

PETROGRAPHIC REPORT

CLIENT: Trevor Burr, AngloGoldAshanti
PROJECT/PROPERTY: CR STUDY
SAMPLE NUMBER: 863685

BY: James R. Shannon, Ph.D.
SAMPLE TYPE: Polished Thin Section
DATE: 17-July 2017

HAND SAMPLE DESCRIPTION: Dark greenish black, very fine to fine grained diabase with slight porphyritic texture. Moderate to strong actinolitic alteration. The sample is nonmagnetic with a pencil magnet and has very minor effervescence along microveinlets.

POLISHED-SECTION DESCRIPTION:

MINERAL	EST %	COMMENTS
PRIMARY		
MICROPHENOS	[8.5]	
Clinopyroxene	8	Subhedral augite microphenocrysts up to 1.5 mm; Some grains are mosaic clusters; Locally altered-replaced by uralite
Plagioclase	0.5	Minor subhedral microphenocrysts to 1 mm; St sericite altered
MATRIX	[86]	
Plagioclase	44	Subhedral, lath-shaped grains up to 0.7 mm
Clinopyroxene?	40	Abundant anhedral pyroxene in matrix; Interstitial to plagioclase; Strong alteration-replacement by uralite prevents identification
Biotite	0.5	Anhedral grains up to 0.1 mm; locally altered to chlorite; uncertain if this is primary or metamorphic
Quartz	1	Anhedral grains up to 0.3 mm interstitial to plagioclase and pyroxene
ACCESSORY	[4]	
Ilmenite	4	Anhedral-subhedral grain outlines up to 0.15 mm; Mostly replaced by clusters of smaller subhedral grains
METAMORPHIC	(6)	
Actinolite	4	Subhedral, elongated grains up to 2 mm; Green to bluegreen pleochroism
Apatite	0.5	Subhedral grains (up to 0.6 mm) concentrated in actinolite patches
Epidote	1	Disseminated epidote associated with pyrite and actinolite
Biotite	0.5	Patchy biotite associated with actinolite may be metamorphic
ALTERATION	(40)	
Uralite	20	Very fine grained uralitic alteration-replacement of groundmass pyroxene and local alteration of augite microphenocrysts;
Sericite	20	Very fine grained white mica alteration-replacement of plagioclase
Carbonate	Tr	Minor carbonate along microfractures
SULFIDES	[1.2]	
Pyrite	1	Anhedral-subhedral disseminated grains associated with actinolite and epidote
Chalcopyrite	0.2	Anhedral grains included in and intergrown with pyrite

Pyrrhotite?	Tr	Minor grains included in and associated with pyrite; Color and weak anisotropism suggest pyrrhotite
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COMMENT

Two thinsections were prepared: A standard covered thinsection was made of the altered diabase; A polished thinsection was prepared of a thin actinolite band with more abundant sulfides. It should be noted that the polished thinsection exaggerates the amount of actinolite and sulfide in the sample.

TEXTURES

The sample displays a very fine to fine grained, microporphyritic diabase texture. Small subhedral augite microphenocrysts and minor plagioclase microphenocrysts impart a slight porphyritic texture. The matrix consists of subhedral plagioclase laths and completely altered pyroxene. Accessory ilmenite may be primary or recrystallized from primary opaque. Actinolite and biotite are randomly oriented and there are no metamorphic fabrics.

METAMORPHIC OVERPRINT

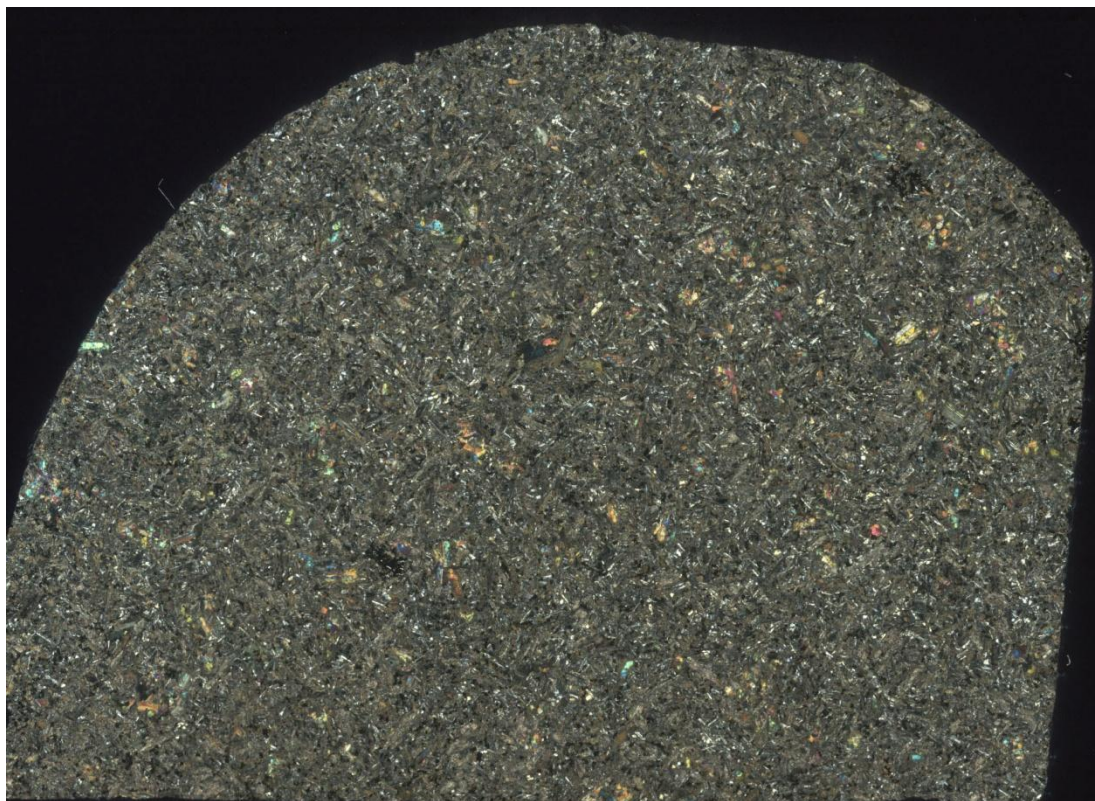
The sample has a weak metamorphic overprint with a band of actinolite with epidote, biotite and sulfides. Some actinolite is locally developed in the uralite alteration of clinopyroxene. There are no preferred fabrics or foliations associated with the metamorphism. The assemblage of actinolite-epidote-biotite suggests a medium metamorphic grade equivalent to amphibolite facies.

ALTERATION/MINERALIZATION

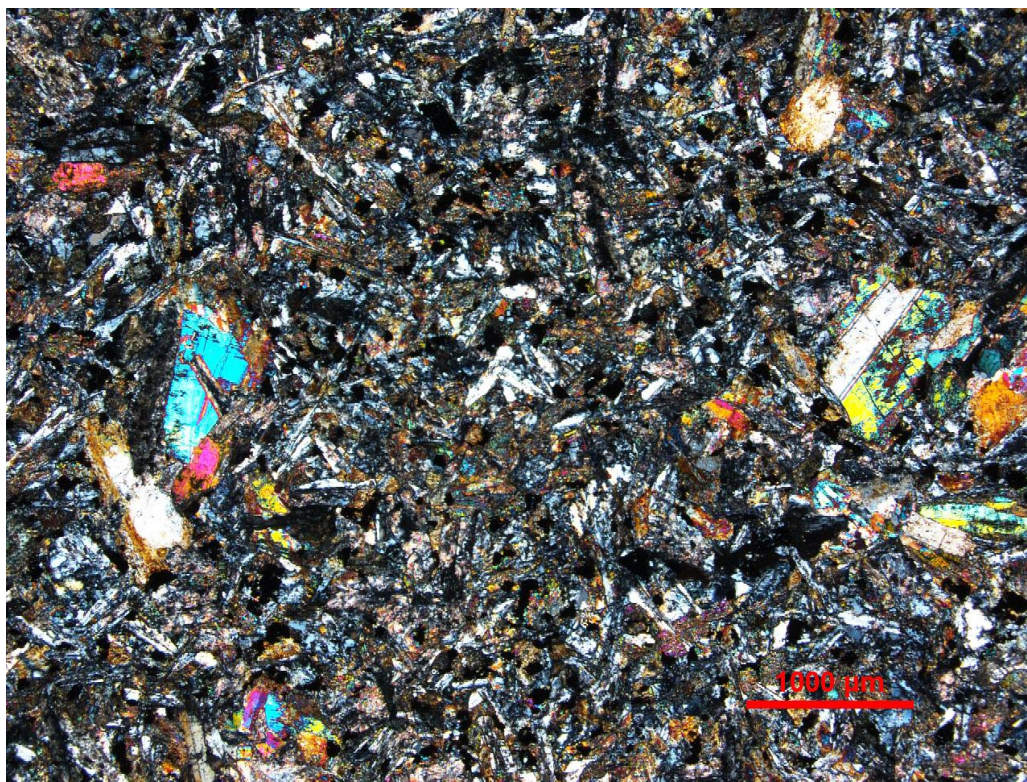
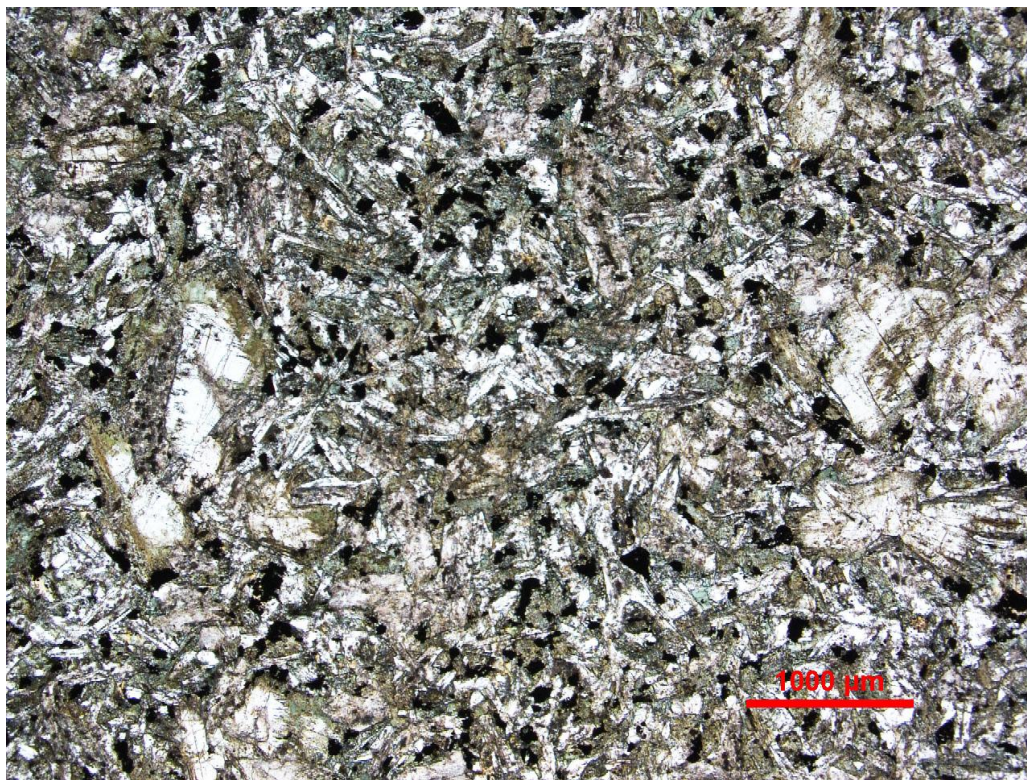
The rock is moderate-strong altered with extensive uralitization of pyroxene in the matrix and weak-moderate alteration of augite microphenocrysts. Plagioclase is moderate to strong sericite altered. The uralite and sericite suggest a moderate hydrothermal alteration overprint. Disseminated sulfides are not associated with this alteration.

ROCK NAME: Augite Microporphyritic Meta-Diabase

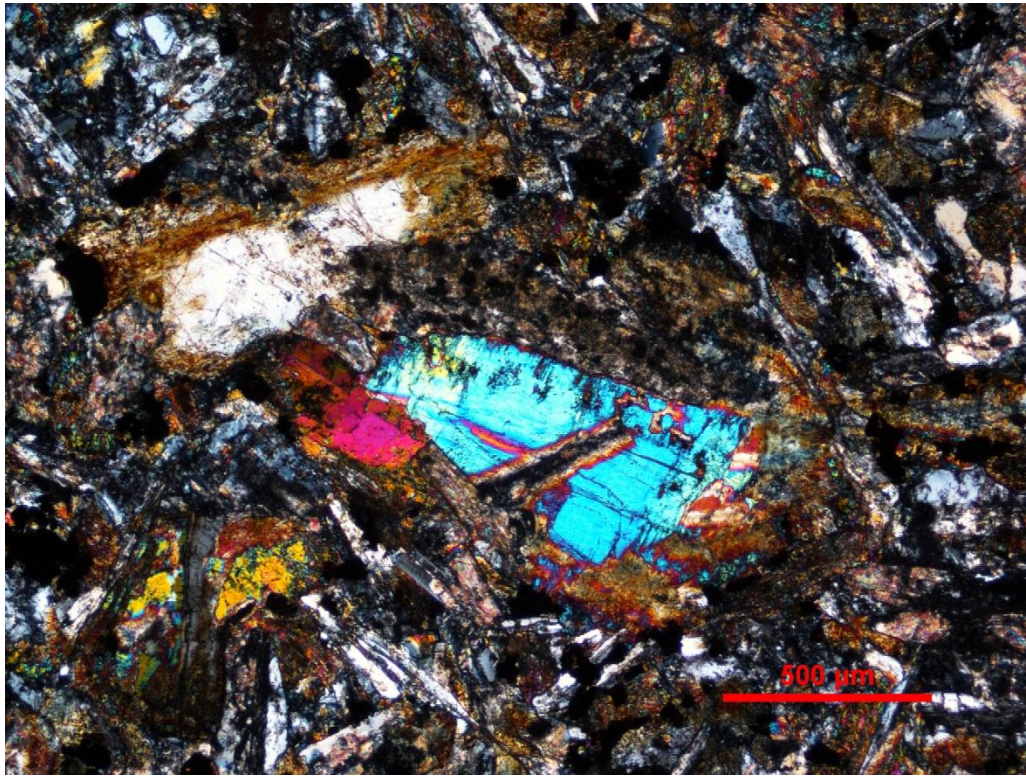
PROTOLITH: Augite Diabase



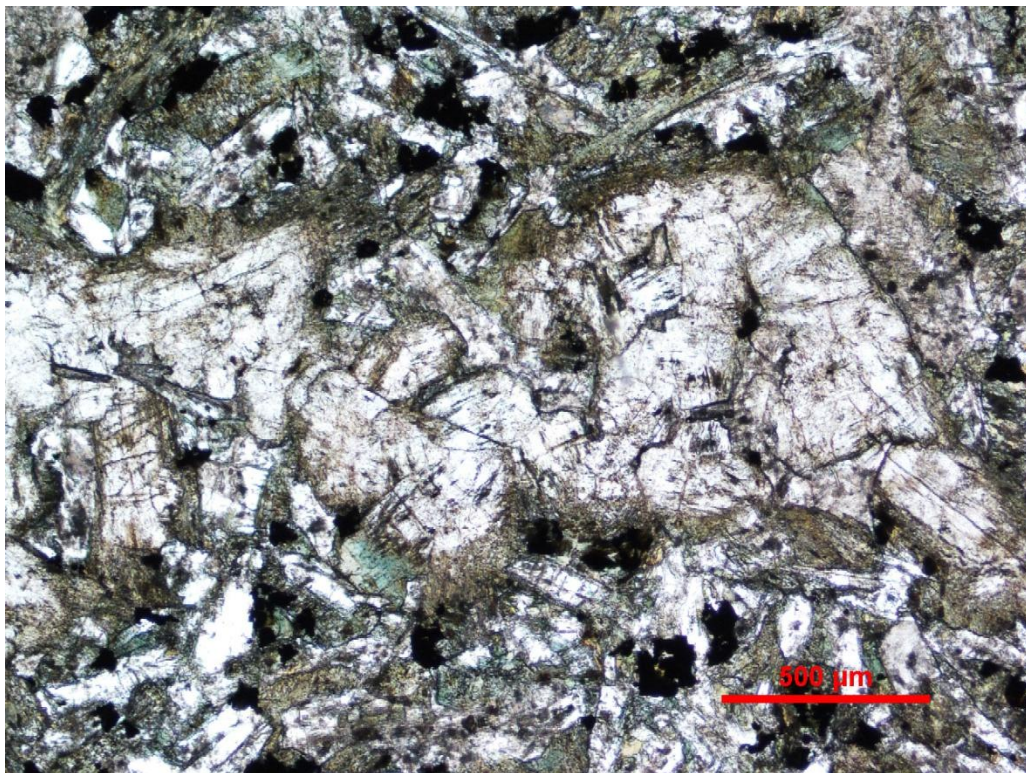
Sample 863685. Wide-field, full-thinsection view of fine grained microporphyritic augite diorite. Top- plane light; Bottom- crossed polarizers. 3.2 cm across.

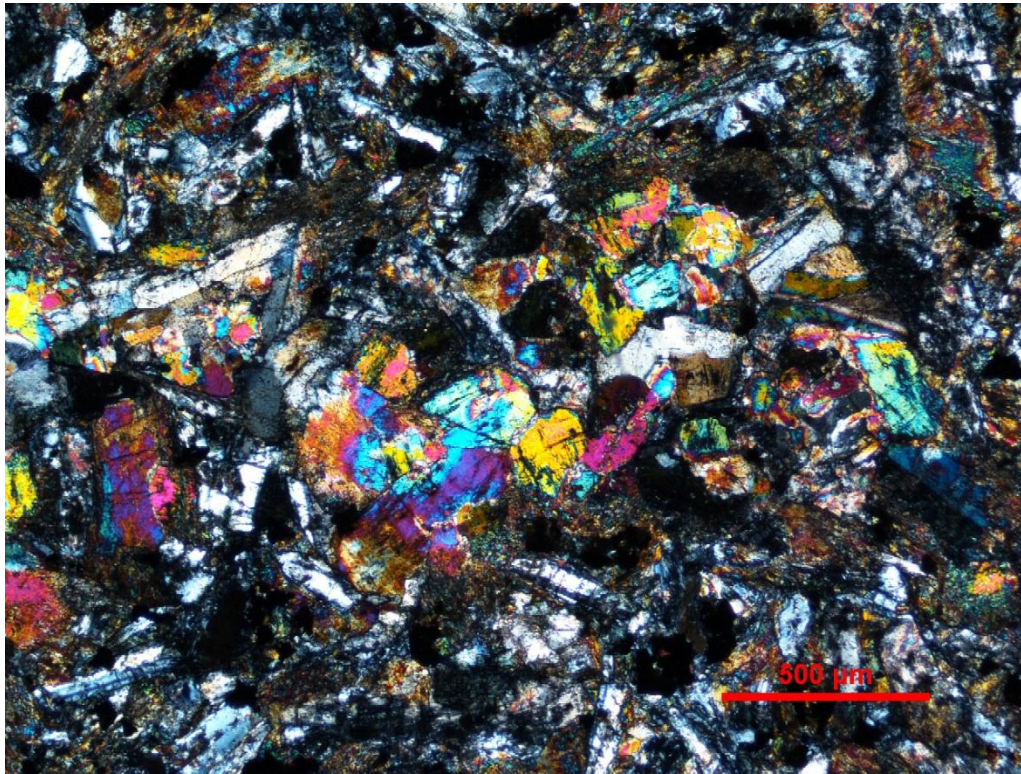


Sample 863685. Augite microphenocrysts with weak uraltic alteration in fine grained groundmass with elongated plagioclase laths. Top- plane light; Bottom- crossed polarizers.

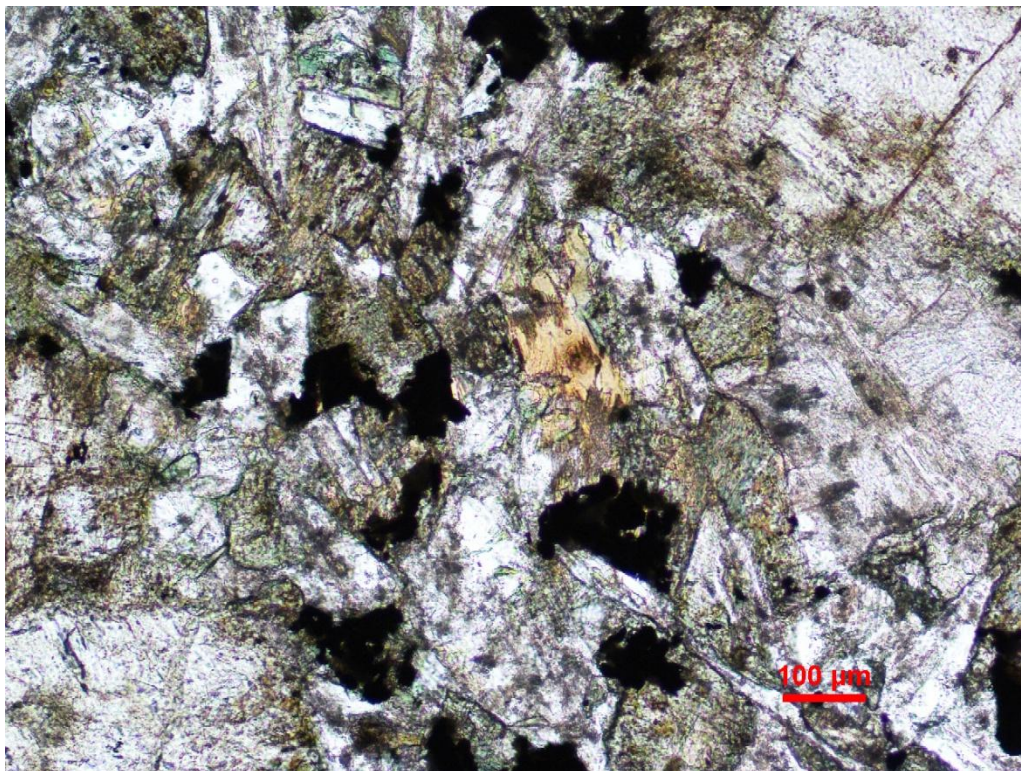


Sample 863685. Close up from above showing minor subophitic plagioclase inclusions in augite microphenocryst. Crossed polarizers.

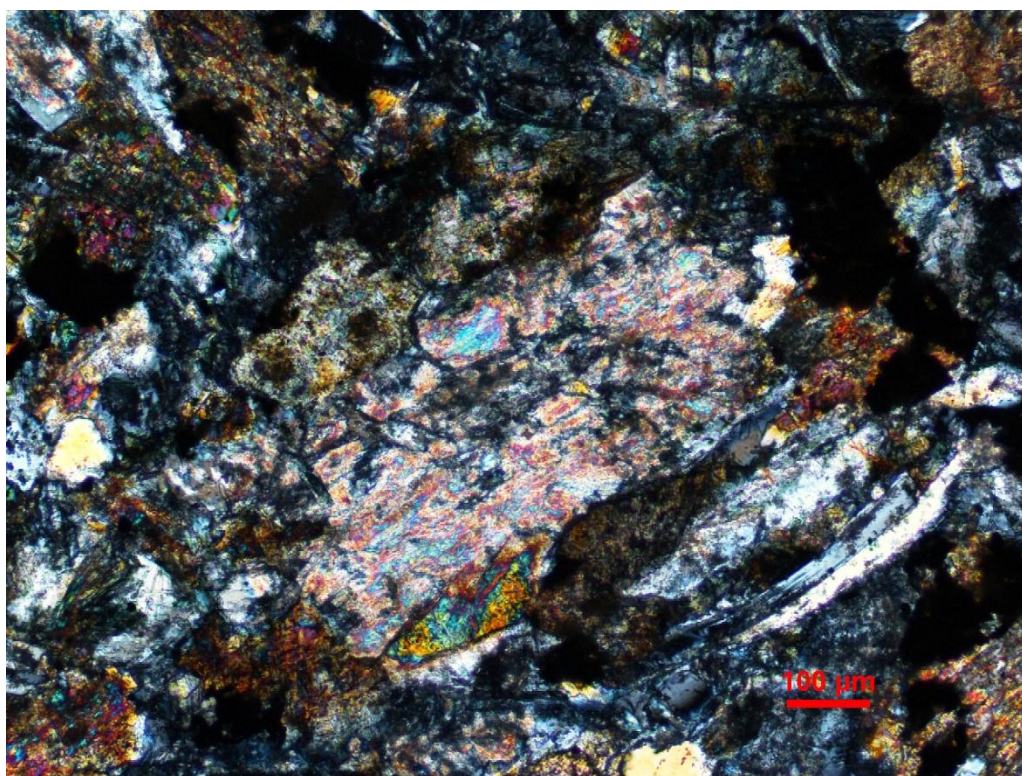
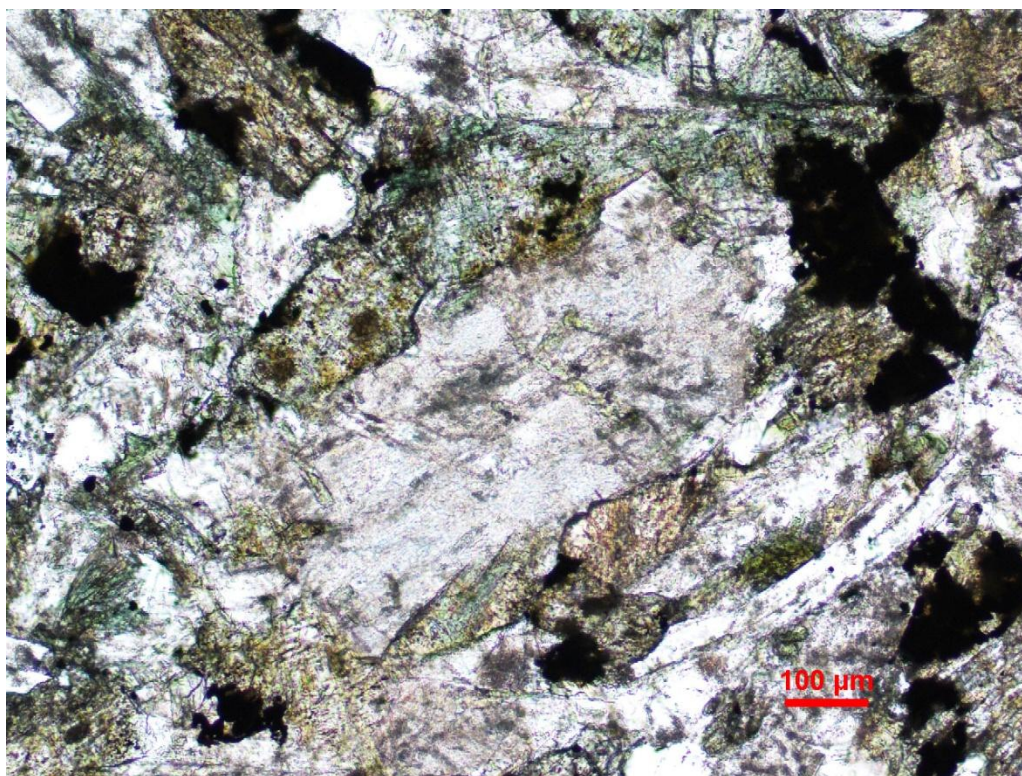




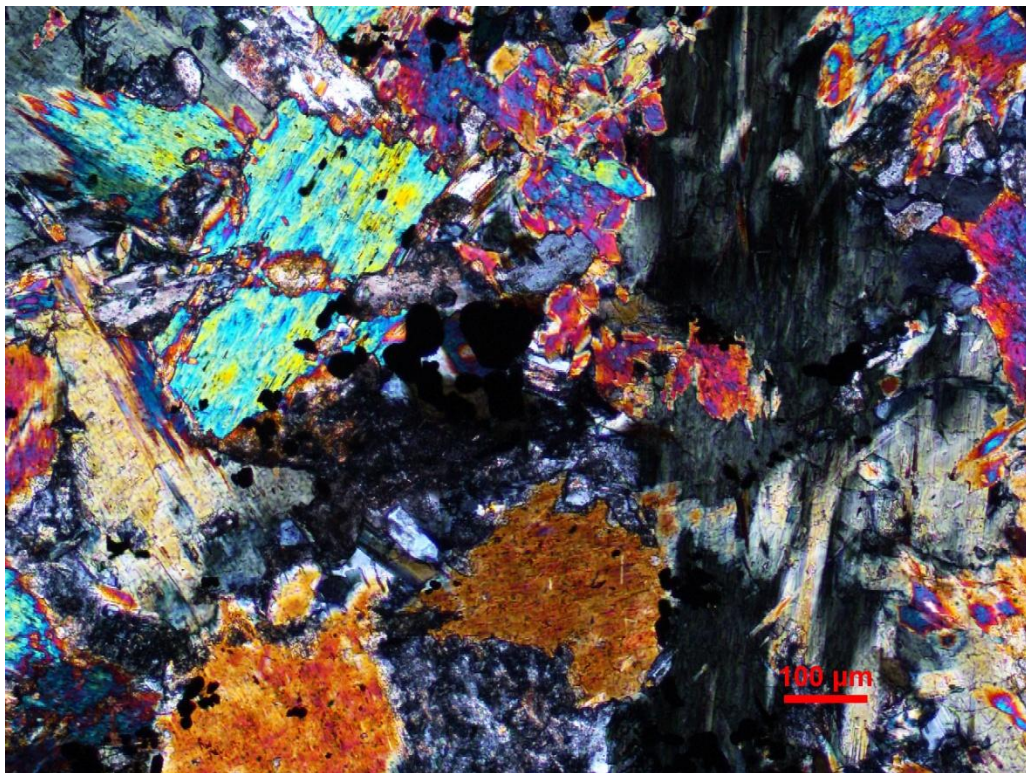
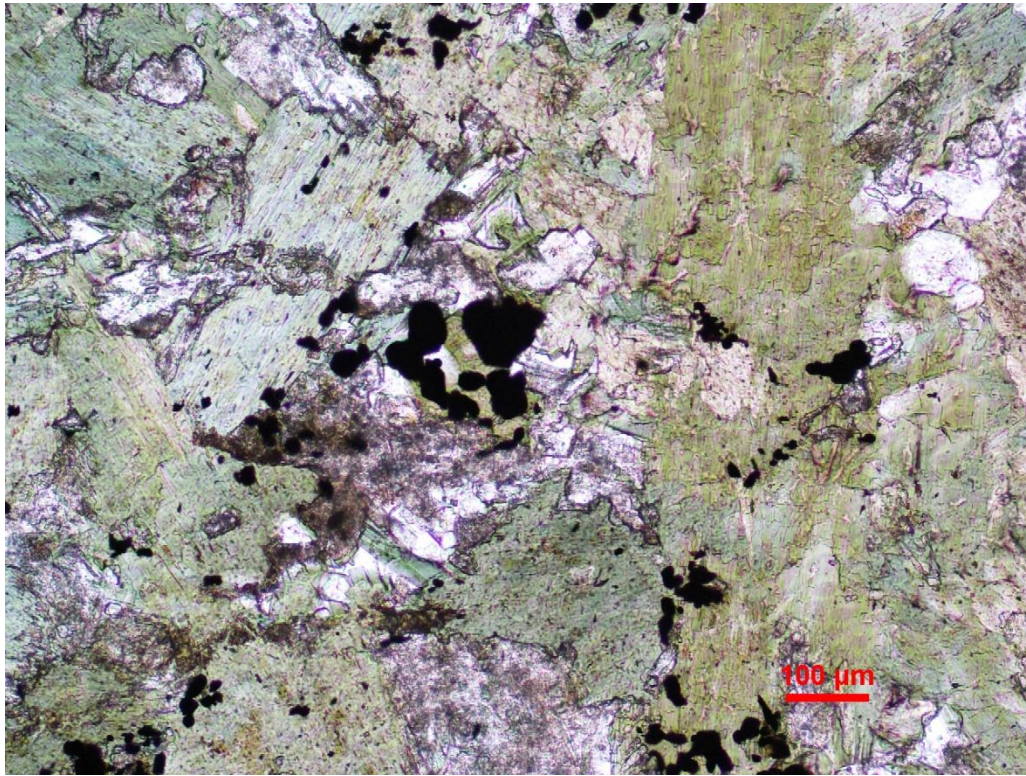
Sample 863685. Augite microphenocryst with subgrain mosaic texture. Top- plane light; Bottom-crossed nicols.

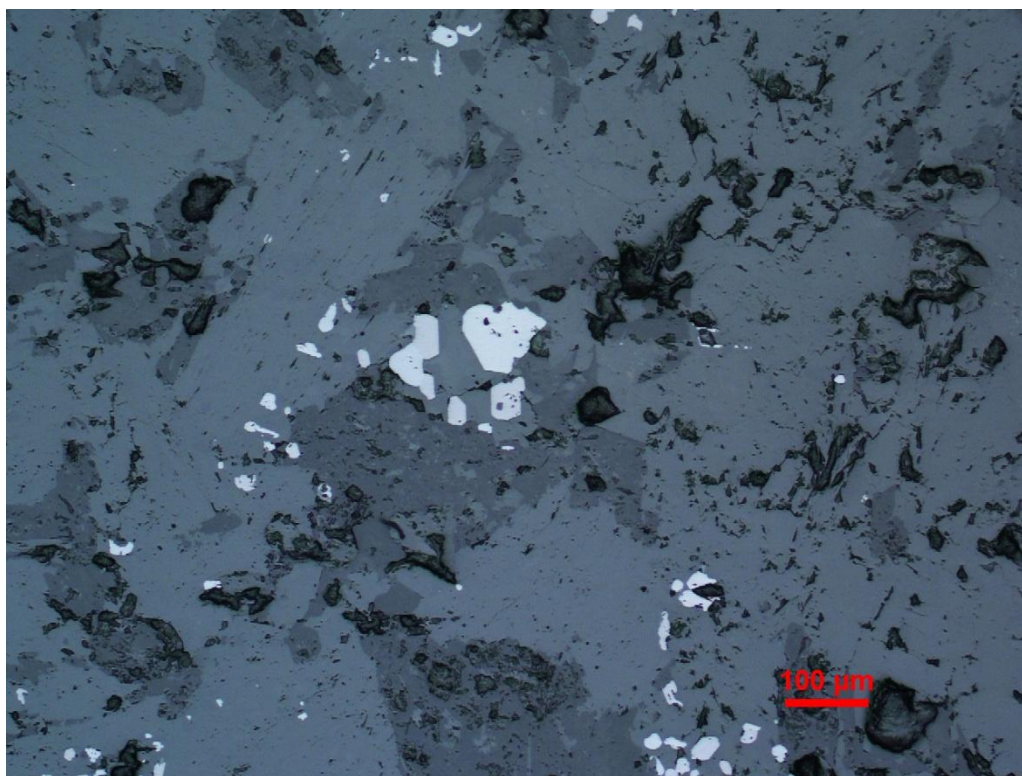


Sample 863685. Minor brownish biotite in diabase matrix. Plane light.

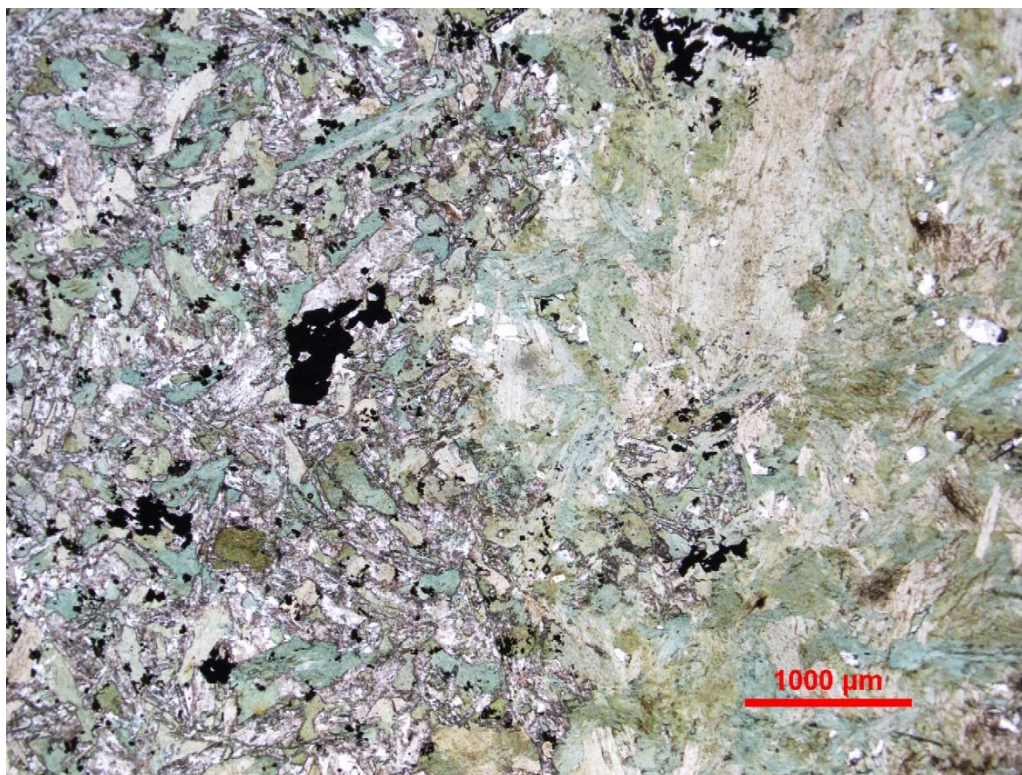


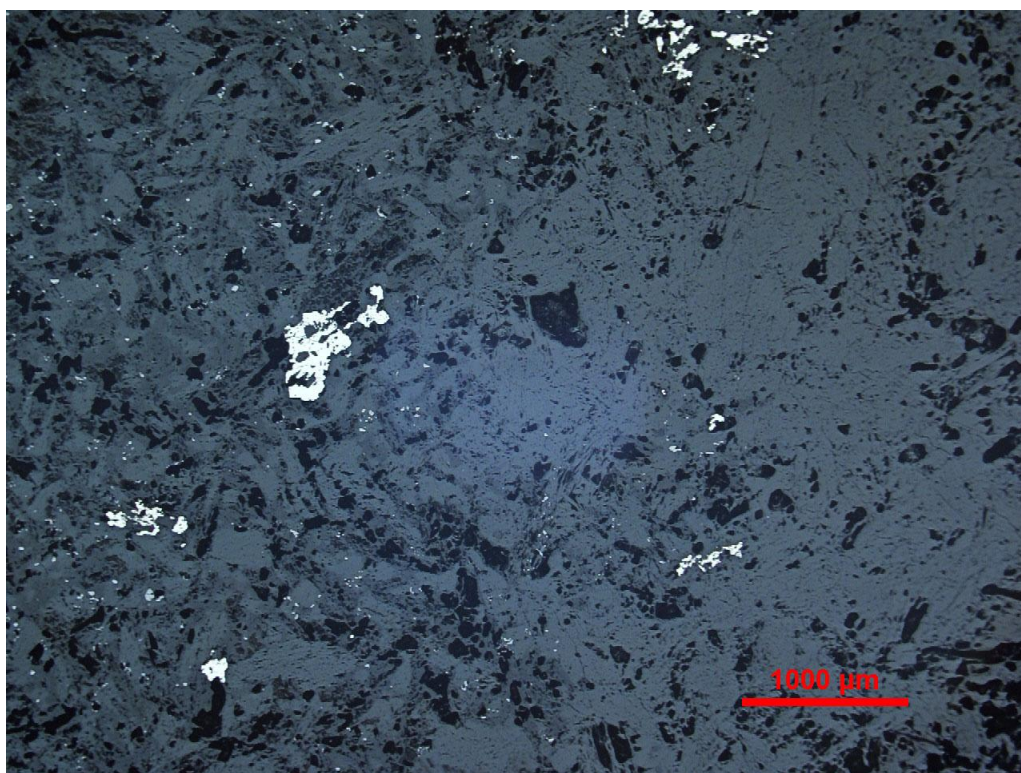
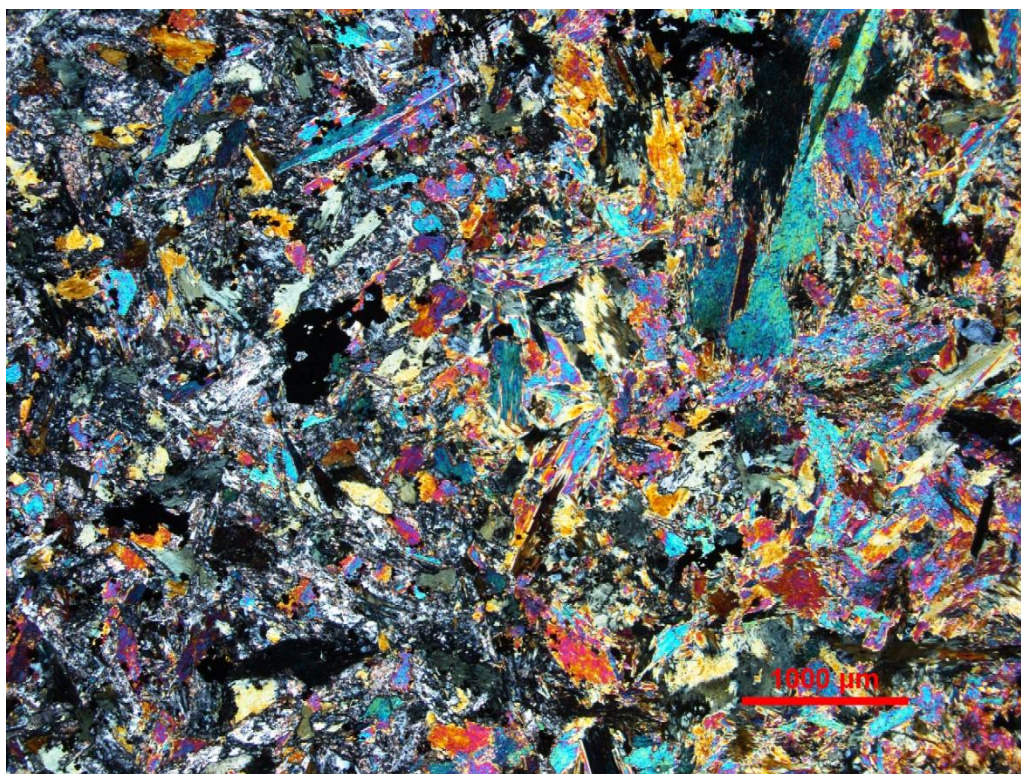
Sample 863685. Strong sericite alteration of plagioclase microphenocryst. Top- plane light; Bottom- crossed polarizer.



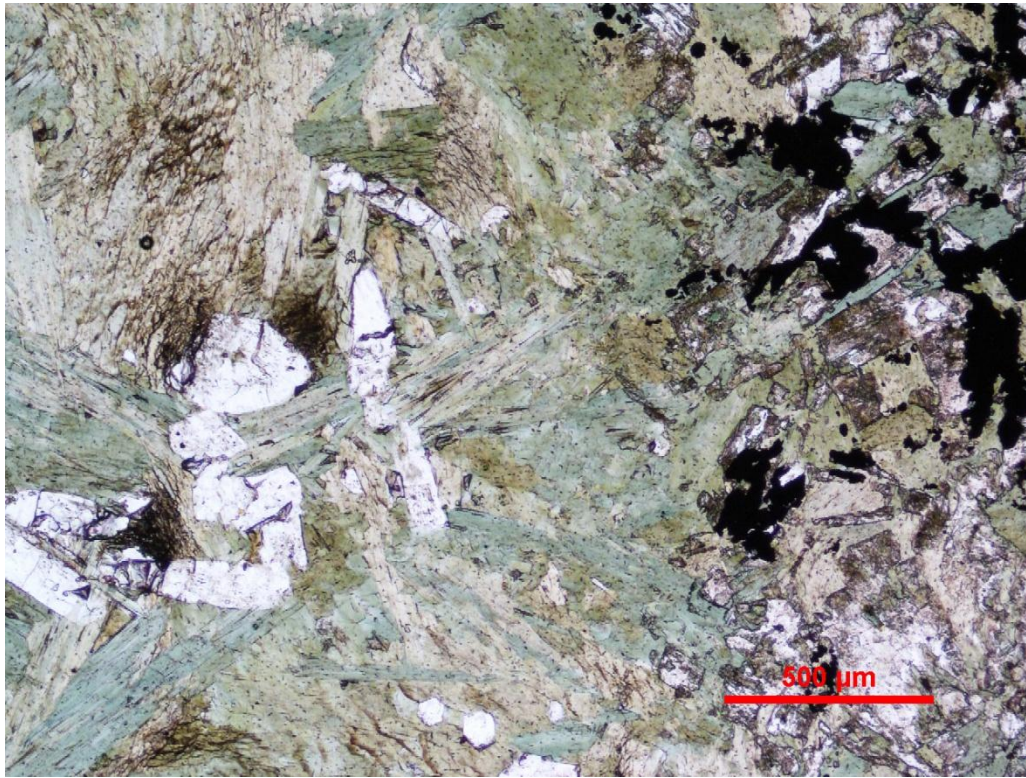


Sample 863685. Disseminated accessory, subhedral ilmenite in diabasic matrix. Top- plane light; Middle- crossed polarizers; Bottom- reflected light.

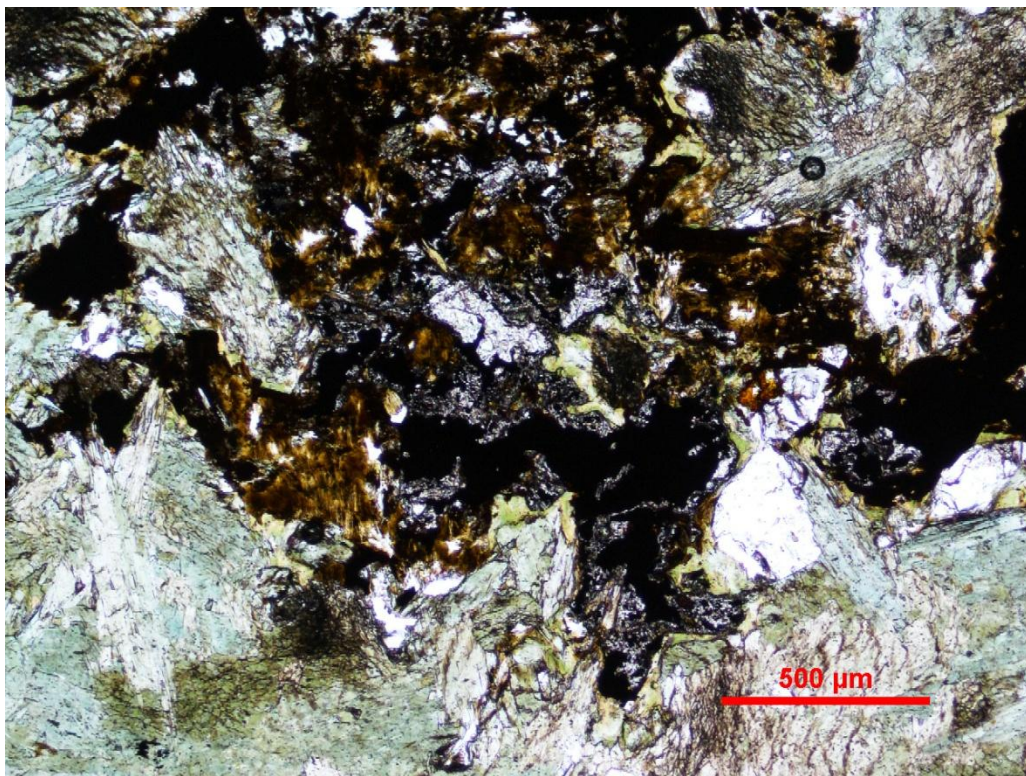


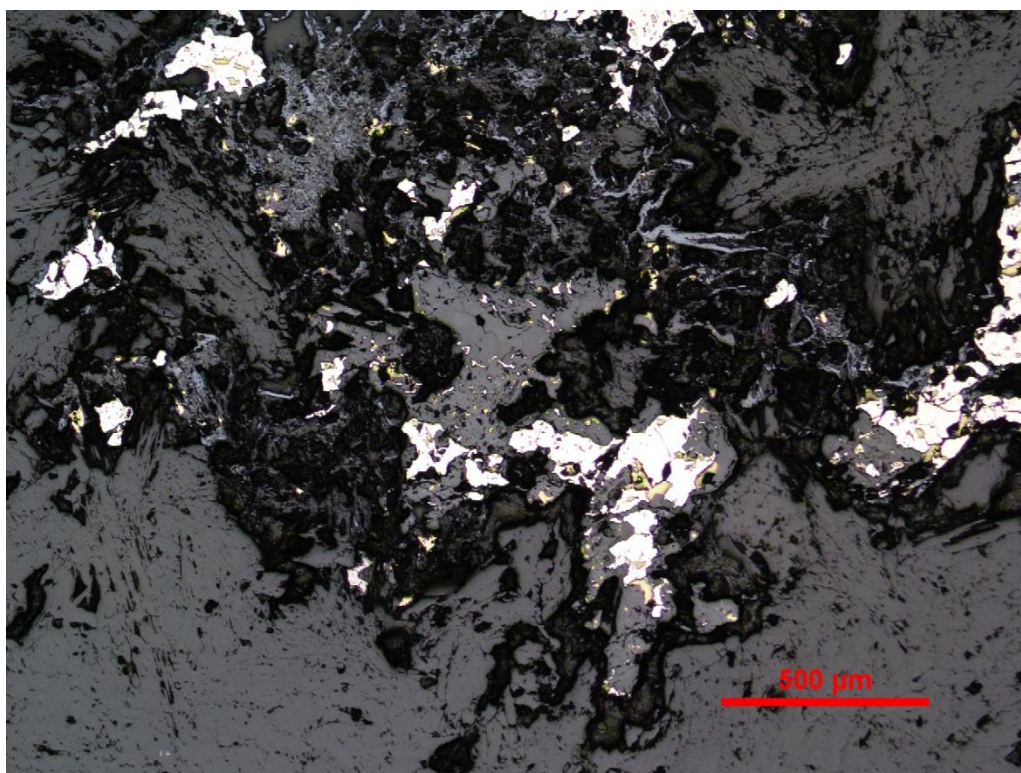
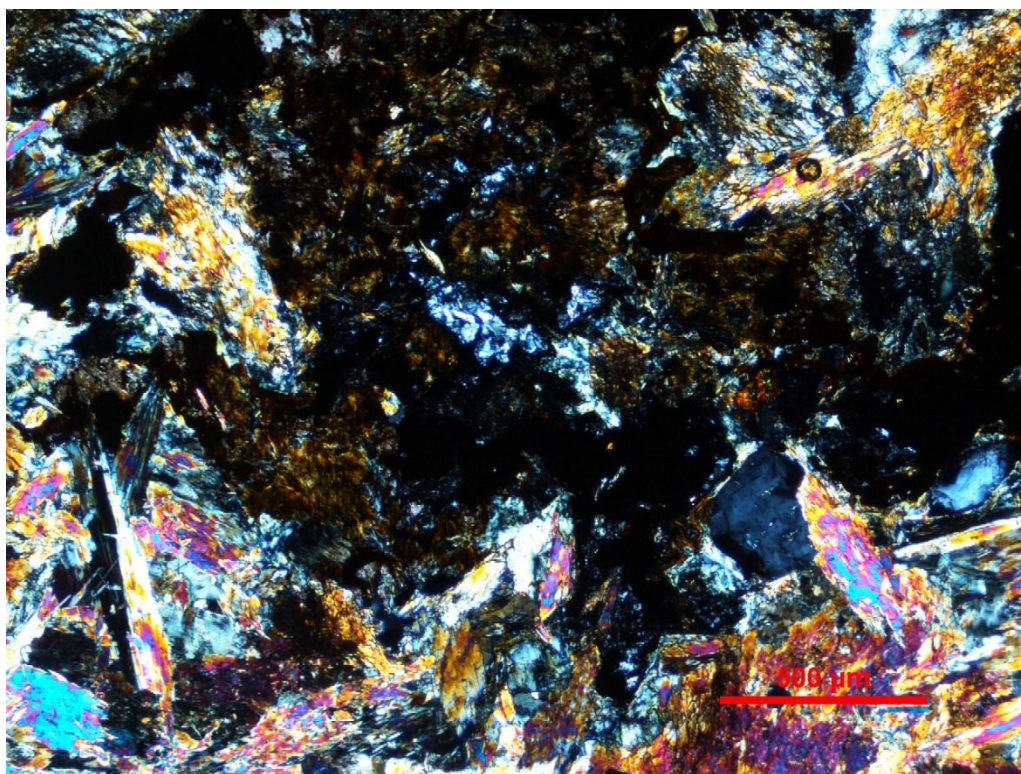


Sample 863685. Metamorphic green-bluegreen actinolite replacing augite diabase. Note disseminated pyrite in diabase and actinolite. Top- plane light; Middle- crossed polarizers; Bottom- reflected light.

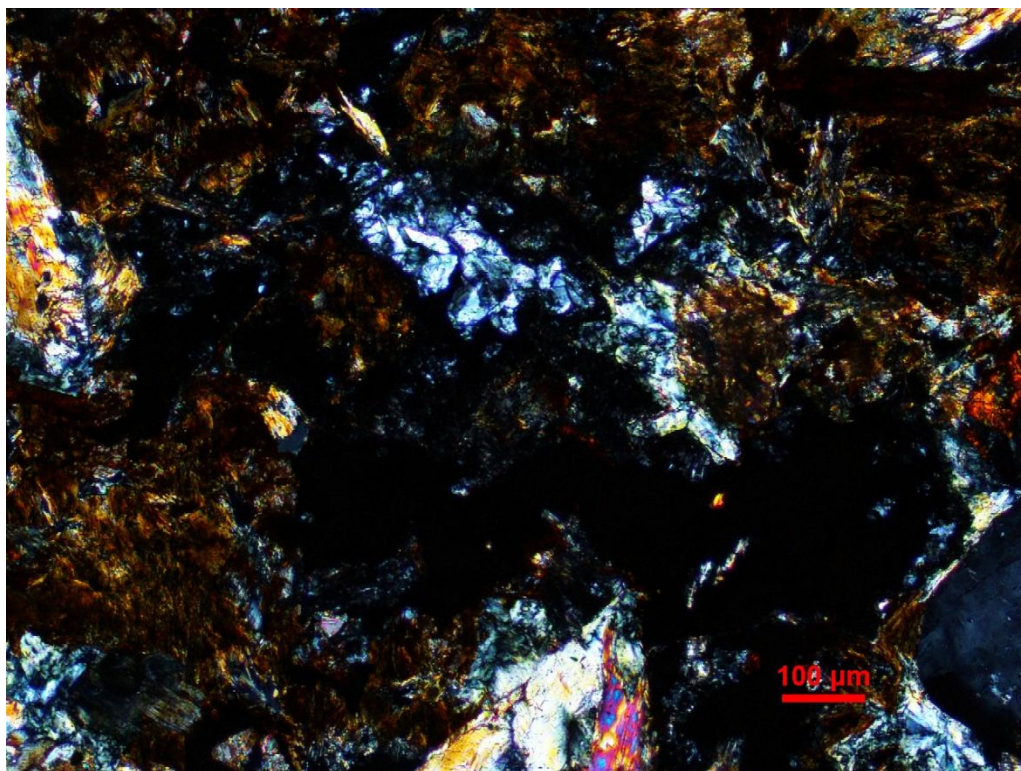
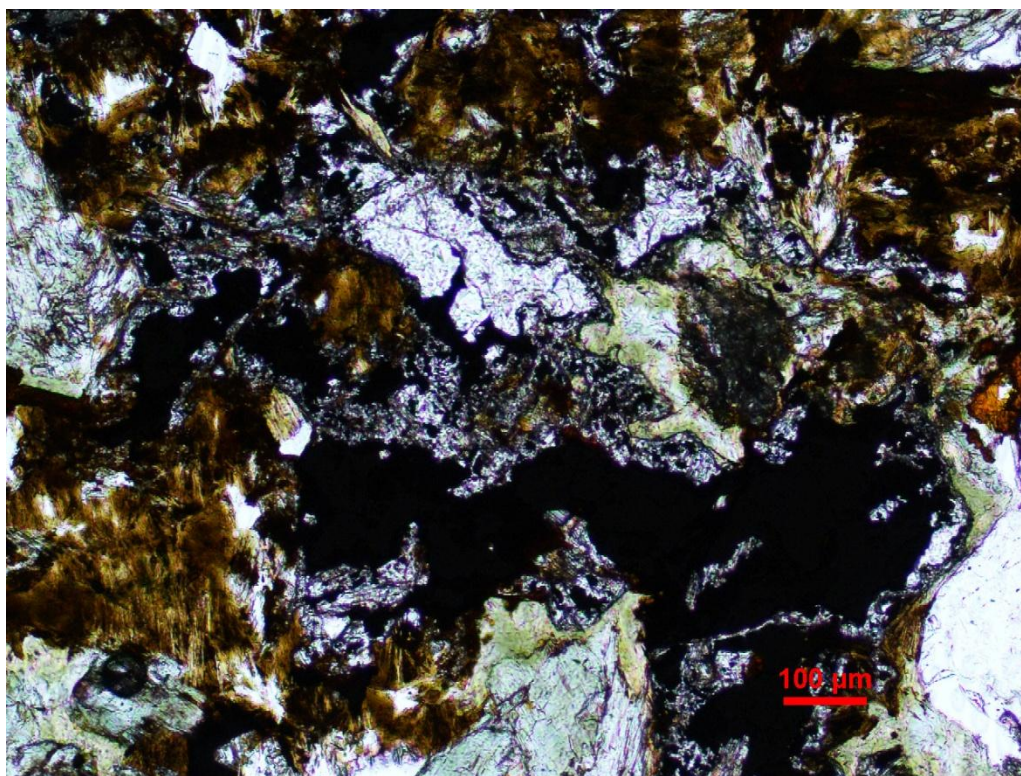


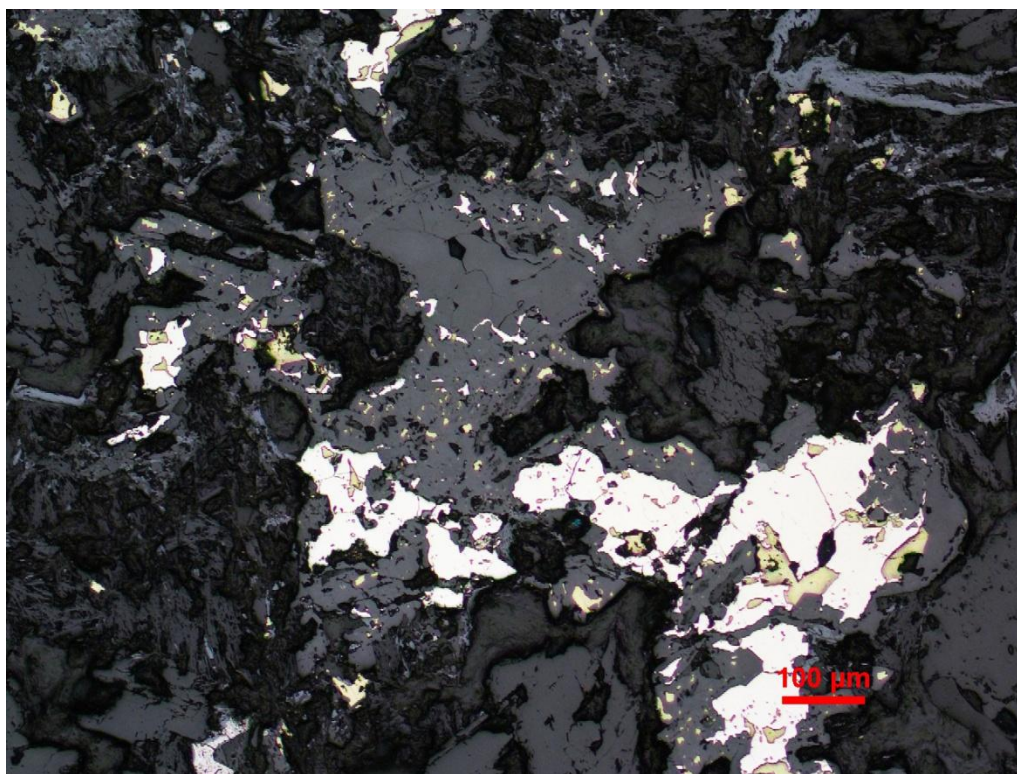
Sample 863685. Concentration of subhedral apatite (white, left) in metamorphic actinolite. Plane light.



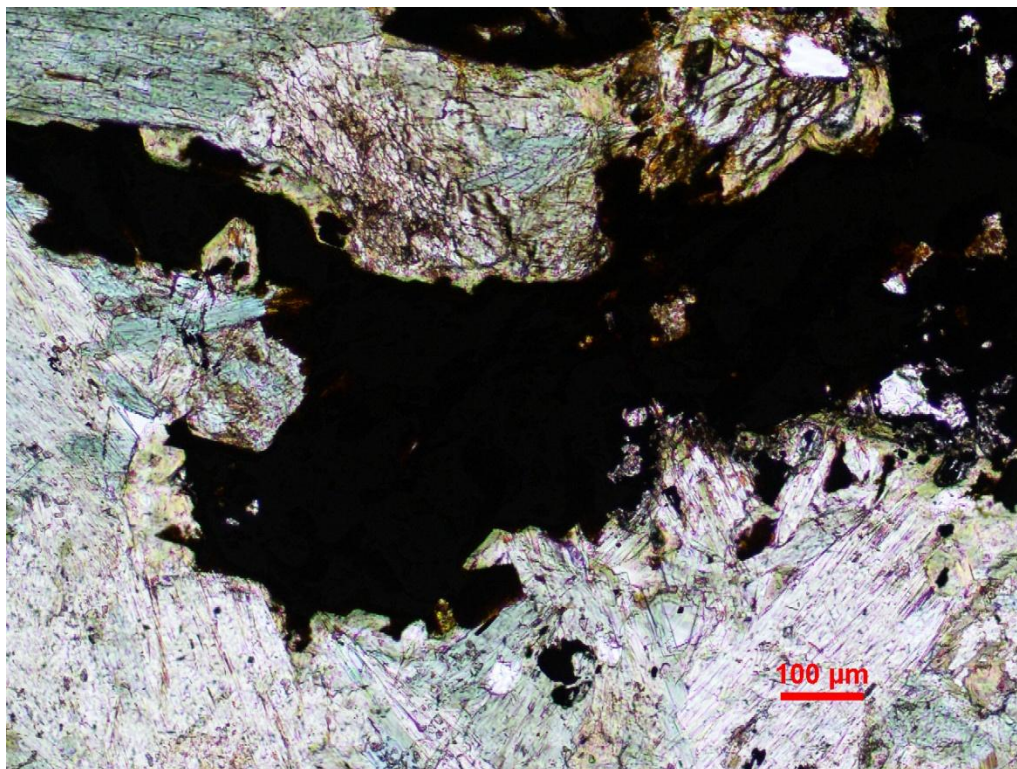


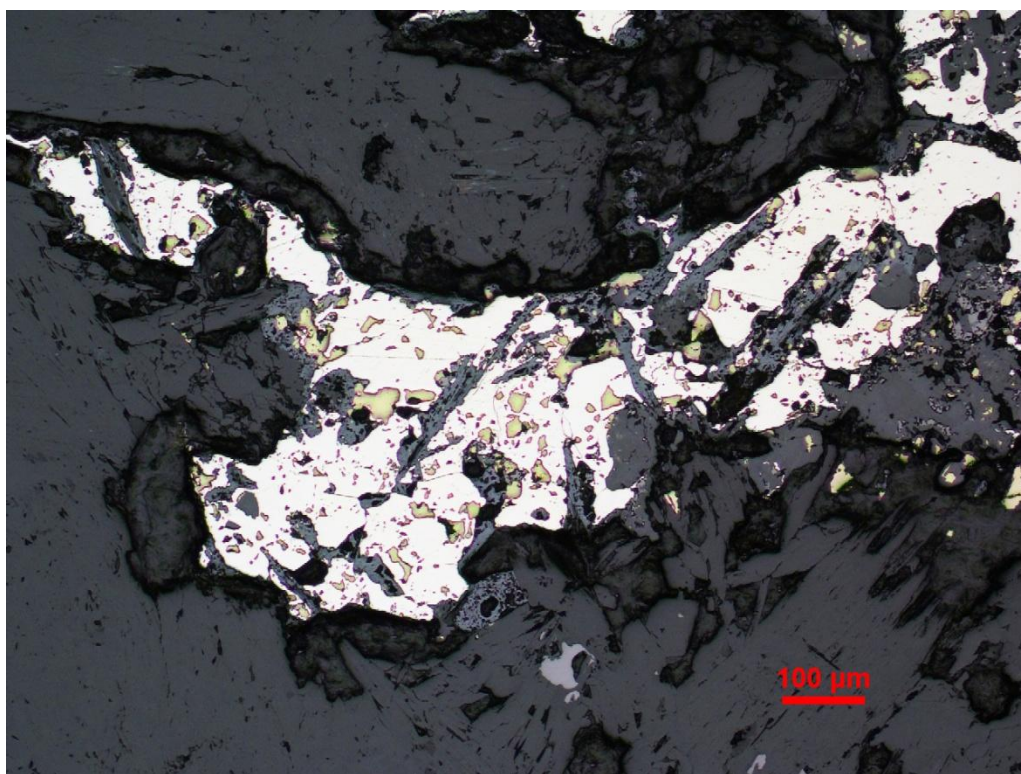
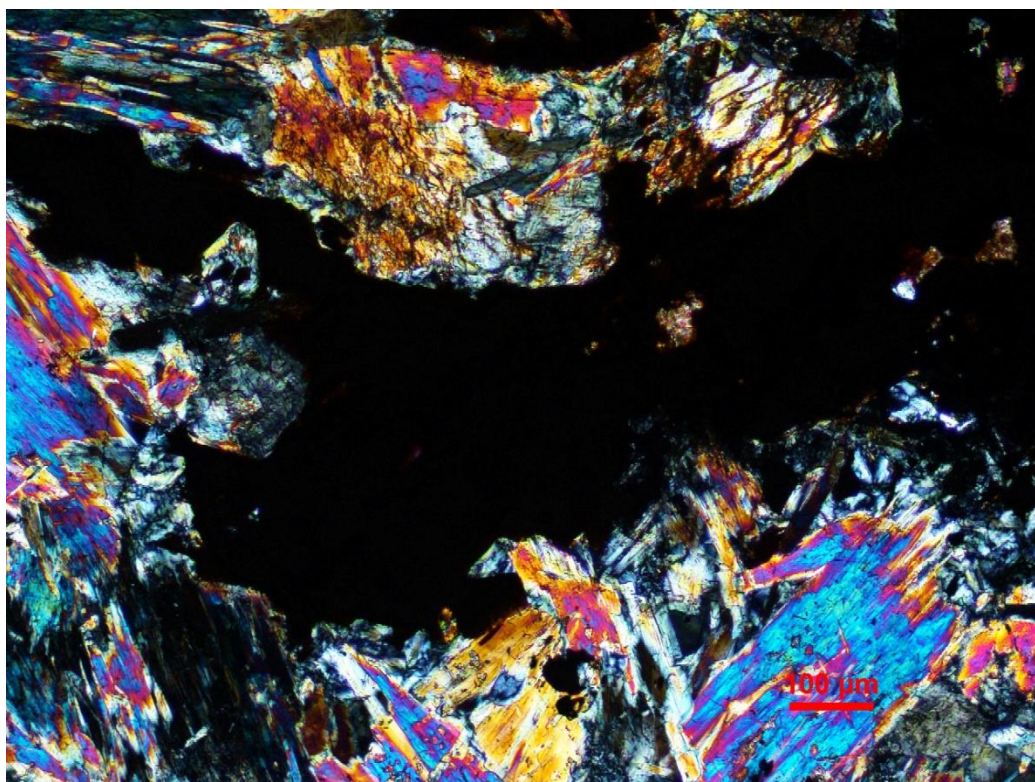
Sample 863685. Disseminated pyrite and chalcopyrite associated with remnant patchy biotite in actinolite. Top- plane light; Middle- crossed polarizers; Bottom- reflected light.



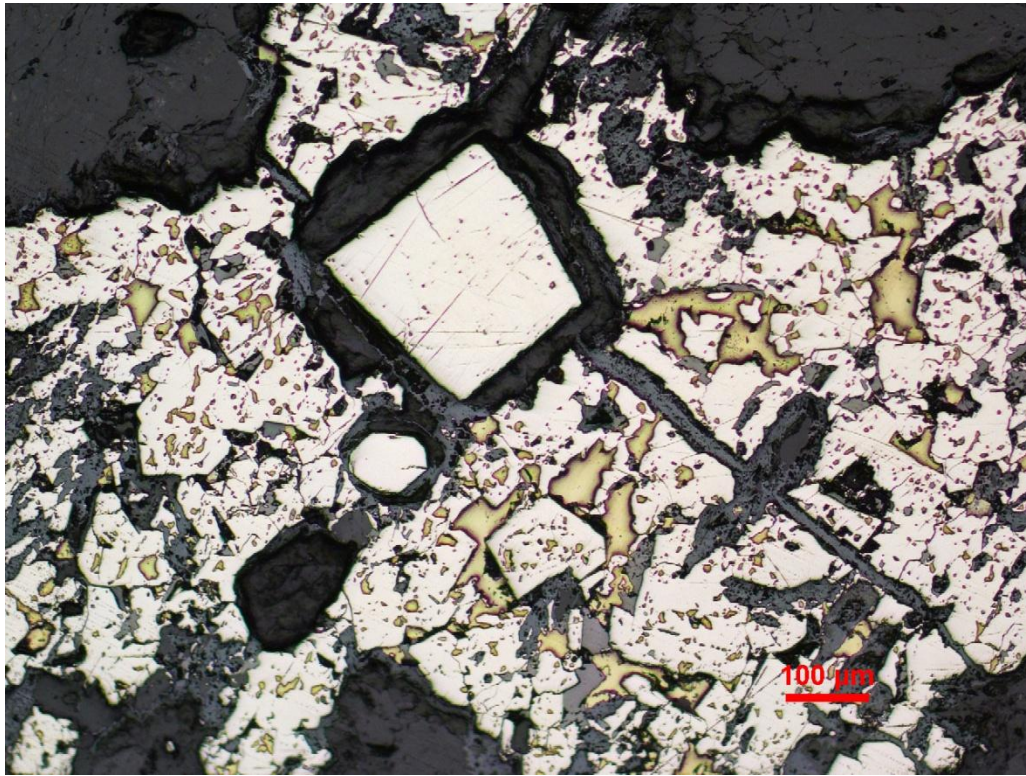


Sample 863685. Close up from above showing sulfides associated with epidote and chlorite. Top- plane light; Bottom- reflected light.

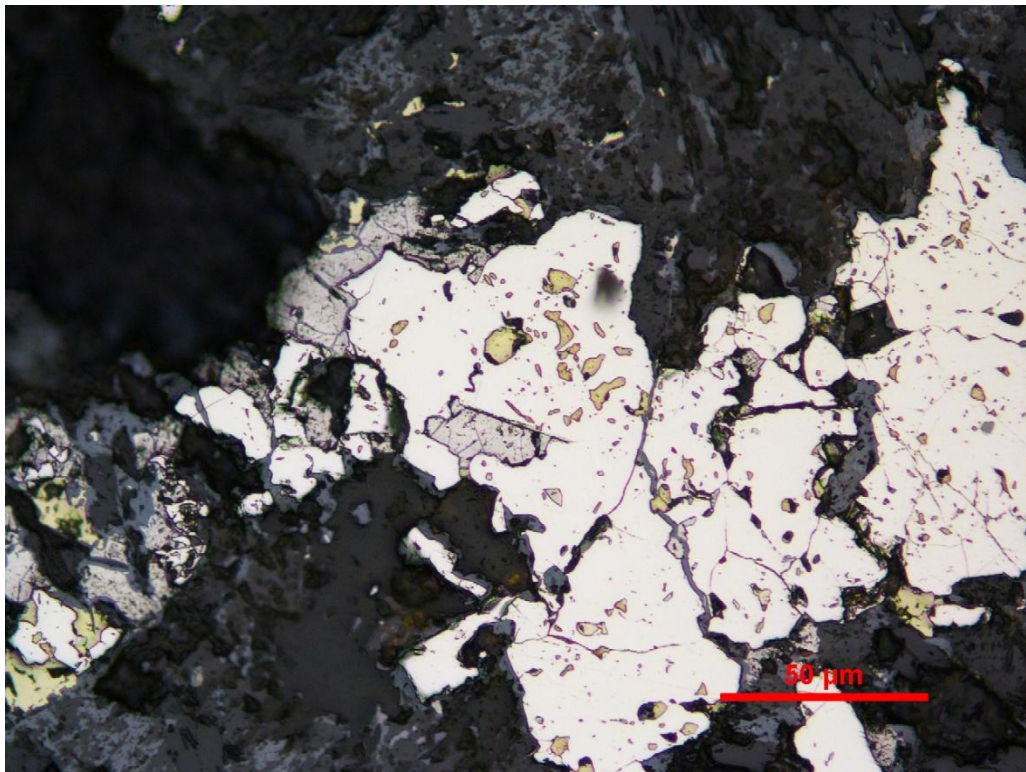




Sample 863685. Disseminated pyrite and chalcopyrite intergrown with metamorphic actinolite and partly rimmed by chlorite after biotite.



Sample 863685. Close up showing fine chalcopyrite intergrown(?) with pyrite. Reflected light.



Sample 863685. Pyrrhotite (pinkish gray) associated with pyrite and chalcopyrite. Reflected light.