

PETROGRAPHIC REPORT

CLIENT: Trevor Burr, AngloGoldAshanti
PROJECT/PROPERTY: CR STUDY
SAMPLE NUMBER: CR-0020

BY: James R. Shannon, Ph.D.
SAMPLE TYPE: Polished Thin Section
DATE: 28-June 2017

HAND SAMPLE DESCRIPTION: Large core sample from 48.5 m. Medium-dark gray, very fine to medium grained gneissic, mylonitic(?), phyllitic schist with three 0.2 to 1.5 cm thick quartz-plagioclase segregation bands. The sample is nonmagnetic with a pencil magnet and does not react to dilute HCl.

POLISHED-SECTION DESCRIPTION:

MINERAL	EST %	COMMENTS
RELICT		Relict igneous rock with feldspar-quartz intergrowth (about 88 percent feldspar and 12 percent quartz); Grains are mostly recrystallized to mosaics but still retain original outlines
Feldspar		Relict subhedral-anhedral grains up to 0.15 mm; remnant albite twinning; Mostly recrystallized to ultra fine mosaics
Quartz		Relict anhedral grains up to 0.1 mm; Recrystallized to mosaics
METAMORPHIC	[55]	
Feldspar	45	Mostly ultrafine, recrystallized feldspar mosaics
Biotite	2	Very fine (0.05 mm) biotite mostly concentrated along relict grain boundaries; Has a weak-moderate foliation that is normal to segregation bands; Locally replaced by chlorite
Quartz	7	Fine recrystallized mosaics
Muscovite	Tr	Trace anhedral grains up to 0.05 in quartz-plagioclase-biotite segregations
Epidote	0.1	Minor disseminated, anhedral grains up to 0.07 mm
Amphibole	Tr	Trace anhedral-subhedral grains up to 0.1 mm
SEGREGATIONS	[45]	Metamorphic segregations
Quartz	33	Anhedral grains up to 1.5 mm
Plagioclase	8	Anhedral grains up to 0.5 mm
Biotite-Chlorite	4	Anhedral grains up to 0.2 mm in and along edges of segregation bands
ACCESSORY	[0.3]	
Ilmenite	0.3	Anhedral-subhedral, locally sieve textured, disseminated grains
Apatite	Tr	Subhedral-anhedral grains up to 0.08 mm
Zircon	Tr	Subhedral grains up to 0.08 mm
ALTERATION	[4]	
Chlorite	2	Pale greenish chlorite locally replaces fine foliated biotite and coarser biotite in quartz-plagioclase-biotite segregations
Sericite	2	
Carbonate	Tr	Trace anhedral carbonate in quartz-feldspar-biotite segregation bands
Hematite	Tr	Tr hematite replace pyrite

SULFIDES	[Tr]	Minor disseminated pyrite and chalcopyrite mostly associated with chlorite, sericite and epidote
Pyrite	Tr	Subhedral-anhedral grains up to 0.1 mm
Chalcopyrite	Tr	Subhedral-anhedral grains up to 0.01 mm

TEXTURES

The sample displays unusual and confusing textures. Most of the sample consists of a relict feldspar-quartz intergrowth with about 1 mm grain size. There are suggestions that feldspars occur as subhedral grains, possibly phenocrysts. Most of the feldspar is recrystallized to ultrafine mosaics of xenomorphic feldspar. Feldspar grains that are not recrystallized locally display albite twinning. Quartz grains are recrystallized to a coarser mosaic than the feldspar. The feldspar and quartz recrystallization resulted in significant grain-size reduction. Grain-size reduction is usually associated with plastic deformation. Quartz is usually much more susceptible to plastic recrystallization than feldspar. The grain size reduction in this sample does not appear to be produced by deformation because the recrystallized feldspar and quartz do not have penetrative deformation fabrics. The origin of these textures is not clear.

About 45 percent of the thinsection consists of irregular bands of coarser grained quartz-plagioclase-biotite. They are similar to bands in other samples from the suite, that are interpreted to be gneissic segregation bands.

The relict feldspar-quartz intergrowth appears to have a metamorphic overprint that produced weakly foliated, fine grained biotite concentrated along relict grain boundaries. The biotite foliation is normal to the segregation bands. The weak biotite foliation is also parallel to a weak alignment of relict elongated grains. The weak biotite foliation cuts across the segregation bands indicating that it is overprinting them.

The sample has weak hydrothermal(?) alteration including weak-moderate chloritization of biotite and weak sericitization of plagioclase. Trace disseminated pyrite and chalcopyrite are associated with chlorite, sericite and epidote. There are three thin (0.1 mm) veinlets of zeolite(?) that cut across foliations and segregation bands.

METAMORPHISM

The biotite-plagioclase-quartz assemblage indicates a low-medium grade of metamorphism equivalent to upper greenschist or lower amphibolite facies. The metamorphism produced a weak-moderate foliation that is perpendicular to quartz-feldspar segregations. These relations suggest that gneissic banding was produced during an earlier metamorphic event which has been overprinted by a lower grade biotite event. Perhaps traces of amphibole are residual from the earlier, higher grade (amphibolite) metamorphism.

ROCK NAME: Biotite Gneissic 'Schist'

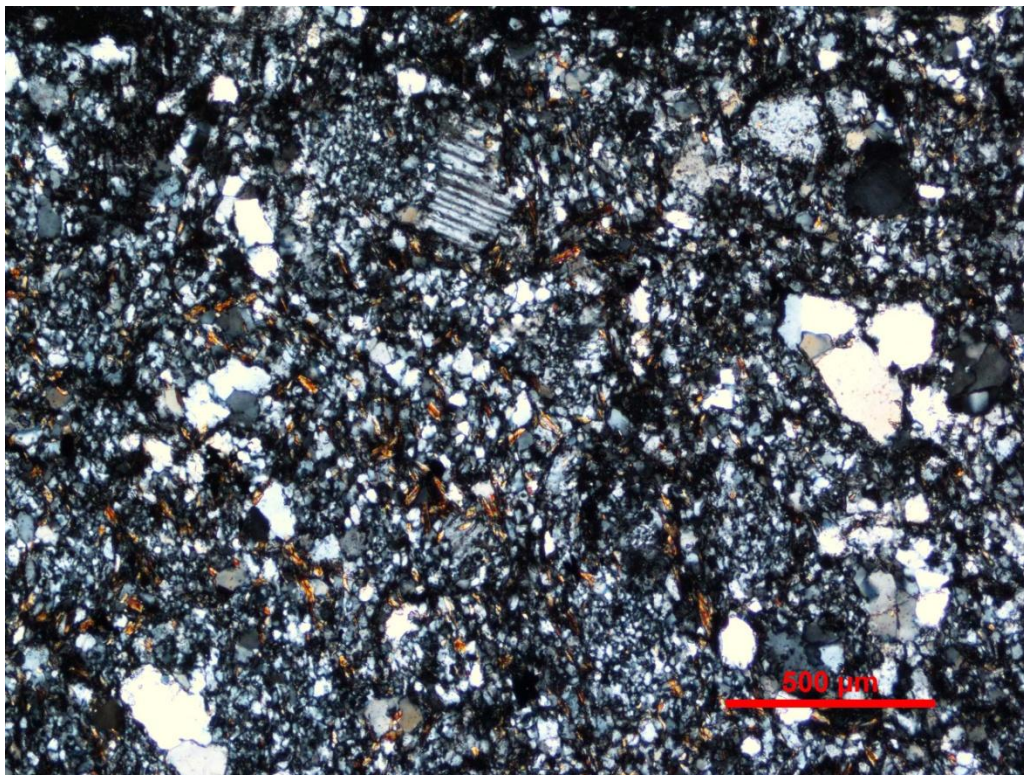
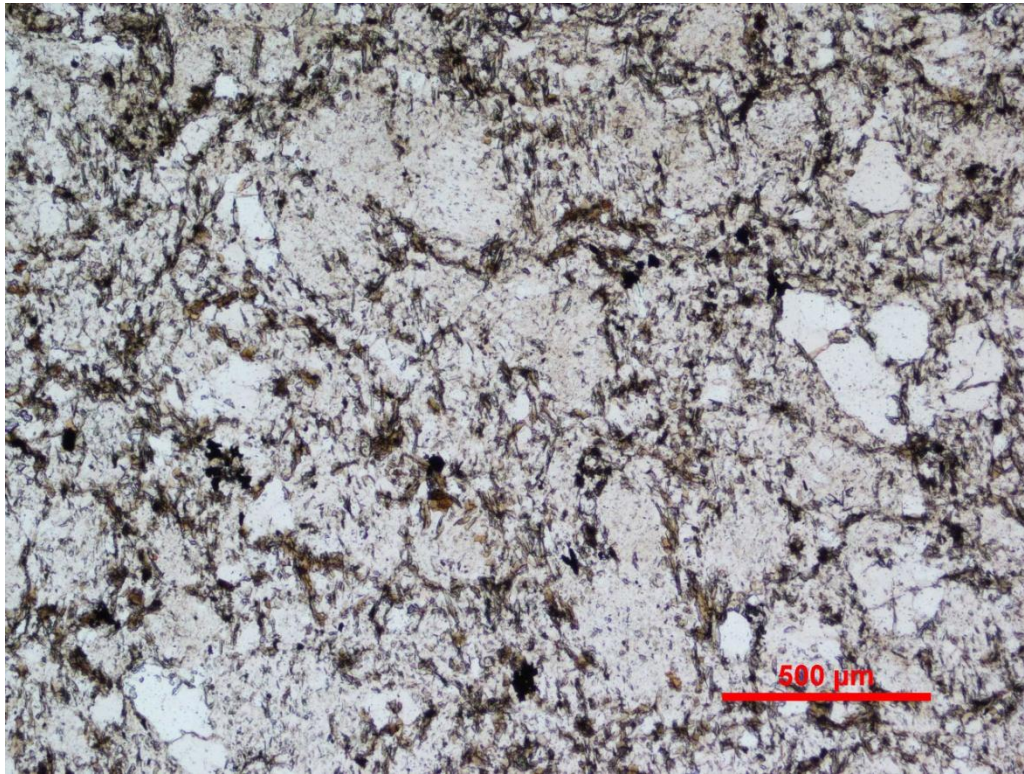
PROTOLITH: Intermediate-Felsic Composition Igneous Rock With Feldspar and Quartz (Some suggestions this was a very crowded porphyritic rock?)



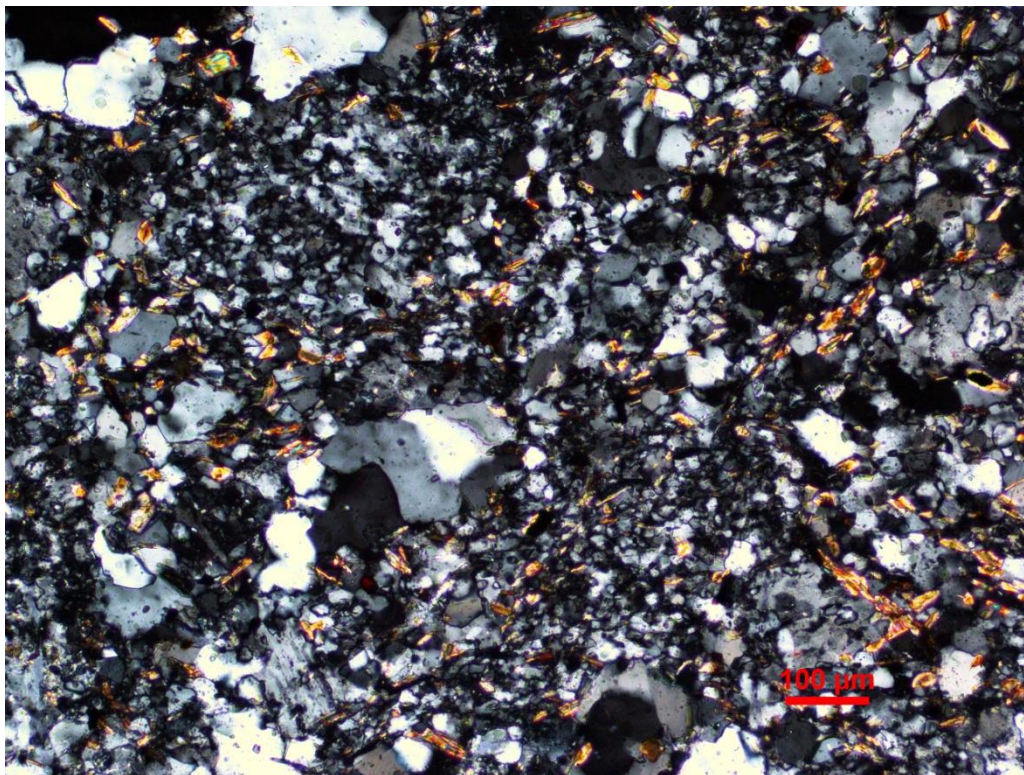
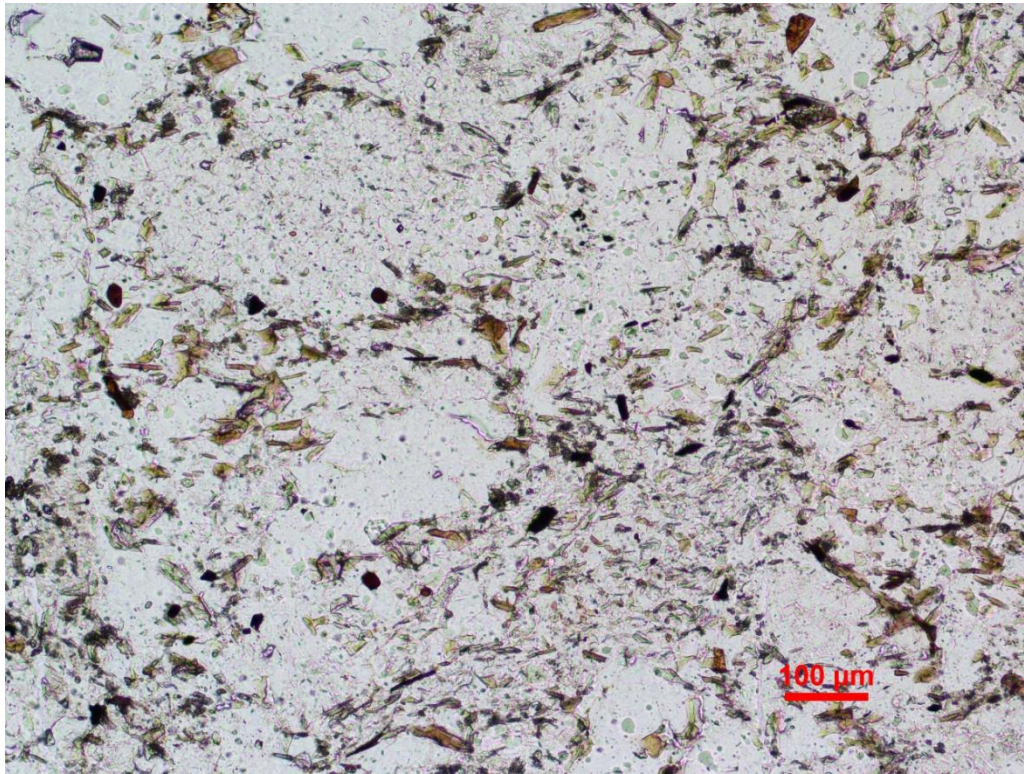
Sample CR-0020. Wide-field, full-thinsection view showing very fine to fine grained rock with irregular quartz-plagioclase-biotite segregation(?) bands. Top- plane light; Bottom- crossed polarizers.3.7 cm across.



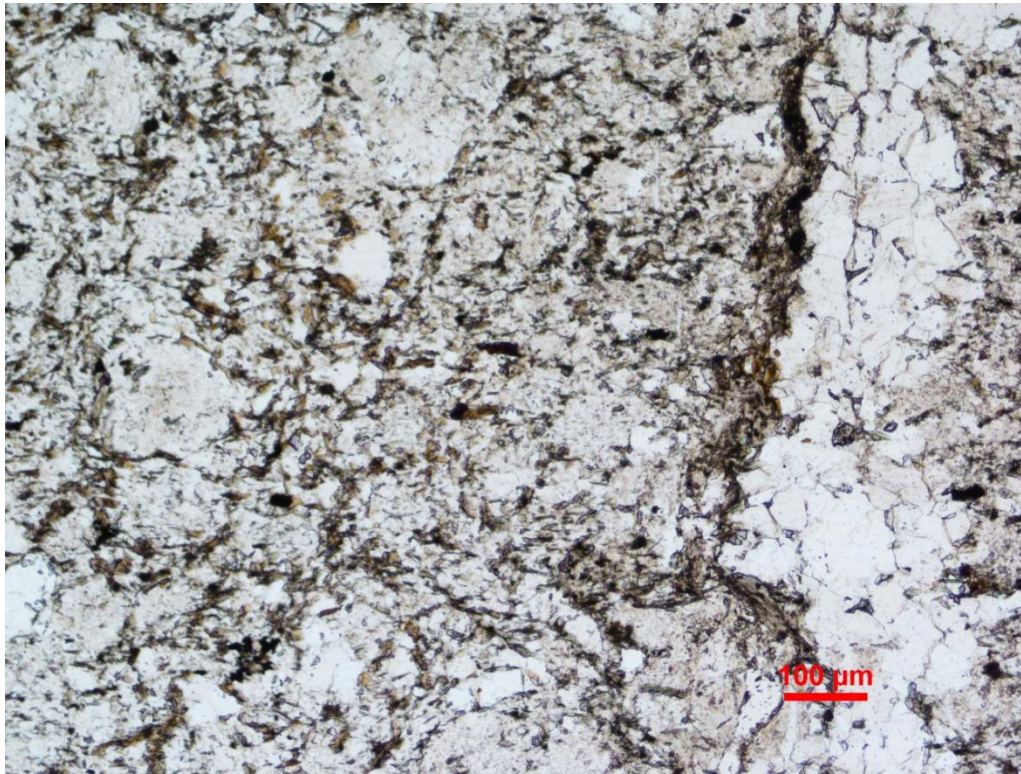
Sample CR-0020. Strongly recrystallized feldspar and quartz with relict igneous texture. Top-plane light; Bottom- crossed polarizers.



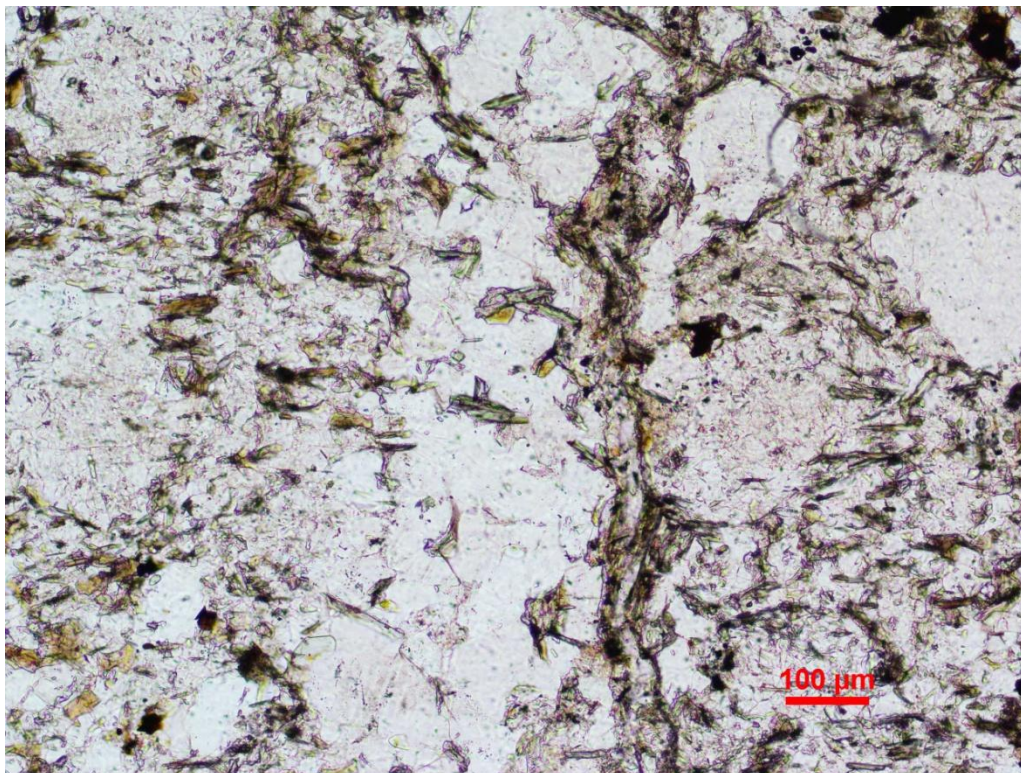
Sample CR-0020. Relict albite twinning in plagioclase grain (top center). Note most feldspar grains replaced by ultrafine mosaics and quartz grains with coarser recrystallization. Top- plane light; Bottom- crossed polarizers

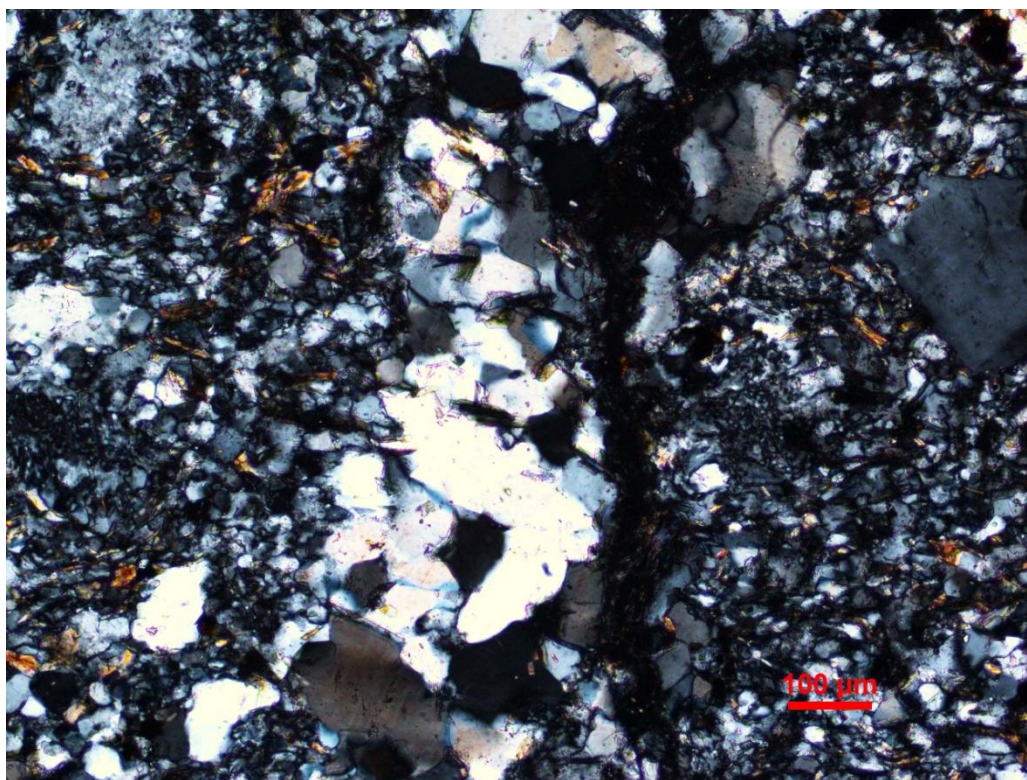


Sample CR-0020. Most biotite forms along relict grain boundaries and is foliated parallel to relict grain elongation. Top- plane light; Bottom- crossed polarizers.

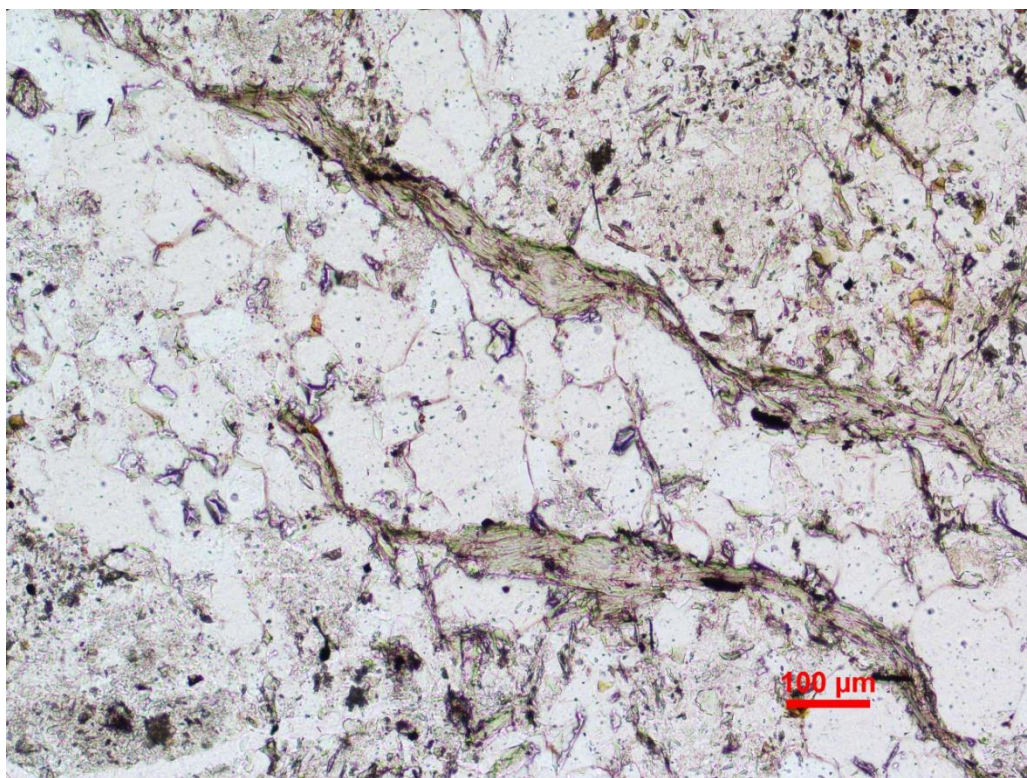


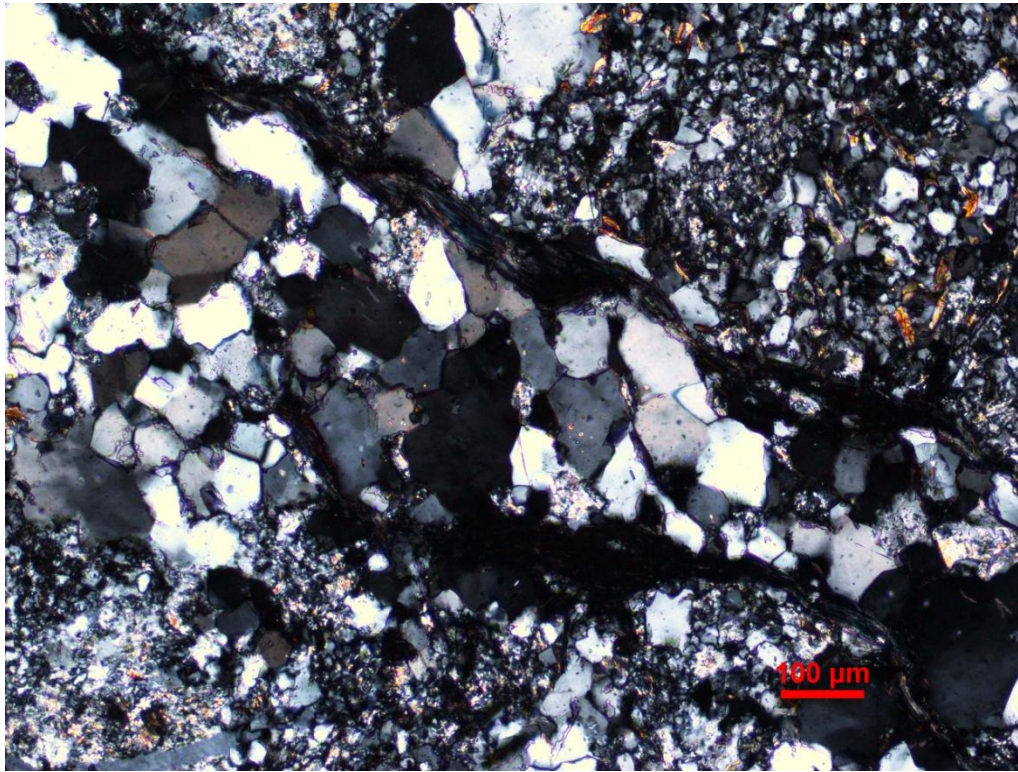
Sample CR-0020. Fine biotite foliation is perpendicular to the quartz-plagioclase-biotite segregation bands. Plane light.



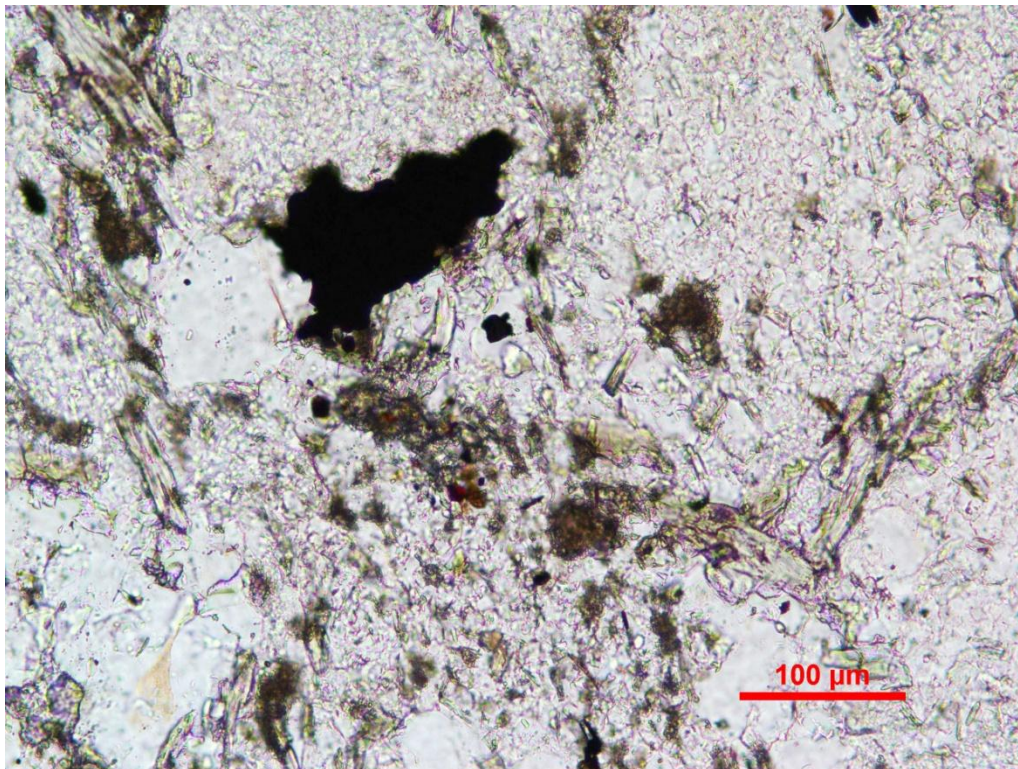


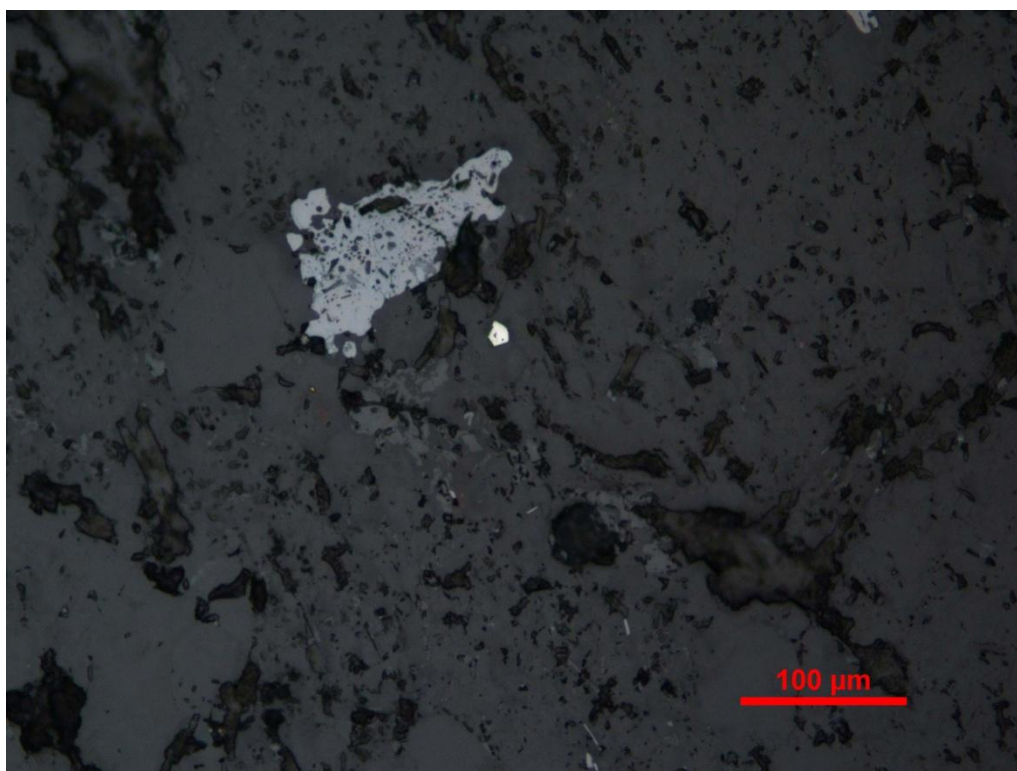
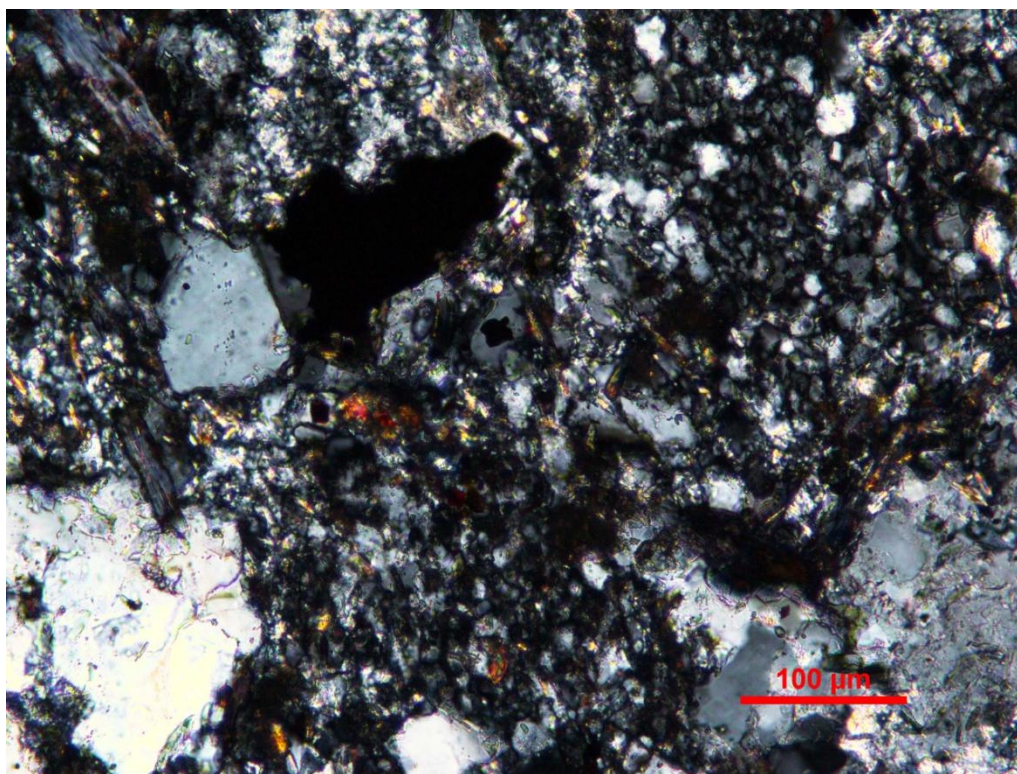
Sample CR-0020. Chlorite replaces foliated biotite that crossed quartz-plagioclase-biotite segregation band. Top- plane light; Bottom- crossed polarizers.



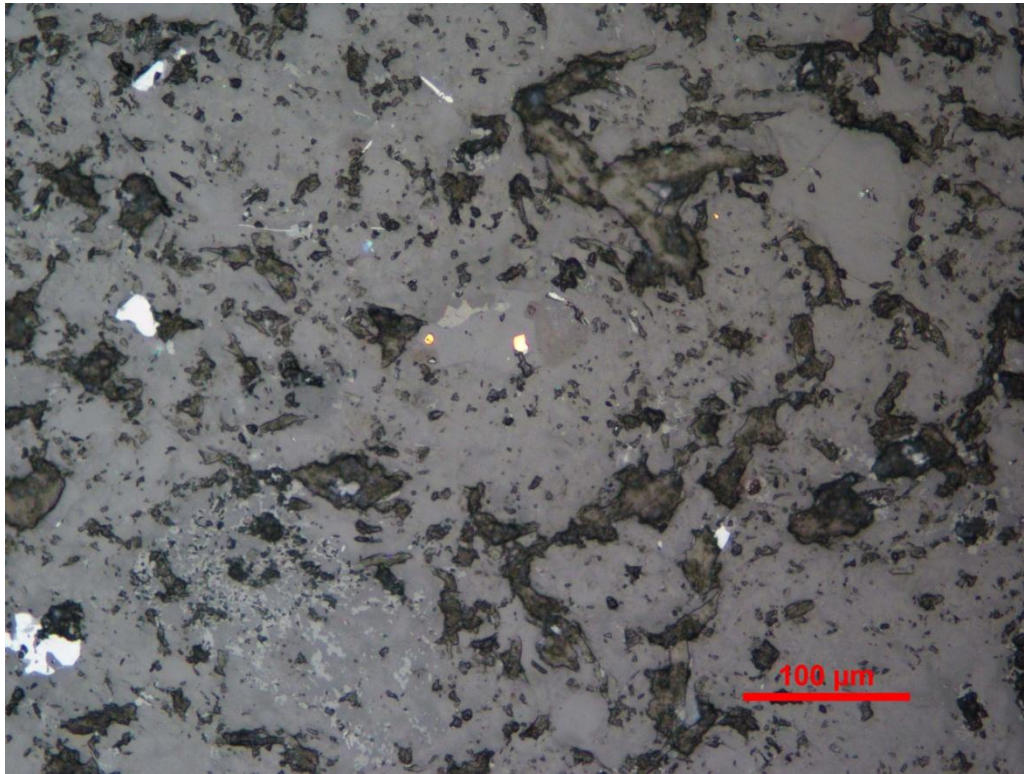


Sample CR-0020. Chlorite also replaces biotite concentrations along margins of quartz-plagioclase-biotite segregations. Top- plane light; Bottom- crossed polarizers.

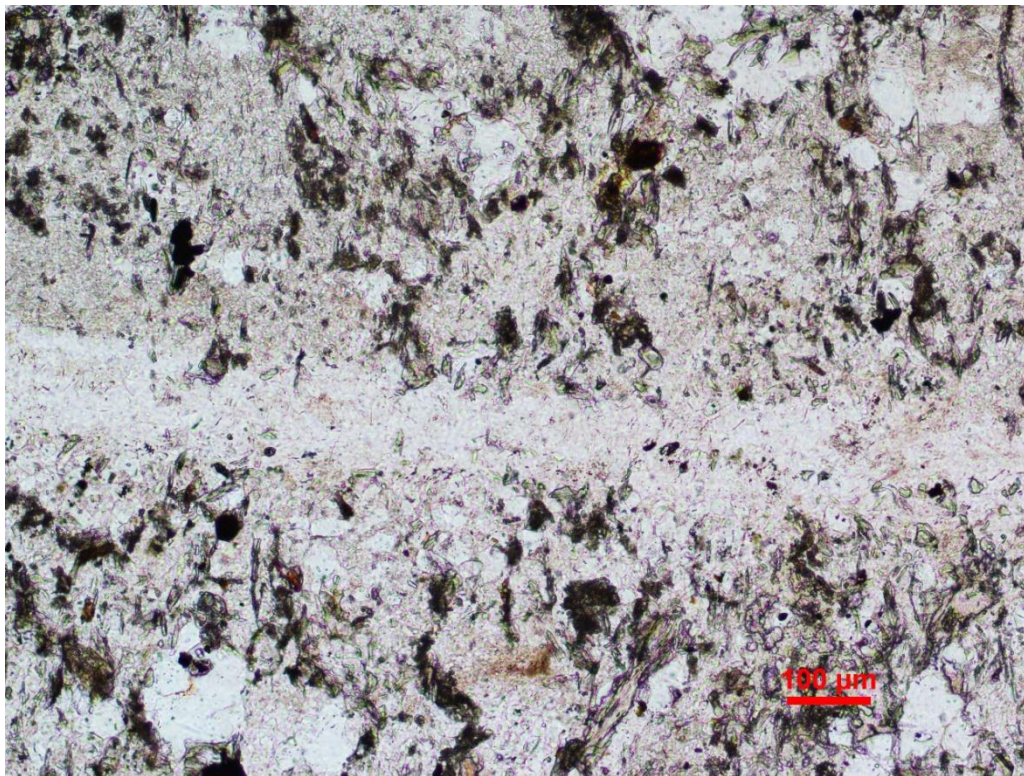


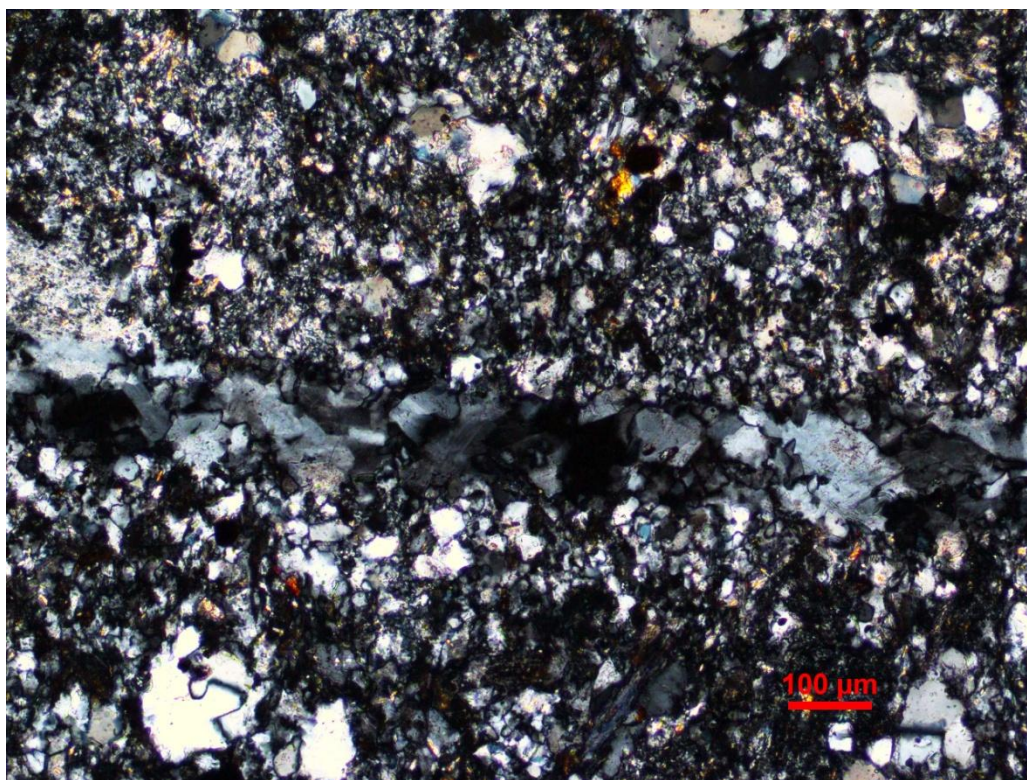


Sample CR-0020. Disseminated pyrite associated with sericitized plagioclase and disseminated epidote. Top- plane light; Middle- crossed polarizers; Bottom- reflected light.



Sample CR-0020. Fine disseminated chalcopyrite in quartz near sericite and chlorite. Reflected light.





Sample CR-0020. Zeolite veinlet cutting relict feldspar-quartz. Note minor disseminated epidote (birefringent). Top- plane light; Bottom- crossed polarizers.