blebs. Opaque minerals are dominated by ilmenite, with minor sulifdes.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	46		7.2	5	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	53		11	8	anhedral	poikilitic	with a consertal texture
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.4						
Sulfide	0.1						

Interval domain no: **2** Domain rel. abundance (%): 50 Domain name: bottom

Lithology: **olivine gabbro** Observer: CL

Texture: granular Ave. grain size: medium grained

Detailed description: This domain is a medium-grained olivine gabbro with a granular texture. Olivine is commonly rimmed by both orthopyroxene and clinopyroxene. Small olivine occurs as inclusion within both plagioclase and clinopyroxene. Plagioclase is commonly deformed and shows undulose extinction and deformation twins, although magmatic twins can be seen. Clinopyroxene commonly displays a consertal intergrowth texture with orthopyroxene and contains abundant brown amphibole blebs. A primary orthopyroxene grain is present and contains small olivine. Brown amphibole also occurs at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite, with minor sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			2.8	anhedral	subequant	rimmed by pyroxenes
Plagioclase	54		5	3.2	anhedral	subequant	undulose extinction and deformation twins
Clinopyroxene	35		3.6	2.8	anhedral	subequant	with a consertal texture
Orthopyroxene	1		2.8	2.8	anhedral	subequant	
Amphibole	0.5		0.2	0.1	anhedral	interstitial	
Opaques	0.4						
Ilmenite	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 4 Observer(s): RT

Detailed description The static background alteration is slight and mainly confined to Ol and Cpx.

Comment type	Comment
Alteration general comments:	The static background alteration is slight and mainly confined to Ol and Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	5		1
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		70		40
Chlorite	40			60
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro grading to a medium grained, weakly foliated gabbro. Deformation is mainly observed in tapered twins, undulose extinction and subgrains in plagioclase.

Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium to fine shape: anhedral boundaries: curved texture: medium to fine grains with curved contacts.
Plagioclase:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries. texture: coarse to medium grains with incipient plastic strain.
Clinopyroxene:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: medium to fine grains with curved contacts.
Oxide:	geometry: thin pods rimming cpx and olivine coarse grains.

THIN SECTION LABEL ID: **360-U1473A-87R-8-W 91/94-TSB-TS_314** Piece no.: #03 TS no.: 314

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape but is deformed. It is partly recrystallized and shows undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene and olivine.
Metamorphic petrology:	Sample is only slightly altered.
Structure:	weakly deformed coarse-grained olivine gabbro. Recrystallization is mainly observed in the formation of localized fine-grained aggregates of recrystallized plagioclase.

Plane-polarized

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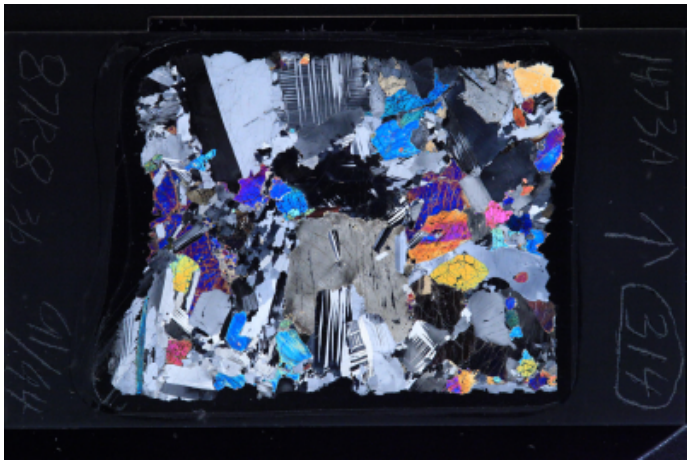
Cross-polarized



33355041

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is occasionally rimmed by clinopyroxene. Small olivine occurs as inclusion within both plagioclase and clinopyroxene. Plagioclase is in a tabular shape but is deformed. It is partly recrystallized and shows undulose extinction and deformation twins. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene and olivine. Clinopyroxene displays a consertal intergrowth texture with orthopyroxene and contains brown amphibole blebs. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			3.6	anhedral	subequant	rimmed by clinopyroxene
Plagioclase	74		8	6	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	17		8	5	anhedral	poikilitic	
Amphibole	0.2		0.2	0.1	anhedral		
Opaques	0.4						
Ilmenite	0.2						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 8 Observer(s): JL

Detailed description Slight altered sample. Olivine is slightly replaced by serpentine, talc and oxide in mesh rims. Cpx is partially replaced by 2nd Cpx, brown amphibole and minor colorless amphibole. Plagioclase is only slightly altered to 2nd plagioclase along grain edges.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		8
Amphibole, brown	n/a	55	n/a	n/a
Amphibole, colorless		10		
Clay minerals		5		
Clinopyroxene, sec.	n/a	30	n/a	n/a
Oxide	5			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	35	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: GV

Detailed description weakly deformed coarse-grained olivine gabbro. Recrystallization is mainly observed in the formation of localized fine-grained aggregates of recrystallized plagioclase.

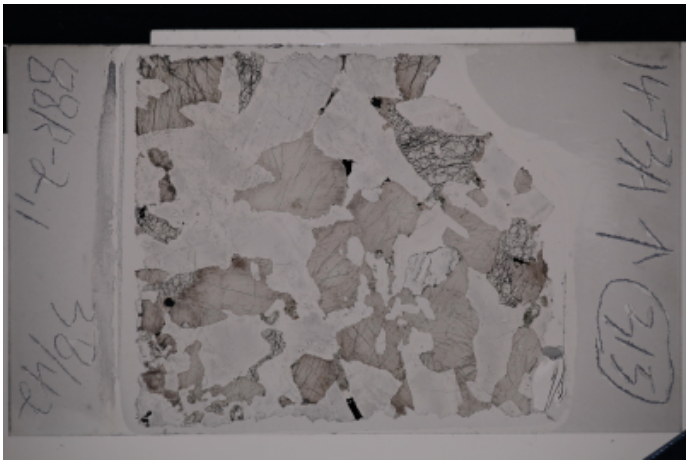
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	weak	n/a
CPF fabric intensity:	weakly foliated/lineated [CPF_fabric]	1
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: coarse to medium grains with curved contacts.
Plagioclase:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: curved boundaries texture: medium grains with curved contacts, locally fine recrystallized grains.
Clinopyroxene:	size: medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: medium grains with straight to curved contacts.

THIN SECTION LABEL ID: **360-U1473A-88R-2-W 38/42-TSB-TS_315** Piece no.: #01 TS no.: 315

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and show undulose extinction and deformation twins. Occasionally, it also shows an oscillatory zoning. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine.
Metamorphic petrology:	The alteration intensity of this thin section is slight.
Structure:	coarse-grained olivine gabbro with a submagmatic texture. Incipient plastic strain is observed in mechanical twins and undulose extinction in plag.

Plane-polarized



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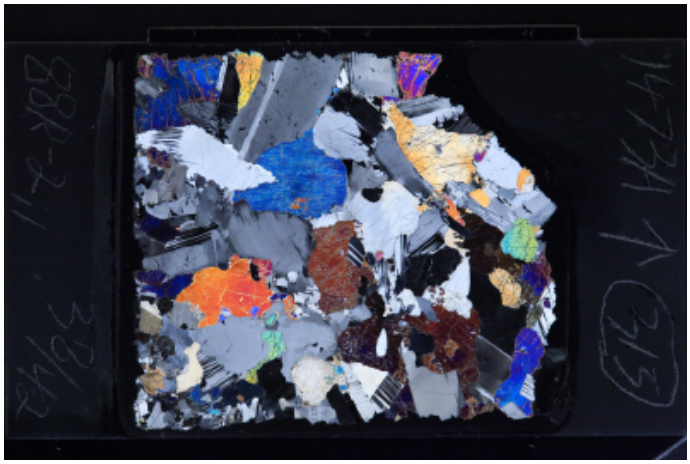
Cross-polarized



33354921

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by both orthopyroxene and clinopyroxene. Small olivine grains occur at the rim of clinopyroxene. Plagioclase is in a tabular shape and show undulose extinction and deformation twins. Occasionally, it also shows an oscillatory zoning. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine. Clinopyroxene commonly shows a consertal intergrowth texture with orthopyroxene and contains brown amphibole blebs. Opaque minerals are composed of ilmenite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			4.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	46		10	7	anhedral	tabular	
Clinopyroxene	45		8	6	anhedral	poikilitic	with a consertal texture
Amphibole	0.2		0.1	0.05	anhedral	interstitial	
Opaques	0.5						
Ilmenite	0.3						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 9 Observer(s): QM

Detailed description The alteration intensity of this thin section is slight. Ol developed typical mesh texture with serpentine and talc. The replacements of Cpx were colorless amphibole, brown amphibole and clay. Pl was mostly replaced by secondary Pl with minor colorless amphibole occurring in the micro-fractures.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	8		10
Amphibole, brown	n/a	15	n/a	n/a
Amphibole, colorless	10	55		10
Clay minerals	20	30		
Plagioclase, sec.	n/a	n/a	n/a	90
Talc	40	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro with a submagmatic texture. Incipient plastic strain is observed in mechanical twins and undulose extinction in plag.

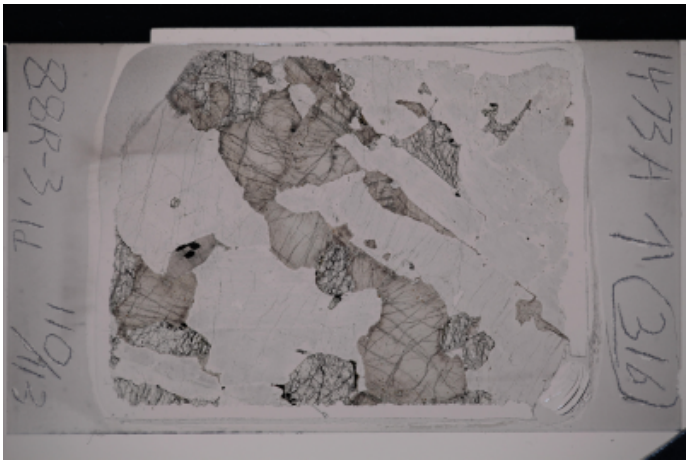
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved texture: coarse grains with curved contacts.
Plagioclase:	size: coarse to medium shape: subhedral boundaries: straight twinning: tapered undulose extinction: irregular subgrains: straight to curved boundaries texture: coarse grains with straight contacts.
Clinopyroxene:	size: medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains with straight to curved contacts.
Oxide:	geometry: pods located at cpx and olivine grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-88R-3-W 110/113-TSB-TS_316** Piece no.: #01 TS no.: 316

Group	Summary
Igneous petrology:	A coarse-grained orthopyroxene-bearing olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and displays an oscillatory zoning. It also show undulose extinction and deformation twins. Subhedral plagioclase is occasionally partly or fully enclosed within both clinopyroxene and olivine.
Metamorphic petrology:	Static background alteration intensity is only slight.
Structure:	coarse-grained olivine gabbro with a submagmatic texture. Plastic strain is observed in tapered twins, undulose extinction and incipient subgrain development in plag.

Plane-polarized



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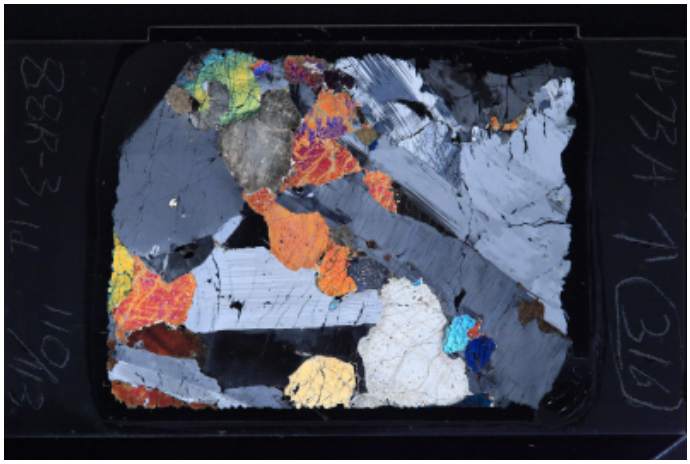
Cross-polarized



33354841

IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained orthopyroxene-bearing olivine gabbro with a subophitic texture. Olivine is commonly rimmed by orthopyroxene, and sometimes by brown amphibole and opaque minerals. Small euhedral olivine occurs as inclusion within plagioclase. Plagioclase is in a tabular shape and displays an oscillatory zoning. It also show undulose extinction and deformation twins. Subhedral plagioclase is occasionally partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene displays a consertal texture and contains abundant brown amphibole blebs. Primary orthopyroxene with tight exsolution lamellae contains inclusions of ilmenite and sulfide. Opaque minerals are composed of ilmenite and sulfide.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	10			5.6	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	71		20	12	anhedral	tabular	
Clinopyroxene	16		9	8	anhedral	poikilitic	with a consertal texture
Orthopyroxene	2		5	5	anhedral	subequant	
Amphibole	0.3		0.3	0.1	anhedral		
Opaques	0.5						
Ilmenite	0.3						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 5 Observer(s): JL

Detailed description Static background alteration is negligible. Most of the alteration is associated with serpentine, talc and magnetite replacement after olivine and 2nd Cpx and brown amphibole after primary Cpx. Plagioclase is rather fresh with minor 2nd replacement as shown in a high contrast PPL image.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	7	5	0	3
Amphibole, brown	n/a	35	n/a	n/a
Amphibole, colorless		10		
Clinopyroxene, sec.	n/a	55	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	30	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro with a submagmatic texture. Plastic strain is observed in tapered twins, undulose extinction and incipient subgrain development in plag.

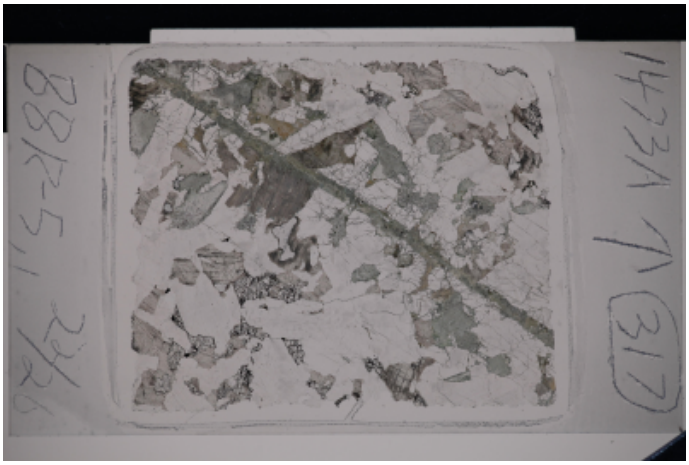
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	size: medium shape: anhedal boundaries: curved texture: coarse grains with curved contacts.
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered (magmatic locally preserved) undulose extinction: irregular subgrains: straight boundaries texture: coarse grains with straight contacts.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures; common texture: coarse grains with straight to curved contacts.
Oxide:	geometry: thin pods located at cpx grain boundaries.

THIN SECTION LABEL ID: **360-U1473A-88R-5-W 22/26-TSB-TS_317** Piece no.: #01 TS no.: 317

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texutre, crosscut by an amphibole vein. Plagioclase is commonly in a tabular shape and show undulose extinction and deformation twins. Occasionally, it displays an oscillatory zoning. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene.
Metamorphic petrology:	Static alteration intensity is moderate, and more intense near an amphibole vein. Near the vein, olivine is replaced by pseudomorphic amphibole aggregate with chlorite corona.
Structure:	coarse-grained olivine gabbro with a submagmatic - weakly crystal-plastic fabric. Solid-state microstructures mainly consist of tapered twins, undulose extinction and subgrains in plag.

Plane-polarized



33354661

Cross-polarized

33354721

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texutre, crosscut by an amphibole vein. Olivine is partly recrystallized and rimmed by orthopyroxene. Plagioclase is commonly in a tabular shape and show undulose extinction and deformation twins. Occasionally, it displays an oscillatory zoning. Subhedral tabular plagioclase is partly or fully enclosed within clinopyroxene. Clinopyroxene shows a consertal texture and contains brown amphibole blebs. It is highly altered and replaced by amphibole. Opaque minerals are composed of sulfides and ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	62		7.8	6	anhedral	tabular	undulose extinction
Clinopyroxene	33		5	4	anhedral	poikilitic	with a consertal texture
Opaques	0.3						
Ilmenite	0.1						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 20 Observer(s): TN

Detailed description Intense alteration near vein. Olivine is replaced by pseudomorphic amphibole and talc, and by mesh-forming serepentine; clinopyroxene by secondary clinopyroxene patches, brown amphibole patches, blebs and fringes, by green and colorless amphibole rims, and by clay along cleavage surfaces; plagioclase has chlorite coronas and has fractures filled by chlorite and amphibole.

Comment type	Comment
Vein 1 minerals:	green Amp

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	60	40		10
Amphibole, brown	n/a	10	n/a	n/a
Amphibole, colorless	50	10		20
Amphibole, green	10	30		10
Chlorite	5			40
Clay minerals		30		
Clinopyroxene, sec.	n/a	20	n/a	n/a
Oxide	2			n/a
Plagioclase, sec.	n/a	n/a	n/a	30
Sulfide	1			n/a
Talc	20	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro with a submagmatic - weakly crystal-plastic fabric. Solid-state microstructures mainly consist of tapered twins, undulose extinction and subgrains in plag.

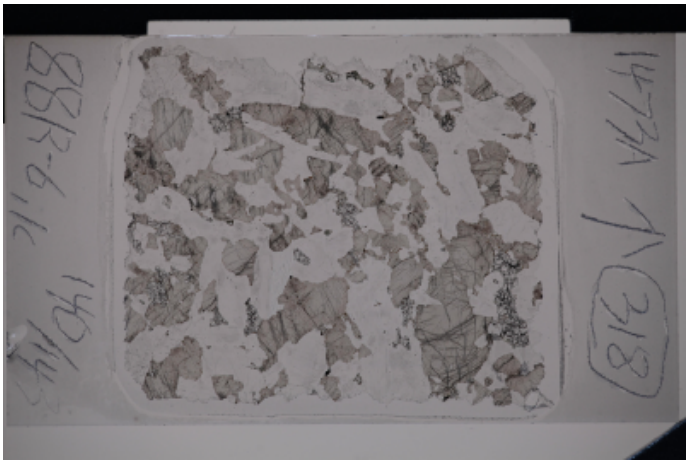
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved undulose extinction: irregular texture: fine grains with curved contacts.
Plagioclase:	size: medium to fine shape: subhedral to anhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight boundaries texture: coarse grains with straight contacts.
Clinopyroxene:	size: medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains with curved contacts.
Oxide:	geometry: few pods located at olivine grain boundaries.
Vein:	there is an amphibole vein crosccuting the rock.

THIN SECTION LABEL ID: **360-U1473A-88R-6-W 140/143-TSB-TS_318** Piece no.: #02 TS no.: 318

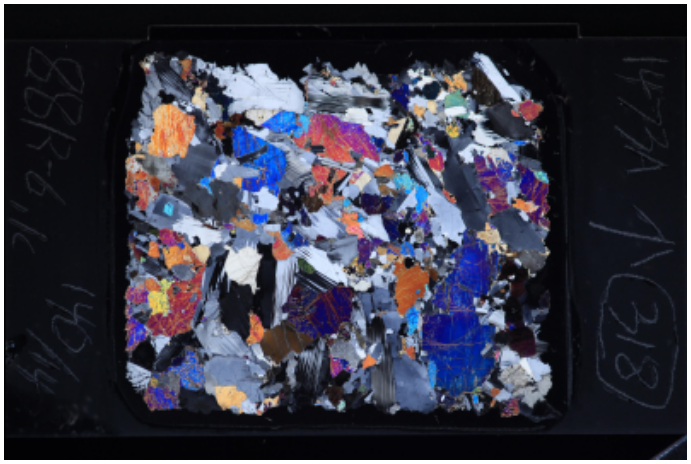
Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a subophitic texture. Plagioclase is in a tabular shape and shows undulose extinction and deformation twins. It occasionally displays an oscillatory zoning. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine.
Metamorphic petrology:	Sample is only slightly altered.
Structure:	coarse-grained olivine gabbro with a submagmatic texture. Deformation microstructures are restricted to mechanical twins and local subgrains in plagioclase.

Plane-polarized



33355881

Cross-polarized



33354641

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene and small olivine occurs either at the rim of clinopyroxene or as inclusion within both plagioclase and clinopyroxene. Plagioclase is in a tabular shape and shows undulose extinction and deformation twins. It occasionally displays an oscillatory zoning. Subhedral plagioclase is partly or fully enclosed within clinopyroxene and olivine. Clinopyroxene displays a consertal texture with orthopyroxene and abundant brown amphibole blebs. Opaque minerals are composed of sulfide and ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	55		9	6	anhedral	tabular	
Clinopyroxene	40		10	6	anhedral	poikilitic	with a consertal intergrowth texture with orthopyroxene
Amphibole	0.2		0.2	0.1	anhedral		
Opaques	0.3						
Ilmenite	0.1						
Sulfide	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): JL

Detailed description Sample is only slightly altered. Secondary phases observed are talc, serpentine and magnetite after olivine; 2nd Cpx, brown amphibole and colorless amphibole after primary Cpx.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		10		
Clay minerals	5			
Clinopyroxene, sec.	n/a	60	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse-grained olivine gabbro with a submagmatic texture. Deformation microstructures are restricted to mechanical twins and local subgrains in plagioclase.

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0

Type	Comment
Olivine:	size: coarse to medium shape: anhedral boundaries: curved texture: coarse grains with curved contacts.
Plagioclase:	size: coarse shape: subhedral boundaries: straight twinning: tapered (magmatic locally observed) undulose extinction: irregular subgrains: straight to curved boundaries texture: local plastic strain observed at grain boundaries of large crystals.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: striaght ot curved fractures: common texture: coarse grains, partially altered.

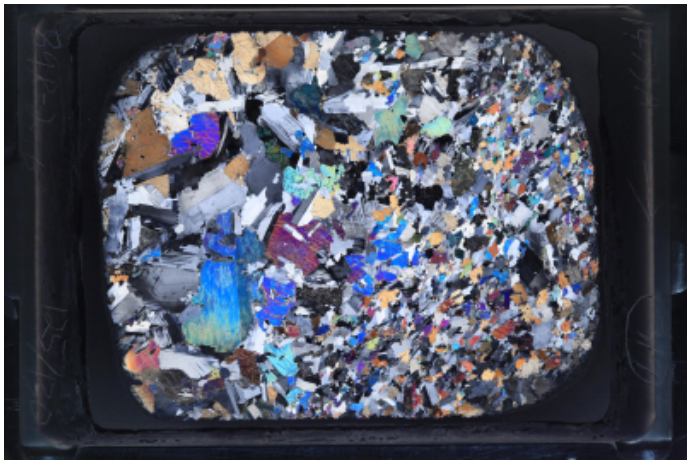
THIN SECTION LABEL ID: **360-U1473A-89R-2-W 125/130-TSB-TS_319** Piece no.: #06 TS no.: 319

Group	Summary
Igneous petrology:	There are two domains, i..e, a coarse-grained and a medium-grained, of olivine gabbro. Both domains show a subophitic texture. Plagioclase in the medium-grained domain is more recrystallized than that in the coarse-grained domain.
Metamorphic petrology:	Static background alteration intensity is only slight.
Structure:	Inclined contact between a fine grained olivine gabbro with a magmatic fabric and a coarse grained olivine gabbro that is isotropic.

Plane-polarized

33355701

Cross-polarized



33355741

IGNEOUS PETROLOGY

Interval domain no: **1** Domain rel. abundance (%): 55 Domain name: lithology domain 1

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: This domain is a coarse-grained olivine gabbro with a subophitic texture. Plagioclase is commonly in a tabular shape and shows magmatic twins, although undulose extinction and deformation twins can also be seen. Subhedral tabular plagioclase is partly or fully enclosed in both olivine and clinopyroxene. Clinopyroxene contains brown amphibole blebs, and occasionally displays a consertal texture. Small amount of orthopyroxene are present and interstitial between plagioclase. Brown amphibole also occurs at the rim of clinopyroxene. Opaque minerals are dominated by sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			5	anhedral	poikilitic	
Plagioclase	58		11	8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	37		10	6	anhedral	poikilitic	
Orthopyroxene	0.2		1	1	anhedral	interstitial	interstitial between plagioclase
Amphibole	0.3		0.6	0.2	anhedral	interstitial	
Opaques	0.2						
Sulfide	0.2						

Interval domain no: **2** Domain rel. abundance (%): 45 Domain name: lithology domain 2

Lithology: **olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: medium grained

Detailed description: A medium-grained olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is commonly in a tabular shape and shows magmatic twins. It is partly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly or fully enclosed within both clinopyroxene and olivine. Clinopyroxene shows a consertal intergrowth texture with orthopyroxene. Brown amphibole, together with opaque minerals, occurs at the rim of clinopyroxene. Opaque minerals are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	6			1.4	anhedral	subequant	rimmed by ortbopyroxene
Plagioclase	52		4.8	3.2	anhedral	tabular	undulose extinction and deformation twins
Amphibole	0.3		0.6	0.1	anhedral	interstitial	
Opaques	0.2						
Ilmenite	0.2						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): JL

Detailed description Sample is only slightly altered. Secondary phases observed are talc after olivine and 2nd Cpx and brown amphibole after primary Cpx. A few olivine grains are extensively altered into green and red clay. Plagioclase alteration is restricted to chlorite near contacts with olivine and minor 2nd plagioclase.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	12	8		5
Amphibole, brown	n/a	40	n/a	n/a
Amphibole, colorless		20		
Chlorite	5			30
Clay minerals	10			
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	70
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: JD

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	moderate	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Magmatic. Undulose extinction.
Plagioclase:	Magmatic. Tapered twins. Patchy extinction.
Clinopyroxene:	Magmatic.

Interval domain no: 2 Domain rel. abundance (%): Domain name: microfabric

Microstructure: magmatic Observer: JD

Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Magmatic. Undulose extinction.
Plagioclase:	Magmatic. Tapered twins. Patchy extinction.
Clinopyroxene:	Magmatic.

THIN SECTION LABEL ID: **360-U1473A-89R-8-W 17/22-TSB-TS_320** Piece no.: #01 TS no.: 320

Group	Summary
Igneous petrology:	A coarse-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be subophitic, as subhedral plagioclase is partly or fully enclosed within the clinopyroxene porphyroclasts.
Metamorphic petrology:	Background alteration intensity is only slight.
Structure:	Incipient crystal-plastic fabric with recrystallized plagioclase, kinked pyroxene, and elongated olivine with undulose extinction.

Plane-polarized

33355601

Cross-polarized

33355681

IGNEOUS PETROLOGY

Lithology: **olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: coarse grained

Detailed description: A coarse-grained olivine gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved, but is very likely to be subophitic, as subhedral plagioclase is partly or fully enclosed within the clinopyroxene porphyroclasts. Olivine is recrystallized and rimmed by clinopyroxene. The neoblasts are aggregated and distributed along the weak foliation. Euhedral olivine also occurs as inclusion within plagioclase. Plagioclase is strongly recrystallized and show undulose extinction and deformation twins. Clinopyroxene is partly recrystallized and displays a consertal texture. Tiny brown amphiboles are interstitial among the clinopyroxene neoblasts and subhedral brown amphibole occurs at the rim of clinopyroxene, together with opaque minerals. Opaque minrals are dominated by ilmenite.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	9			5	anhedral	elongate	rimmed by clinopyroxene
Plagioclase	57		14	8	anhedral	tabular	undulose extinction and deformation twins
Clinopyroxene	33		9	7	anhedral	poikilitic	
Amphibole	0.7		2.8	0.2	subhedral	subequant	
Opaques	0.3						
Ilmenite	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 7 Observer(s): JL

Detailed description Sample is only slightly altered. Most of the grains are deformed and recrystallized. Common secondary phases observed are talc, serpentine, magnetite and minor green clay after olivine; and 2nd Cpx, brown amphibole and pale green amphibole after primary Cpx. Brown hornblende grains associated with Cpx were frequently observed.

Comment type	Comment
Mylonite comments:	recrystallized plagioclase and cpx; elongated primary phases

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10		5
Amphibole, brown	n/a	50	n/a	n/a
Amphibole, colorless		25		
Clay minerals	5			
Clinopyroxene, sec.	n/a	25	n/a	n/a
Oxide	10			n/a
Plagioclase, sec.	n/a	n/a	n/a	100
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

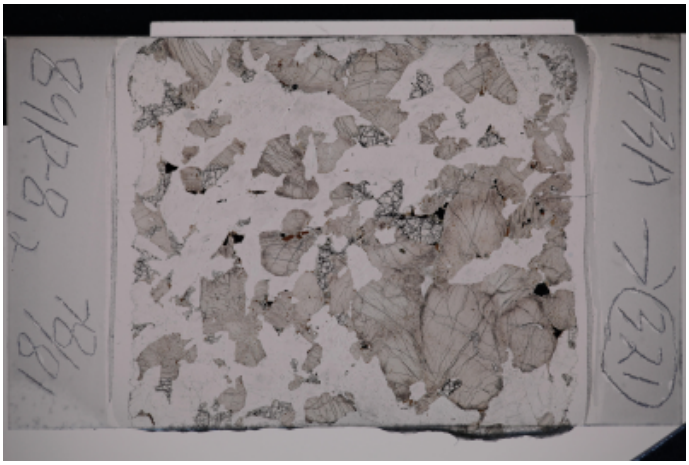
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	anhedral	n/a
Intensity of dynamic recrystallization:	weak	n/a
Magmatic fabric intensity:	isotropic	0
CPF subgrain boundary shape:	curved	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	strongly foliated/lineated [CPF_fabric]	2
Fracture abundance:	rare	n/a

Type	Comment
Olivine:	Grain size: porphyroclasts: ~3 mm. neoblasts: ~0.15 mm. Grain shape: elongated, anhedral. Grain boundary: curved. Undulose extinction: strong. Texture: weakly porphyroclastic, some zones have very elongated porphyroclasts.
Plagioclase:	Grain size: porphyroclasts: ~ 3 mm. neoblasts: ~0.1 mm. Grain shape: porphyroclasts are elongated, neoblasts are anhedral. Grain boundary: irregular. Twinning: magmatic to tapered. Undulose extinction: patchy to strong. Subgrains: well developed in porphyroclasts. Texture: Porphyroclastic with core and mantle.
Clinopyroxene:	Grain size: porphyroclasts: ~4.5 mm. Grain shape: subhedral. Grain boundary: irregular. Undulose extinction: patchy to strong. Texture: magmatic to kinked.

THIN SECTION LABEL ID: **360-U1473A-89R-8-W 78/81-TSB-TS_321** Piece no.: #02 TS no.: 321

Group	Summary
Igneous petrology:	A coarse-grained orthopyroxene-bearing olivine gabbro with a subophitic texture. Plagioclase is in tabular shape and shows an oscillatory zoning. It is weakly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within clinopyroxene. Primary orthopyroxene is in a subequant shape and shows tight exsolution lamellae.
Metamorphic petrology:	The rock shows a slight static background alterataion, which is mainly confined to mafic minerals.
Structure:	coarse grained olivine gabbro with a submagmatic/weakly solid-state texture. Plagioclase shows mechanical twins and local recrystallization to polygonal aggregates at the edges of large grains.

Plane-polarized



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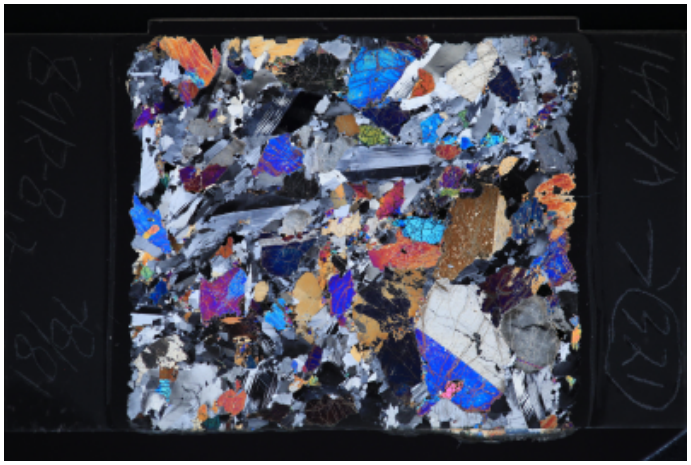
Cross-polarized



33354561

IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bearing olivine gabbro** Observer: CL

Texture: subophitic Ave. grain size: coarse grained

Detailed description: A coarse-grained orthopyroxene-bearing olivine gabbro with a subophitic texture. Olivine is rimmed by orthopyroxene. Plagioclase is in tabular shape and shows an oscillatory zoning. It is weakly recrystallized and displays undulose extinction and deformation twins. Subhedral plagioclase is partly enclosed within clinopyroxene. Primary orthopyroxene is in a subequant shape and shows tight exsolution lamellae. It contains a few brown amphibole blebs. Clinopyroxene shows a consertal intergrowth texture with orthopyroxene and contain abundant brown amphibole blebs. Opaque minerals are composed of ilmenite and sulfides. Brown amphibole, together with opaque minerals, also occur at the rim of clinopyroxene.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5			2.4	anhedral	subequant	rimmed by orthopyroxene
Plagioclase	56		7.2	6	anhedral	tabular	
Clinopyroxene	35		11	6	anhedral	poikilitic	with a consertal texture
Orthopyroxene	3		3.2	2.8	anhedral	subequant	
Amphibole	0.8		0.4	0.1	anhedral		
Opaques	0.7						
Ilmenite	0.4						
Sulfide	0.3						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 6 Observer(s): RT

Detailed description The rock shows a slight static background alterataion, which is mainly confined to mafic minerals.

Comment type	Comment
Alteration general comments:	The rock shows a slight static background alterataion, which is mainly confined to mafic minerals.
Mylonite comments:	Pl locally recrystallized into nearly polygonal aggregates

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	10	10	10	2
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless		30	80	20
Chlorite			20	80
Clinopyroxene, sec.	n/a	40	n/a	n/a
Oxide	20			n/a
Talc	40	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: submagmatic Observer: GV

Detailed description coarse grained olivine gabbro with a submagmatic/weakly solid-state texture. Plagioclase shows mechanical twins and local recrystallization to polygonal aggregates at the edges of large grains.

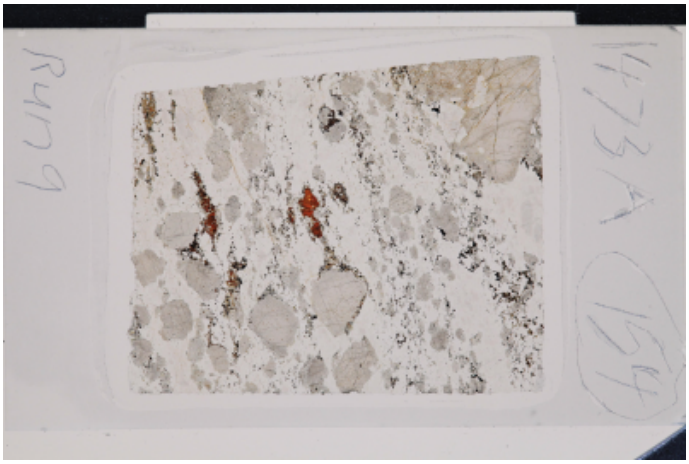
Feature type	Observation	Intensity rank
Magmatic fabric intensity:	isotropic	0
Fracture abundance:	common	n/a

Type	Comment
Olivine:	size: medium shape: anhedral boundaries: curved undulose extinction: irregular subgrains: straight boundaries texture: medium grains with curved contacts.
Plagioclase:	size: coarse to medium shape: subhedral boundaries: straight to curved twinning: tapered undulose extinction: irregular subgrains: straight boundaries texture: coarse grains with tapered twins and locally recrystallized grains into polygonal aggregates.
Clinopyroxene:	size: coarse to medium shape: subhedral to anhedral boundaries: straight to curved fractures: common texture: coarse grains with straight to curved contacts.
Oxide:	geometry: few pods at the boundaries of cpx and olivine.

THIN SECTION LABEL ID: **360-U1473A-Run 09 RCJB-TSB-TS_154** Piece no.: TS no.: 154

Group	Summary
Igneous petrology:	An orthopyroxene-bearing disseminated olivine gabbro. Primary magmatic texture is not preserved, but could be subophitic, as subhedral tabular plagioclase is partly or fully enclosed within clinopyroxnee porphyroclast.
Metamorphic petrology:	Dynamically recrystallized neoblasts consist of olivine, clinopyroxene, orthopyroxene and plagioclase. Static alteration intensity is slight to moderate. Brown clay replacing olivine is conspicuous.
Structure:	Porphyroclastic olivine gabbro with elongate aggregates of neoblasts of olivine and plagioclase defining the foliation.

Plane-polarized



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Cross-polarized

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IGNEOUS PETROLOGY

Lithology: **orthopyroxene-bering disseminated oxide olivine gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained [345]

Detailed description: An orthopyroxene-bearing disseminated olivine gabbro with a porphyroclastic texture. Primary magmatic texture is not preserved, but could be subophitic, as subhedral tabular plagioclase is partly or fully enclosed within clinopyroxnee porphyroclast. Plagioclase is strongly recrystallized and show undulose extinction. Magmatic twins are common in the neoblasts. Olivine is strongly altered and elongated. Olivine neoblasts are occasionally aggregated at the margin of clinopyroxene. A foliation is defined by the preferred orientation of plagioclase and olivine. Clinopyroxene contains brown amphibole blebs. Orthopyroxene is in subequant shape and aligned along the foliation. Opaque minerals commonly associate with olivine neoblasts. They are predominated by ilmenite, which shows intergrowth texture with magnetite and sulfides.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Olivine	5					elongate	strongly altered and original shape is not preserved
Plagioclase	52		3.2	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	40		4.8	3.2	anhedral	subequant	with brown amphibole blebs
Orthopyroxene	2		1.2	0.8	anhedral	subequant	
Opaques	1						
Ilmenite	0.9						
Sulfide	0.1						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 10 Observer(s): TN

Detailed description Olivine is pseudomorphically replaced by brown clay and talc; clinopyroxene by brown amphibole blebs, green amphibole thin fringes, and pseudomorphic or along-cleavage brown clay; orthopyroxene by green/colorless amphibole thin fringes; plagioclase by fracture-filling chlorite and brown clay.

Comment type	Comment
Mylonite comments:	Cpx, Opx, Ol, Pl neoblasts

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	90	5	2	2
Amphibole, brown	n/a	70	n/a	n/a
Amphibole, colorless			50	5
Amphibole, green		10	50	
Chlorite				55
Clay minerals	65	20		40
Oxide	3			n/a
Sulfide	2			n/a
Talc	30	n/a		n/a
Subtotals replaced	100	100	100	100

MICROSTRUCTURES

Microstructure: crystal-plastic Observer: JD

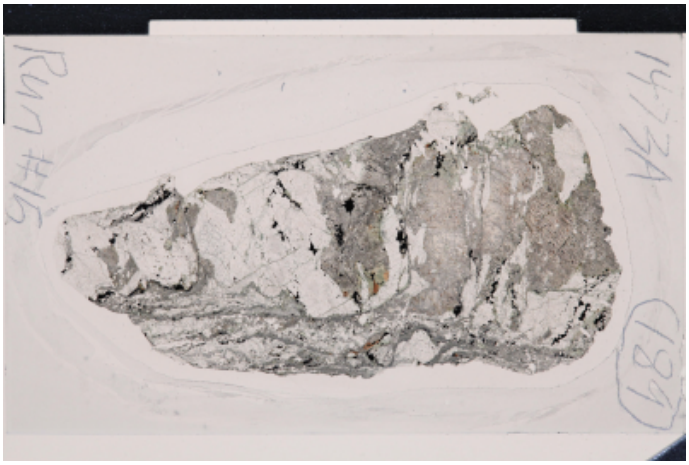
Feature type	Observation	Intensity rank
Recrystallization grain size:	fine grained [BGS]	n/a
Recrystallization grain shape:	equigranular	n/a
Intensity of dynamic recrystallization:	partial	n/a
CPF subgrain boundary shape:	polygonal	n/a
CPF dynamic recrystallization:	strong	n/a
CPF fabric intensity:	porphyroclastic/protomylonitic [CPF_fabric]	3

Type	Comment
Olivine:	Grain size: porphyroclasts: ~1 mm. neoblasts: ~0.2 mm. Grain shape: equigranular Grain boundary: polygonal. Undulose extinction: weak in neoblasts, complete in porphyroclasts. Texture: elongate aggregates of porphyroclasts and neoblasts parallel to the foliation.
Plagioclase:	Grain size: porphyroclasts: 0.75-2 mm. neoblasts: 0.05-0.25 mm. Grain shape: equigranular. Grain boundary: polygonal. Twinning: magmatic to tapered. Subgrains: present at irregular grain boundaries. Undulose extinction: patchy. Texture: Porphyroclastic recrystallized plagioclase elongate parallel to the foliation.
Clinopyroxene:	Grain size: porphyroclasts: 0.75-3.5 mm. neoblasts: ~0.15 mm. Grain shape: subhedral. Grain boundary: irregular. Texture: porphyroclastic.

THIN SECTION LABEL ID: **360-U1473A-Run 15 FMM-TSB-TS_189** Piece no.: TS no.: 189

Group	Summary
Igneous petrology:	A highly altered medium-grained oxide gabbro. The primary magmatic texture is not preserved.
Metamorphic petrology:	Static alteration intensity is moderate. Mafic minerlas are much altered than plagioclase.
Structure:	Altered gabbroic fault breccia with recrystallized plagioclase and clinopyroxene clasts next to cataclastic zone.

Plane-polarized



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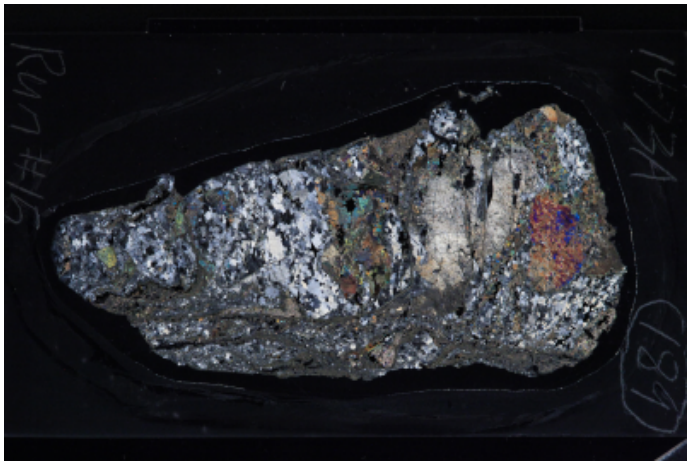
Cross-polarized



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IGNEOUS PETROLOGY

Lithology: **oxide gabbro** Observer: CL

Texture: porphyroclastic Ave. grain size: medium grained

Detailed description: A medium-grained oxide gabbro with a porphyroclastic texture. The primary magmatic texture is not preserved. Plagioclase is highly recrystallized and displays undulose extinction. Clinopyroxene is pervasively altered and replaced by both brown and green amphiboles. Opaque oxides are dominated by ilmenite, with minor sulfides. Intergrowth between ilmenite and sulfide can be seen.

Mineral	Original (%)	Size min. (mm)	Size max. (mm)	Size mode (mm)	Shape	Habit	Comments
Plagioclase	55		4.8	0.8	anhedral	subequant	undulose extinction
Clinopyroxene	40		8	2.4	anhedral	subequant	pervasively altered
Opaques	5						
Ilmenite	4.5						
Sulfide	0.5						

METAMORPHIC PETROLOGY

Total rock alteration estimate (%): 30 Observer(s): TN

Detailed description Olivine is completely replaced by actinolite + talc aggregate; clinopyroxene is replaced by brown amphibole patches by green/colorless amphibole patches or fringes, and by brownish clay along cleavage surfaces; plagioclase has fractures filled with chlorite, actinolite and clay.

Comment type	Comment
Cataclasite comments:	Clasts of gabbros and of constituent minerals in a clay matrix.

Mineral	OL replaced (%)	CPX replaced (%)	OPX replaced (%)	PL replaced (%)
Mineral alteration (%)	100	50		5
Amphibole, brown	n/a	30	n/a	n/a
Amphibole, colorless	45	10		20
Amphibole, green		40		
Chlorite				60
Clay minerals		20		20
Oxide	4			n/a
Sulfide	1			n/a
Talc	50	n/a		n/a
Subtotals replaced	100	100		100

MICROSTRUCTURES

Interval domain no: 1 Domain rel. abundance (%): 30 Domain name: microfabric

Microstructure: fault rock

Cataclasite zone making up 20% of the thin section. Plagioclase and clinopyroxene clasts are enclosed in ultra-fine grained cataclastic material. The coarser grained plagioclase fragments are fractured and show undulose extinction. The ultra-fine grained cataclastic material does not exhibit any apparent shape preferred orientation.

Observer: OP

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a
Fault rock intensity:	cataclasite	5

Type	Comment
Plagioclase:	Grain size: fine-grained fragments; Grain shape: angular to curved; Undulose extinction: irregular; Twinning: tapered; Texture: fine-grained fragments of wall rock within ultra-fine grained cataclastic matrix
Clinopyroxene:	Grain size: fine-grained; Grain shape: fragmented; Texture: fragmented and altered clinopyroxene within ultra-fine grained cataclastic matrix

Interval domain no: 2 Domain rel. abundance (%): 60 Domain name: microfabric

Microstructure: fault rock

Breccia clasts, up to 1 cm in size, adjunct to cataclasite. Clasts are composed of recrystallized plagioclase and clinopyroxene. Shear bands subdivide clasts and merg into cataclasite. The size of the plagioclase clasts decreases towards the cataclasite zone.

Observer: OP

Feature type	Observation	Intensity rank
Fracture abundance:	common	n/a
Fault rock intensity:	well developed fault, breccia	4

Type	Comment
Plagioclase:	Grain size: medium-grained porphyroclasts, fine-grained neoblasts; Grain shape: anhedral porphyroclasts, anhedral to polygonal neoblasts; Grain boundary: straight to curved; Undulose extinction: irregular; Twinning: tapered; Texture: neoblast-dominated clasts surrounded by thin shear bands merging into cataclasite
Clinopyroxene:	Grain size: medium-grained porphyroclasts, medium- to fine-grained neoblasts; Grain shape: anhedral; Grain boundary: straight to curved; Texture: strongly recrystallized and altered clinopyroxene porphyroclasts
Oxide:	interstitial oxides associated to plagioclase and oxides associated to pyroxene alteration