

PETROGRAPHIC REPORT

CLIENT: Trevor Burr, AngloGoldAshanti
PROJECT/PROPERTY: CR STUDY
SAMPLE NUMBER: CR-0005

BY: James R. Shannon, Ph.D.
SAMPLE TYPE: Polished Thin Section
DATE: 21-June 2017

HAND SAMPLE DESCRIPTION: Core from 53.30 m shows dark green-black, very fine to fine grained hornblende-augite meta-gabbro. No preferred fabrics/foliations. The sample is weak to moderate magnetic with a pencil magnet. Lack of effervescence with dilute HCl indicates little/no carbonate.

POLISHED-SECTION DESCRIPTION:

| MINERAL | EST % | COMMENTS |
|--------------------|--------------|--|
| PRIMARY | (95) | |
| Plagioclase | 44 | Subhedral, elongated grains up to 1 mm; albite twinning and normal zoning; Local moderate alteration-replacement by sericitic saussurite |
| Hornblende | 20 | Remnants (up to 1.75 mm) of brown-green magmatic hornblende extensively replaced by metamorphic, actinolitic amphibole |
| Clinopyroxene | 20 | Remnant grains up to 0.8 mm common sub-grain mosaic textures; Locally replaced by bluegreen actinolitic amphibole |
| Orthopyroxene | 10 | Relict subhedral grains up to 1 mm; Replaced by urallite |
| Biotite | 0.5 | Minor, anhedral, interstitial grains up to 0.2 mm |
| Quartz | 0.4 | Minor, anhedral, interstitial grains up to 0.4 mm |
| ACCESSORY | (4.2) | |
| Magnetite-Ilmenite | 4 | Fairly abundant disseminated, anhedral magnetite grains up to 1 mm with abundant exsolved ilmenite; Magnetite locally replaced by titanomagnetite(?) |
| Apatite | 0.2 | Disseminated subhedral grains |
| Radioactive Phase | Tr | Tiny, elongated inclusions up to 0.015 mm in hornblende |
| METAMORPHIC | (30) | |
| Actinolite | 30 | Green to blue green metamorphic, actinolitic(?) amphibole extensively replaces magmatic hornblende and clinopyroxene; locally with fine polysynthetic twinning |
| ALTERATION | (28) | |
| Saussurite | 18 | Very fine grained patchy alteration of plagioclase with large component of white mica (sericite) |
| Uralite | 10 | Secondary amphibole mixture replacing orthopyroxene |
| SULFIDES | (0.6) | |
| | | Minor disseminated sulfides with non-magmatic character; Probably remobilized and/or introduced during metamorphic overprinting or alteration |
| Pyrite | 0.5 | Anhedral, highly irregular grains replacing plagioclase |
| Chalcopyrite | 0.05 | Minor anhedral grains associated with actinolite |

TEXTURES

The sample displays a very fine to fine grained, mafic-rich, diabasic texture with elongated plagioclase lath texture. Relict primary mafic phases include clinopyroxene (augite), orthopyroxene, brown-green hornblende and minor biotite. Most hornblende and some clinopyroxene are replaced by metamorphic, actinolitic(?) amphibole with distinct green-bluegreen pleochroism and local fine polysynthetic twinning. Preferred metamorphic fabrics (foliations/lineations) were not developed during the moderate metamorphic overprinting. Plagioclase occurs as subhedral, elongated laths with random orientations. It displays albite twinning and normal, igneous zoning. Minor anhedral, interstitial biotite and quartz may represent a small component of late-magmatic hydrous phases. There is relatively abundant disseminated accessory magnetite-ilmenite, some subhedral apatite and trace fine radioactive phase (possibly baddeleyite?) as inclusions in hornblende.

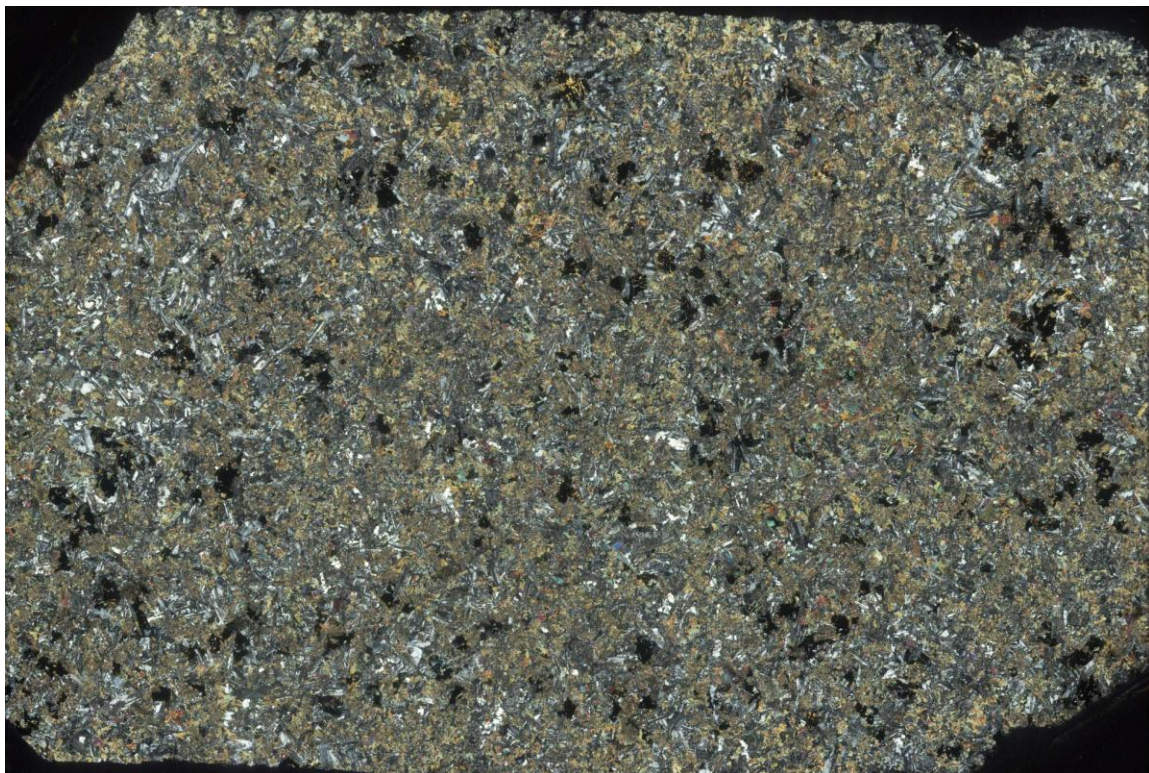
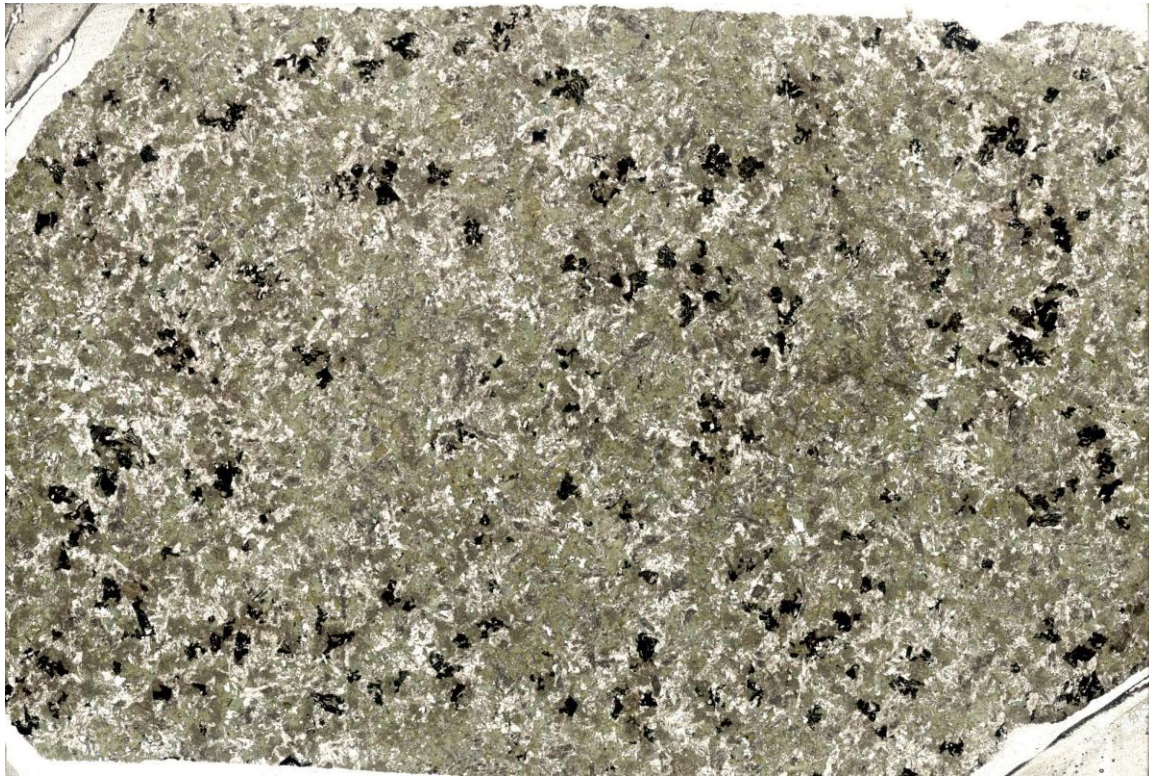
The sample has a moderate alteration overprint consisting of saussuritic alteration of plagioclase. The saussurite has a major component of white mica (sericite) and albite(?). A very fine-grained uraltite-like intergrowth replaces relict orthopyroxene. Minor mineralization includes disseminated pyrite and chalcopyrite. The pyrite clearly replaces altered plagioclase, developed along cleavages and grain boundaries. Chalcopyrite is associated with actinolitic amphibole. The disseminated sulfides do not have magmatic sulfide character (i.e. composite grains as blebby inclusions in primary silicates), and were remobilized or introduced during metamorphic and/or alteration overprinting. It is not clear if the alteration is part of the metamorphic overprinting or related to a separate hydrothermal alteration overprint. The former interpretation is favored.

METAMORPHIC OVERPRINT

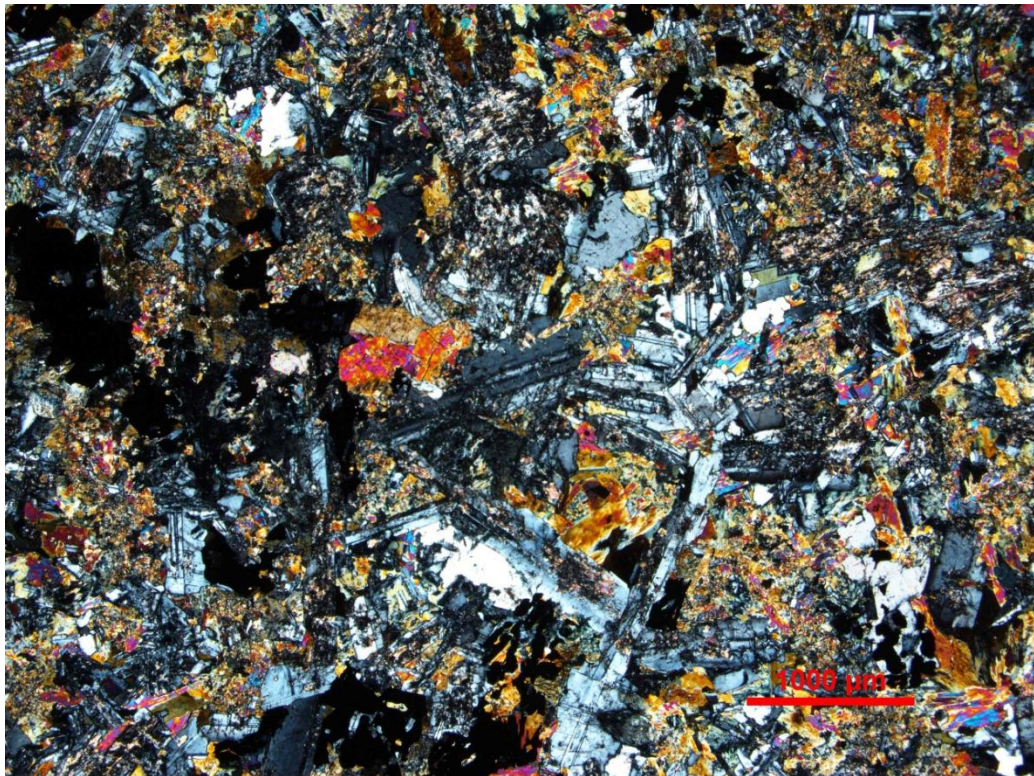
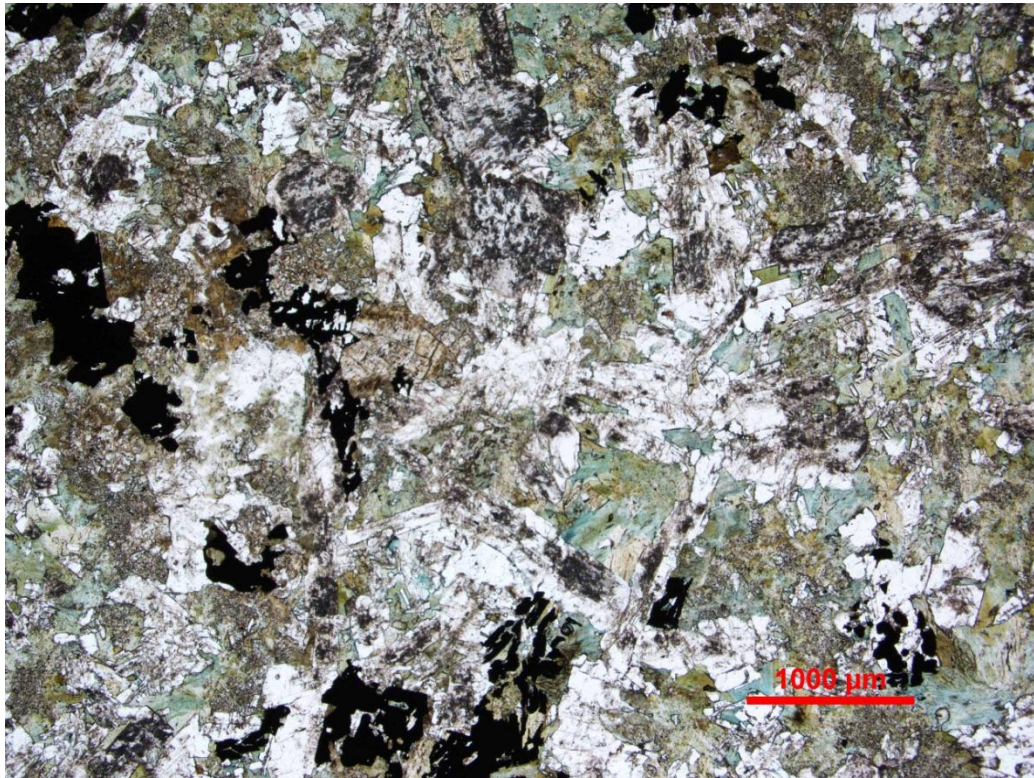
A moderate metamorphic overprint includes moderate-strong actinolization(?) of magmatic hornblende and some replacement of clinopyroxene. No preferred, penetrative metamorphic fabrics (foliation/lineation) were developed. Moderate saussuritization of plagioclase and uraltization of orthopyroxene may be part of the metamorphic overprinting.

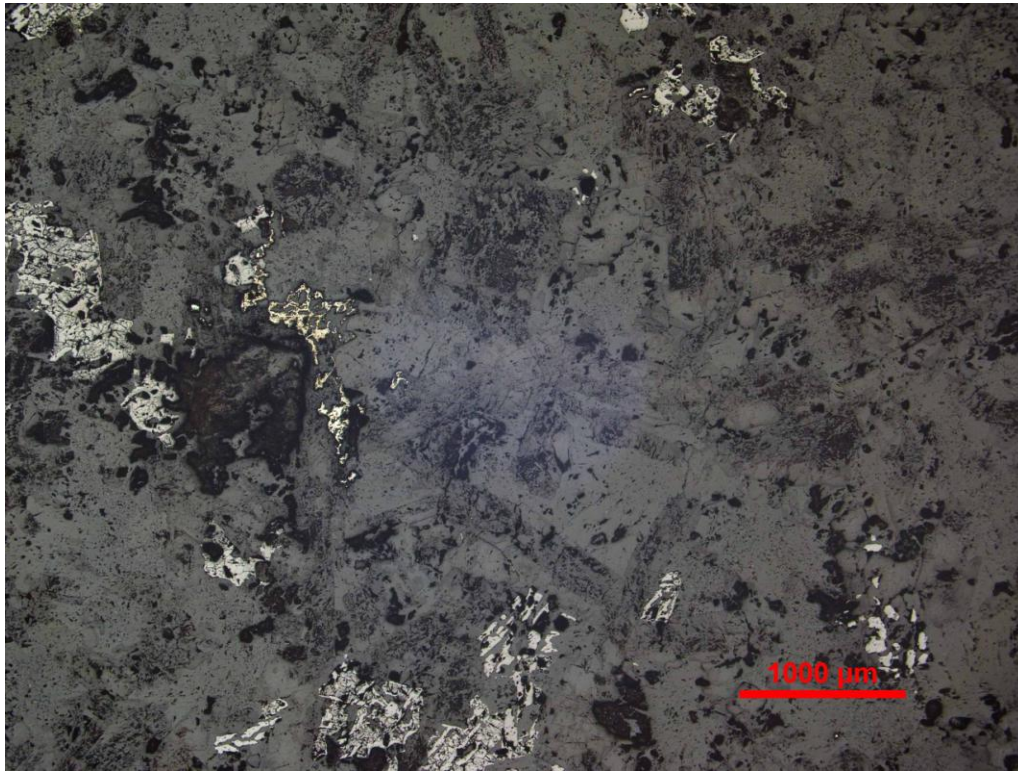
**ROCK NAME: Amphibolitic Hornblende-Augite-Orthopyroxene-Biotite
Metagabbro/Diabase**

PROTOLITH: Mafic-Rich, Oxide-Rich Gabbro

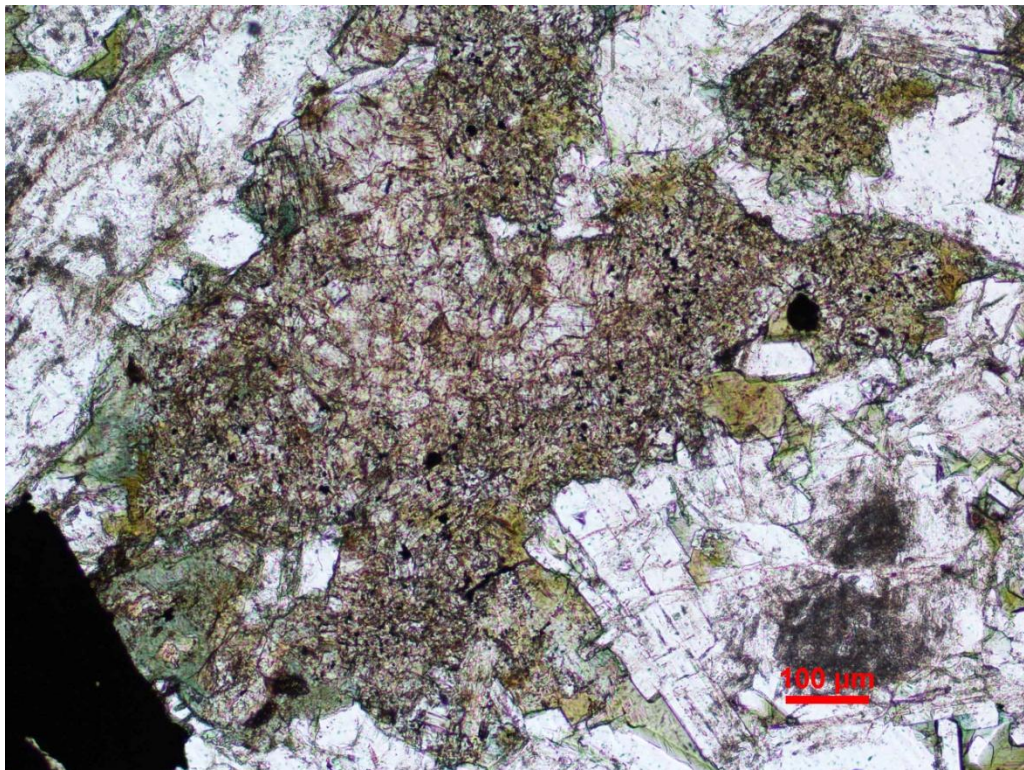


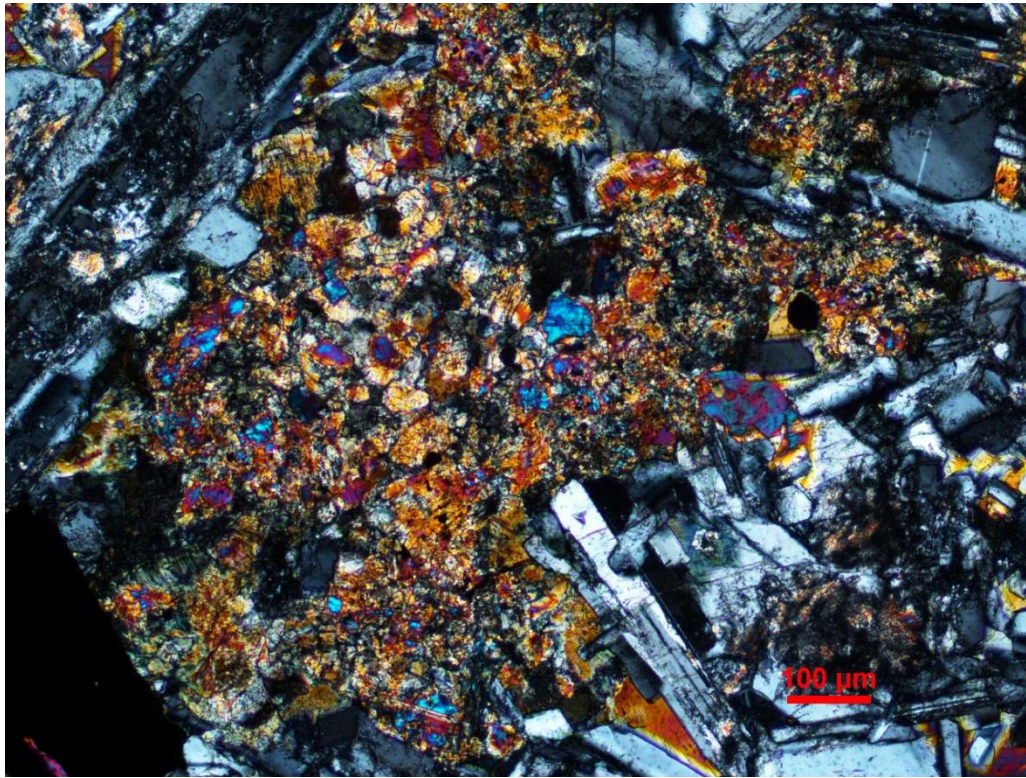
Sample CR-0005. Wide-field, full thinsection view showing very fine to fine grained, mafic-rich and oxide-rich meta-gabbro. Top- plane light; Bottom- crossed polarizers



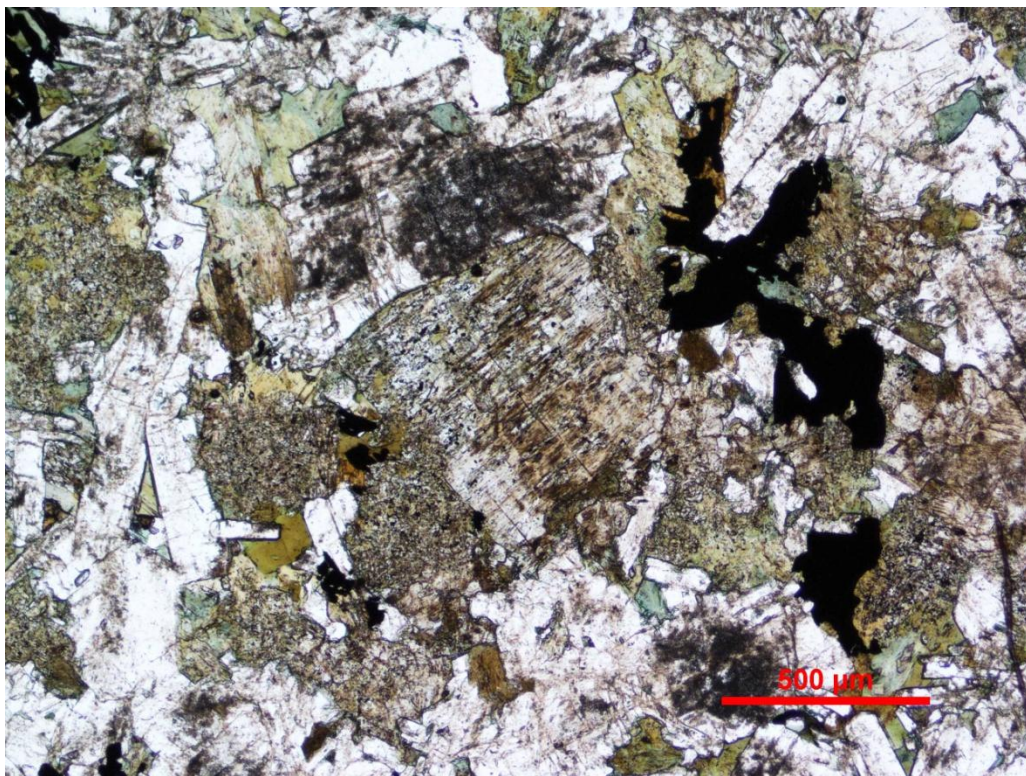


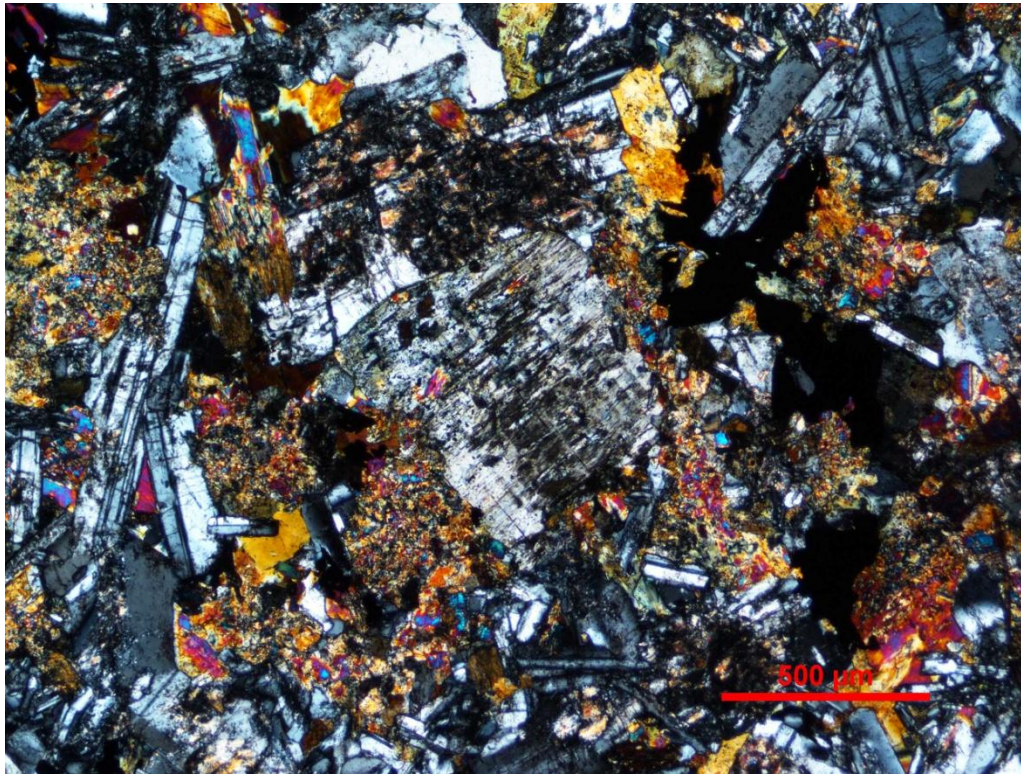
Sample CR-0005. Relict pyroxenes with abundant metamorphic, green-bluegreen actinolitic amphibole. Anhedrally disseminated pyrite (left center). Note lack of metamorphic fabrics. Top-plane light; Middle- crossed polarizers; Bottom- reflected light.



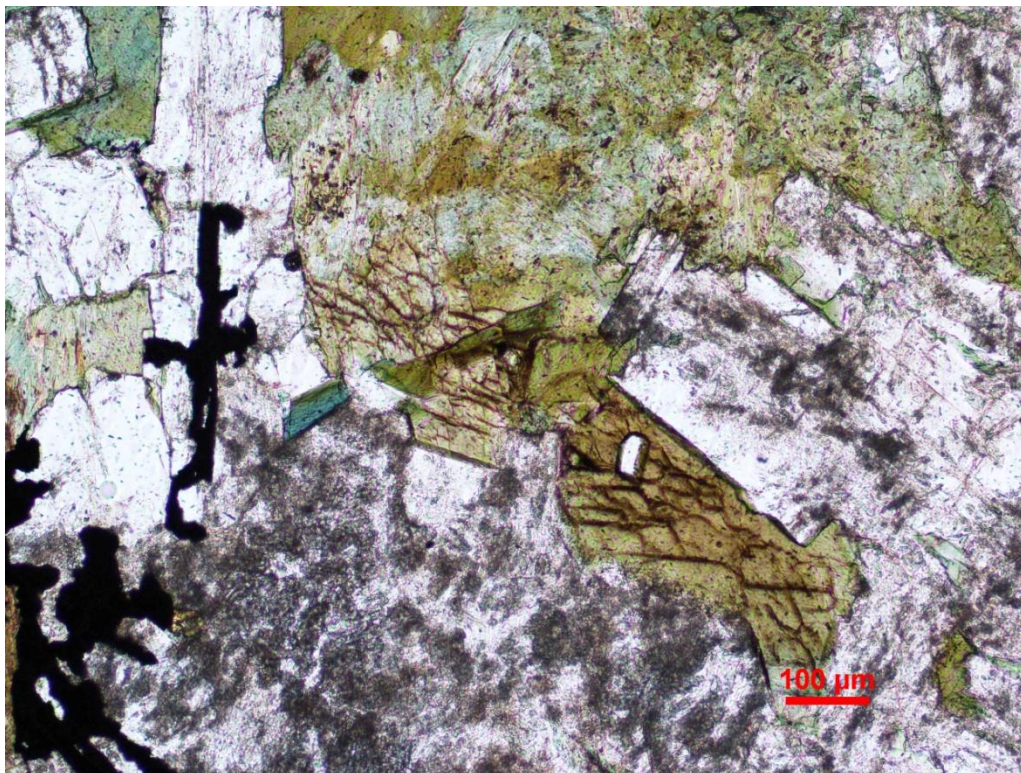


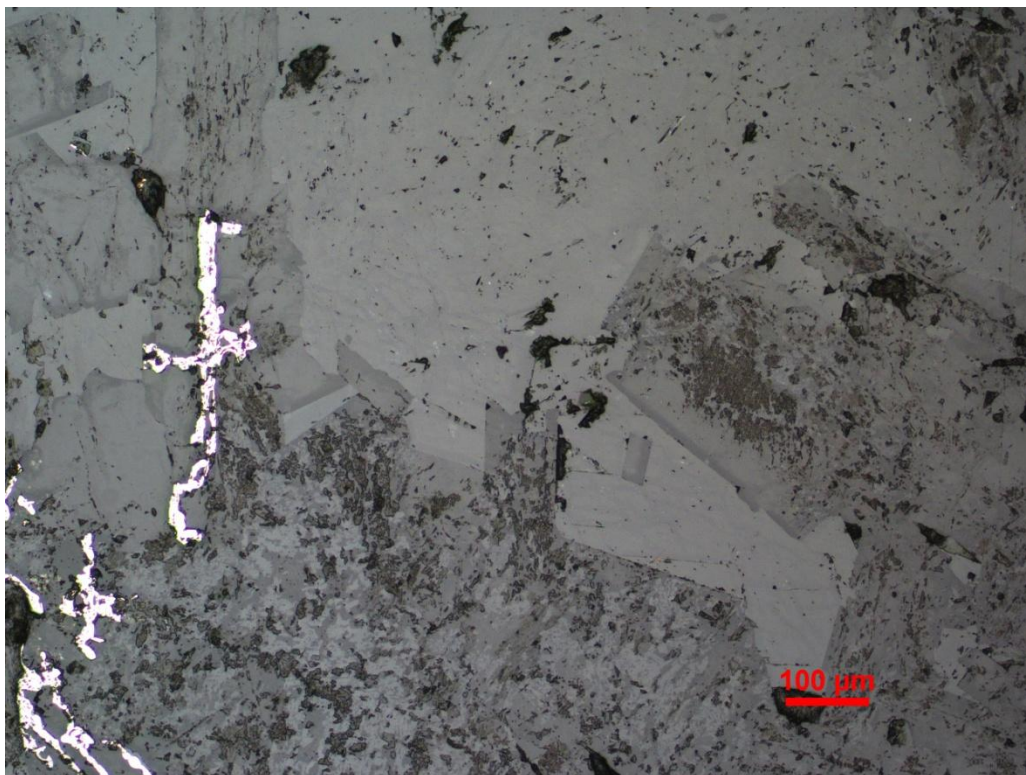
Sample CR-0005. Relict clinopyroxene with micro-mosaic texture and partial rim of actinolitic amphibole (green). Top- plane light; Bottom- crossed polarizers.



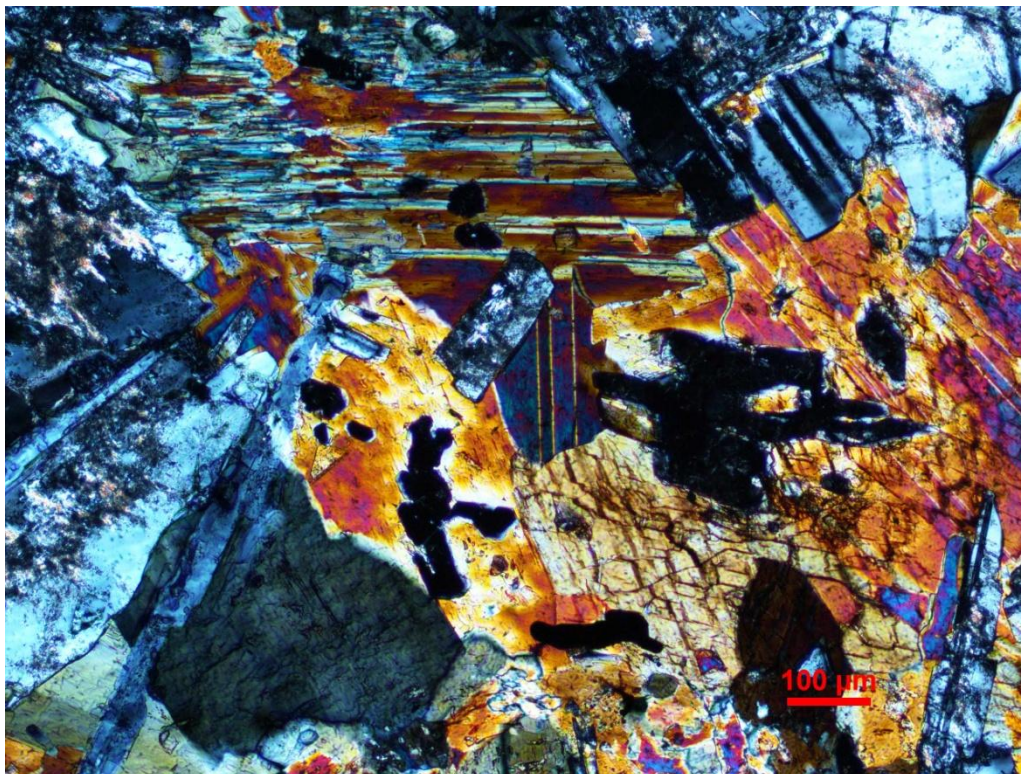
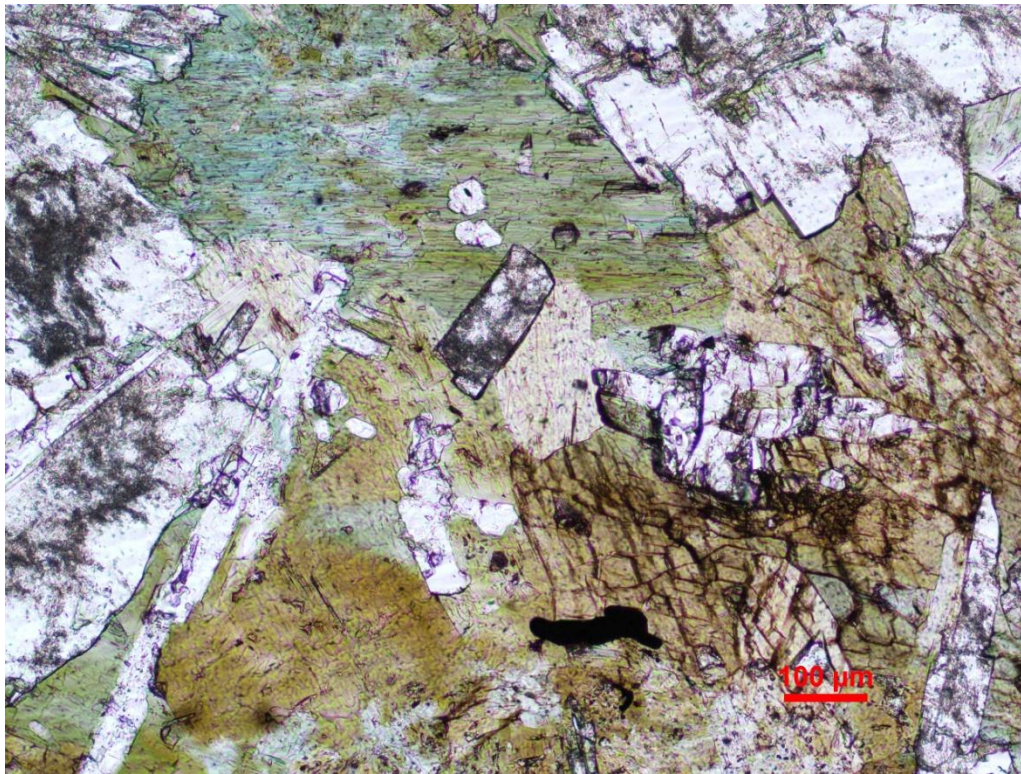


Sample CR-0005. Relict orthopyroxene (center), clinopyroxene and remnants of brown hornblende. Top- plane light; Bottom- crossed polarizers.





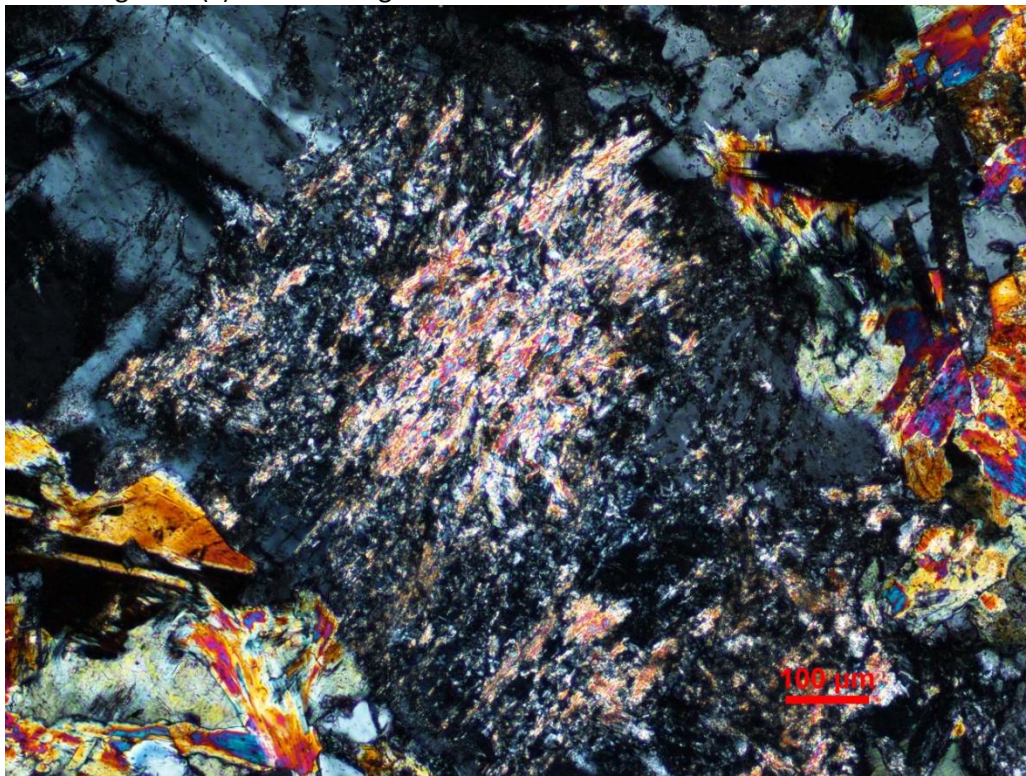
Sample CR-0005. Remnants of brown-green magmatic hornblende partly replaced by bluegreen actinolitic amphibole. Note disseminated, anhedral pyrite (left) replaces plagioclase. Top- plane light, Middle- crossed polarizers; Bottom- reflected light.



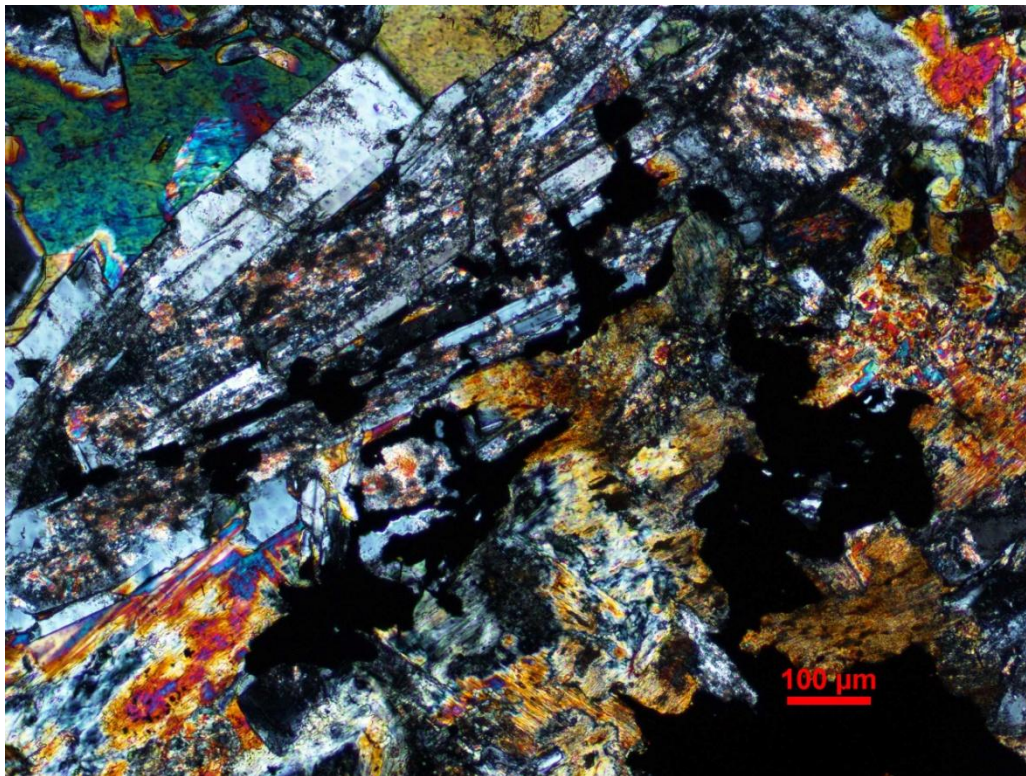
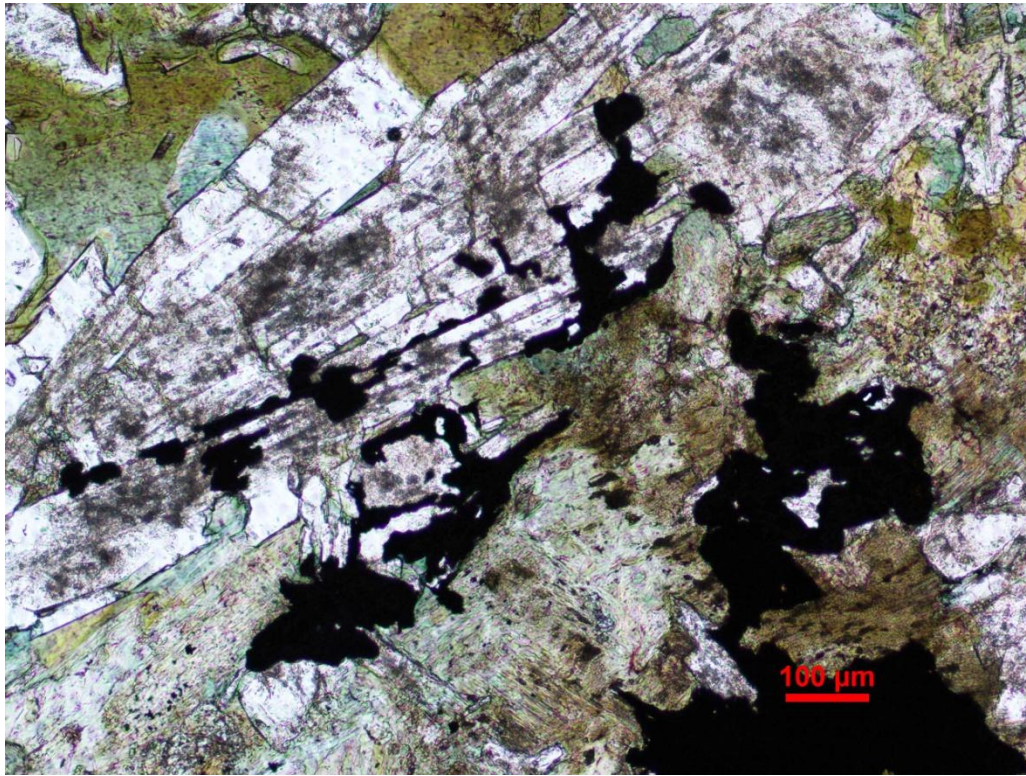
Sample CR-0005. Close-up view from above showing metamorphic, actinolitic(?) amphibole with polysynthetic twinning replacing relict magmatic brown hornblende. Top- plane light; Bottom- crossed polarizers.

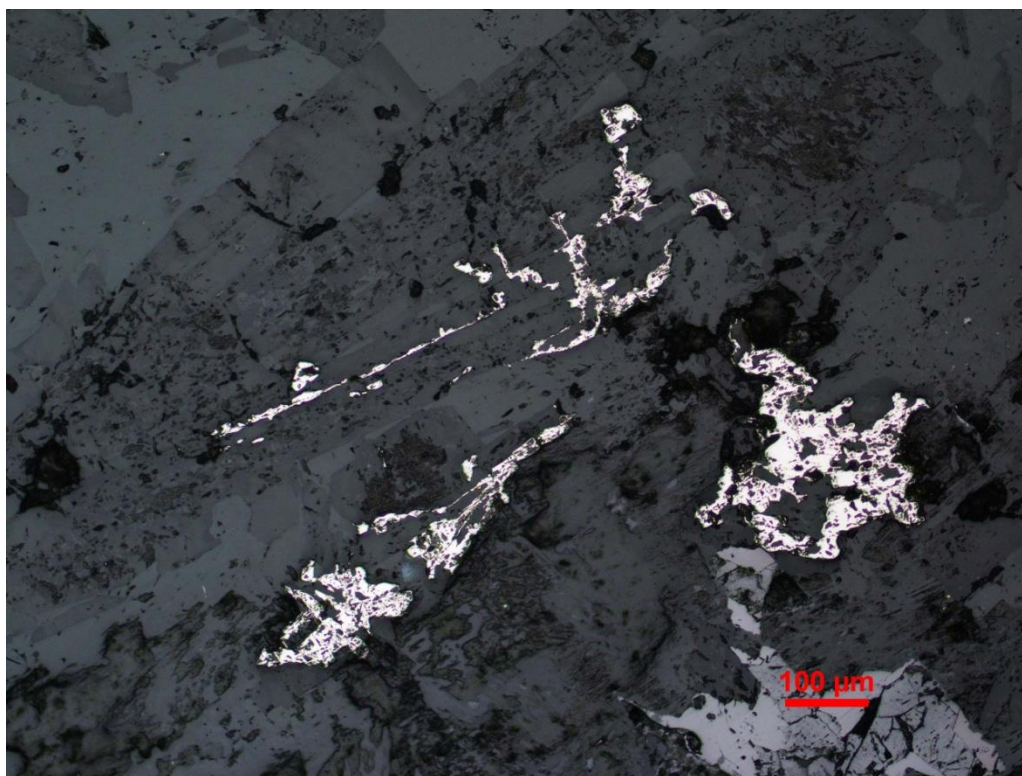


Sample CR-0005. Close-up view of magnetite with exsolved ilmenite. Magnetite is locally replaced by titanomagnetite(?). Reflected light.

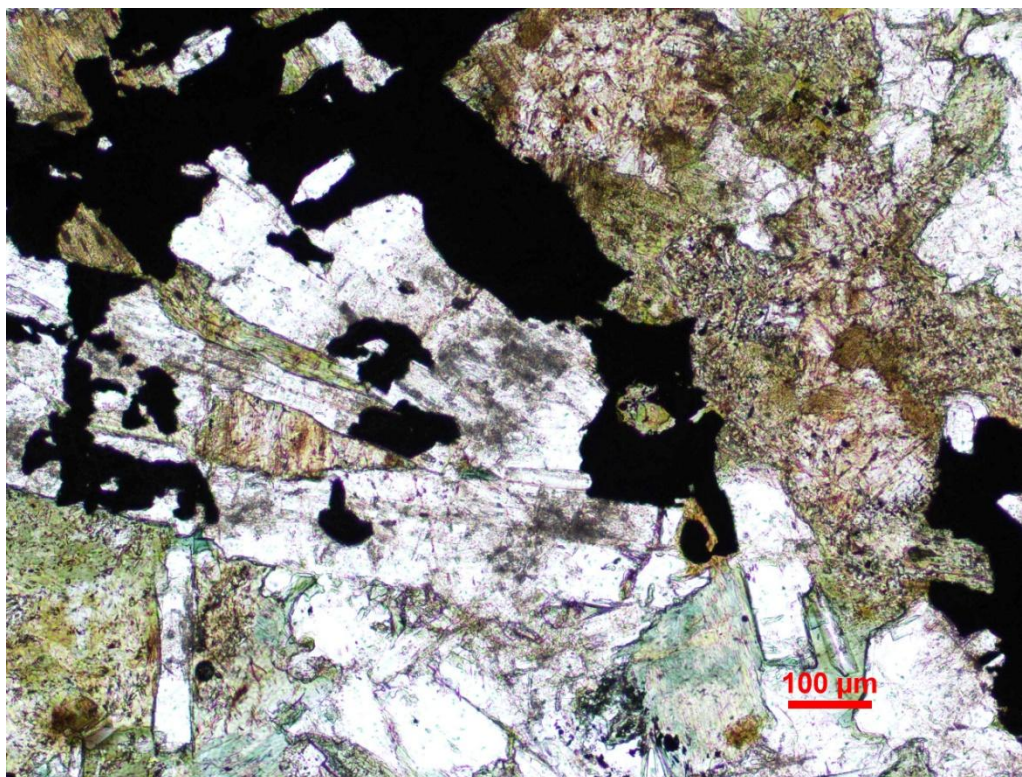


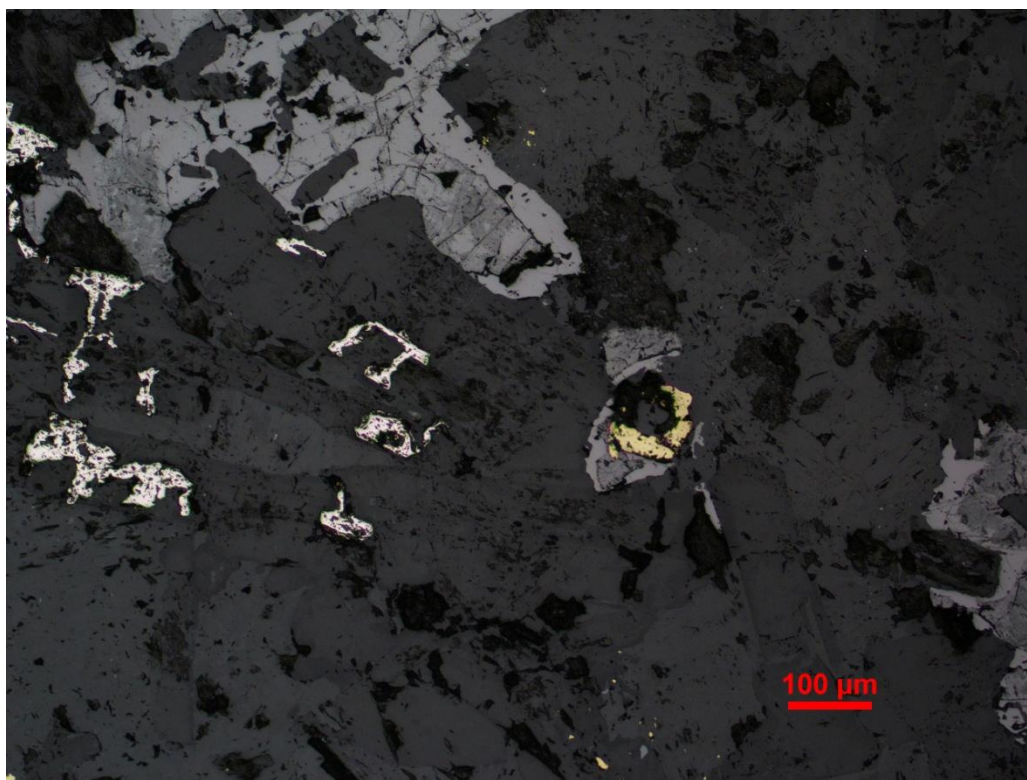
Sample CR-0005. Local moderate-strong sericite (saussurite) alteration of plagioclase. Crossed polarizers.





Sample CR-0005. Anhedronal disseminated pyrite replacing serricite-altered plagioclase. Top- plane light; Middle- crossed polarizers; Bottom- reflected light.





Sample CR-0005. Disseminated pyrite replacing plagioclase (left) and disseminated chalcopyrite associated with actinolitized hornblende and magnetite-ilmenite. Top- plane light; Bottom- reflected light.