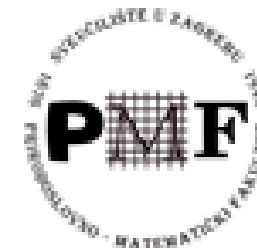




Sveučilište u Zagrebu
Prirodoslovno-matematički fakultet
Geološki odsjek
Mineraloško-petrografski zavod



OPTIČKA SVOJSTVA ANIZOTROPNIH DVOOSNIH MINERALA – 7. dio

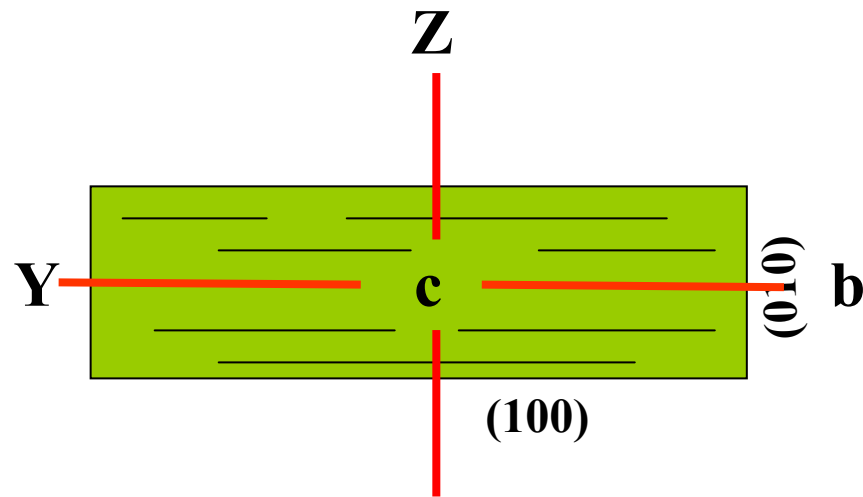
epidot, zoisit, kloriti

EPIDOT

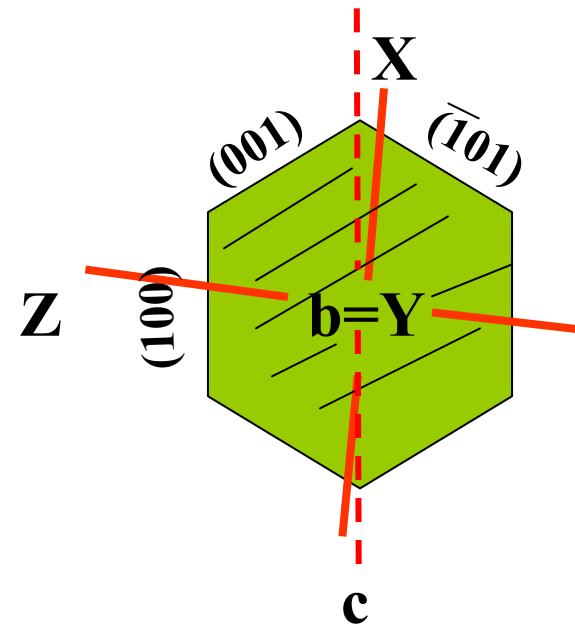
- $\text{Ca}_2(\text{Fe}^{3+}, \text{Al})\text{Al}_2[\text{SiO}_4 \mid \text{Si}_2\text{O}_7]\text{O}(\text{OH})$
- 2/m
- kristali izduženi duž osi b
- izvrsna kalavost po {001}, slabija po {100}
- žutozelene boje

MIKROSKOPSKA SVOJSTVA

- uzdužni presjeci paralelni s osi b su izduženi pravokutnici
 - poprečni presjeci su nepravilni šesterokuti
 - ako se vide oba sustava kalavosti, sijeku se pod kutom od 115°
 - bezbojan, najčešće žut i zelen
 - slabi pleokroizam u žutoj i zelenoj boji
 - visokog pozitivnog reljefa
- $n_x=1,720-1,734$ $n_y=1,724-1,763$ $n_z=1,734-1,779$
- umjereno visok dvolom $n_z-n_x = 0,014-0,045$
- žive boje 2. i 3. reda



uzdužni presjek $\perp c$ i $\parallel b$

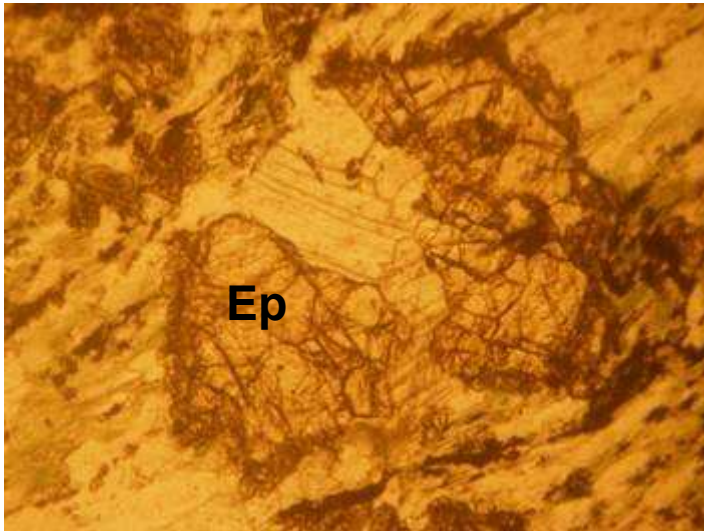


poprečni presjek, presjek $\parallel (010)$
(ravnina optičkih osi)

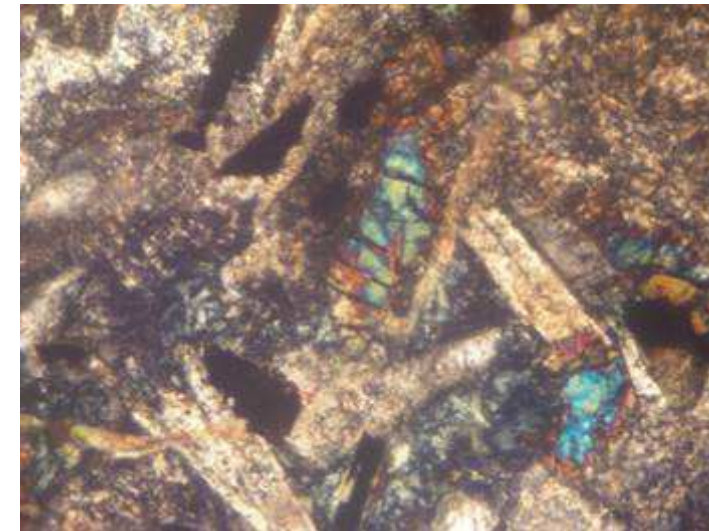
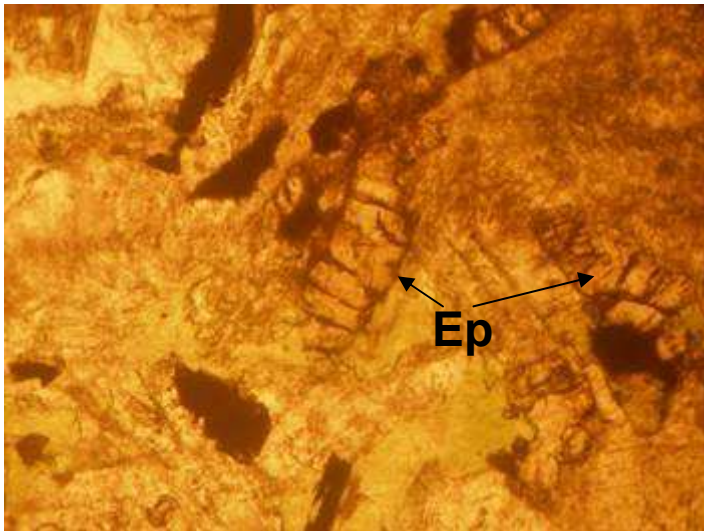
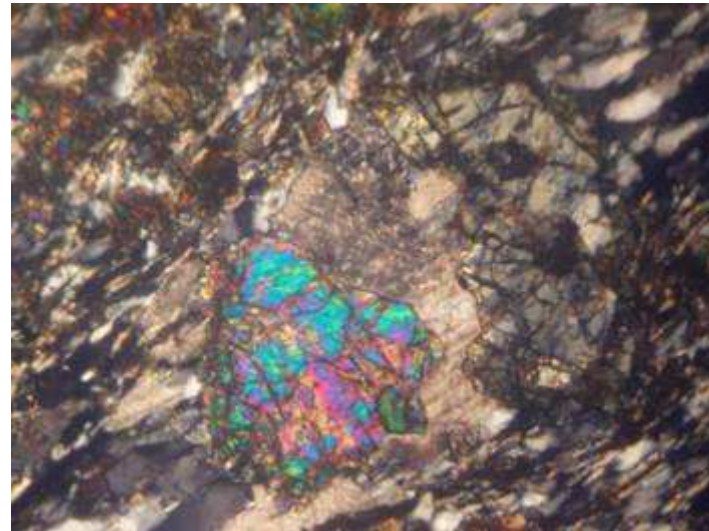
- uzdužni presjeci potamne paralelno s pukotinama kalavosti
- poprečni presjeci paralelni s (010) potamne koso:
 $Z : (001) = 15-25^\circ$

- optički je negativan, $-2V = 69 - 89^\circ$
- optički karakter izduženja može biti i pozitivan i negativan, budući da u uzdužnim presjecima smjerom izduženja ide vibracijski smjer Y , koji se podudara s b

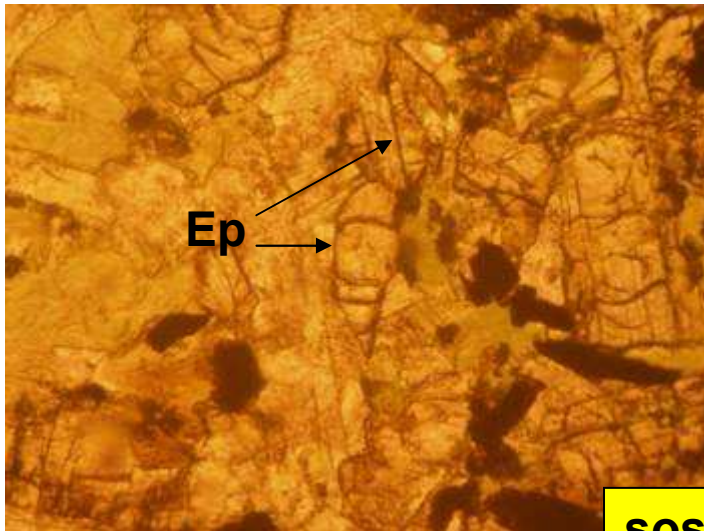
bez analizatora



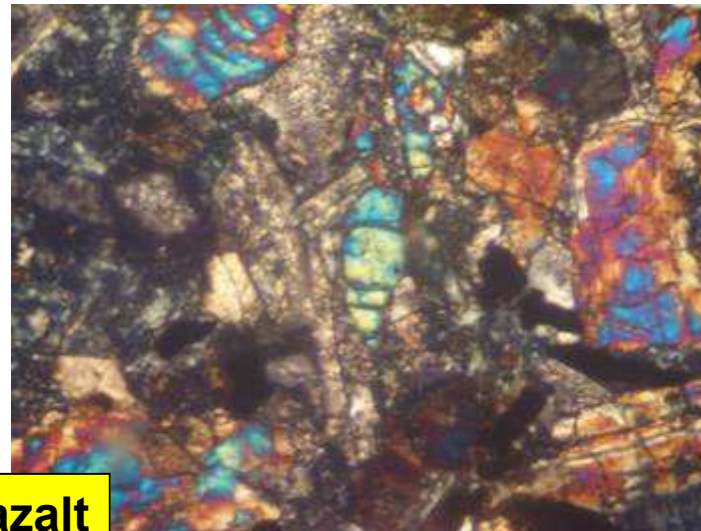
s analizatorom



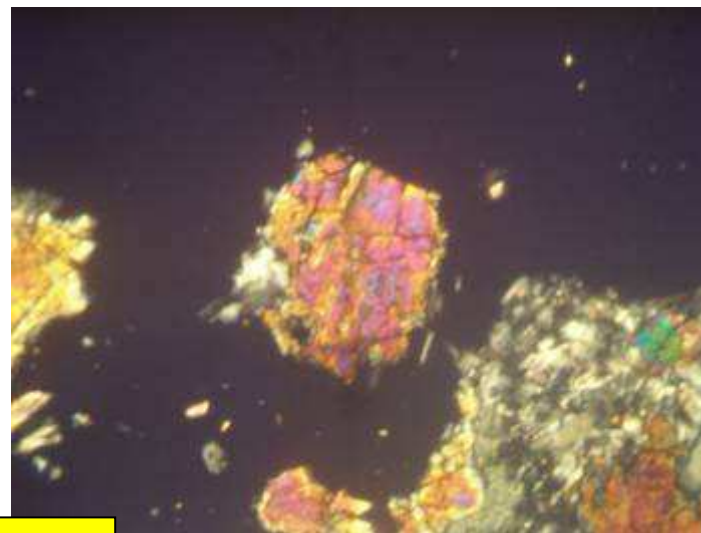
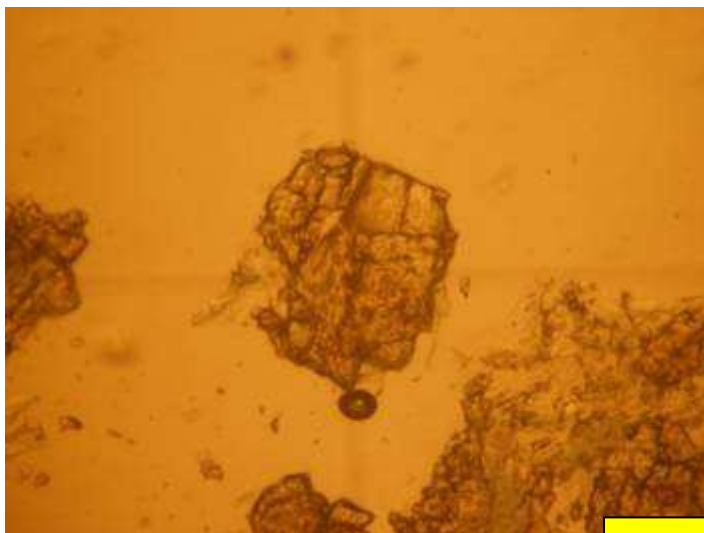
bez analizatora



s analizatorom

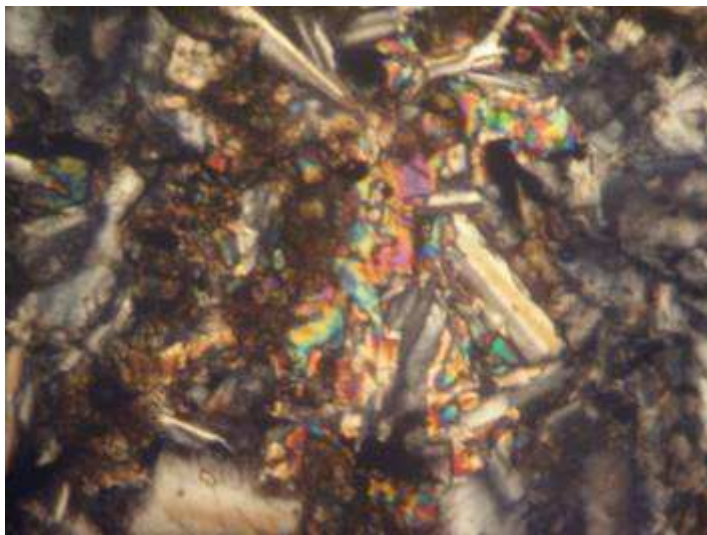
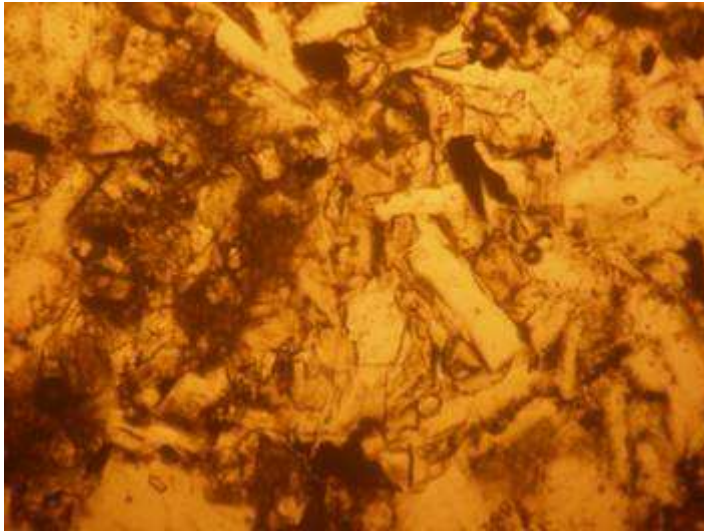


sosiritski bazalt

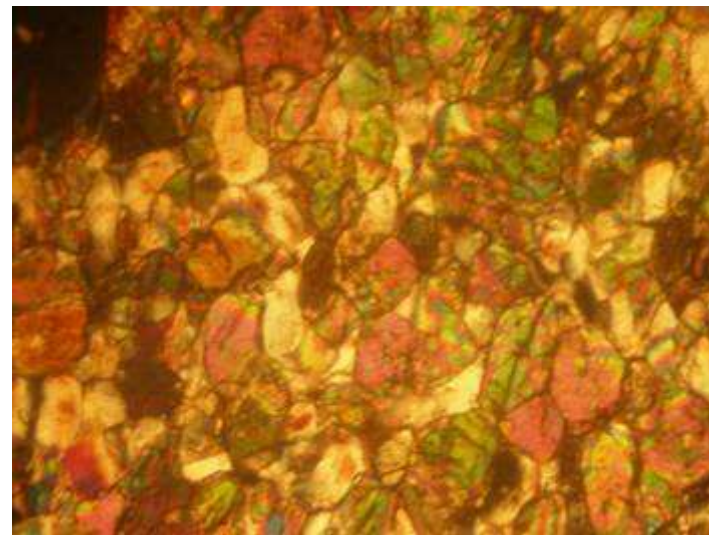
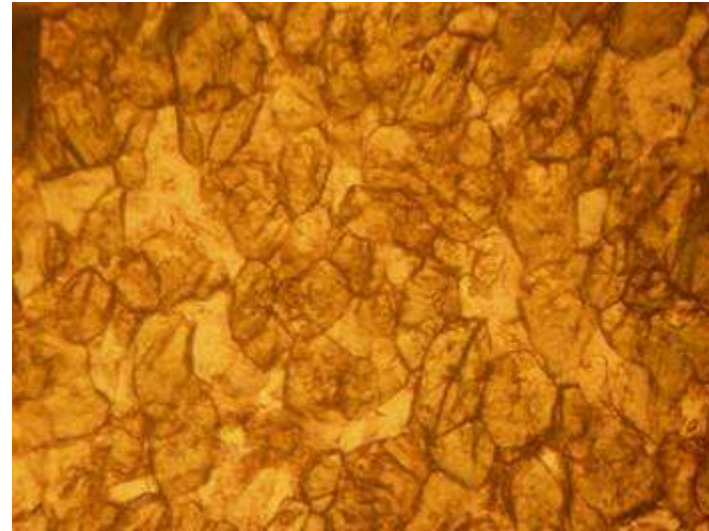


zeleni škriljavac

sosiritizacija



**zrna epidota u amfibolskom
škriljavcu**



zrna epidota interferiraju u živim bojama

Izmjene:

- izmjene epidota su rijetke

Pojavljivanje:

- raširen mineral:

u eruptivnim stijenama vezan za kasnomagmatske ili poslijemagmatske procese

raširen u metamorfnim stijenama niskog stupnja metamorfizma

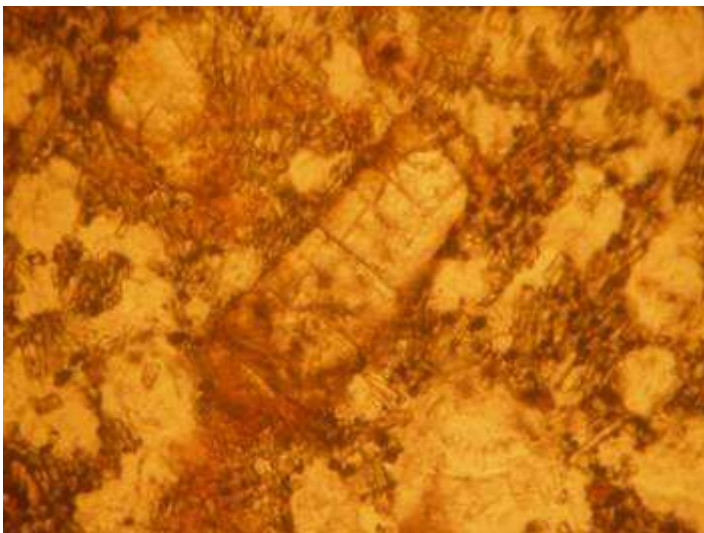
retrogradnom metamorfozom nastaje iz kalcijsko-aluminijskih minerala (bazični plagioklasi, amfiboli, augit)

- za njegov nastanak bitni su hidrotermalni procesi

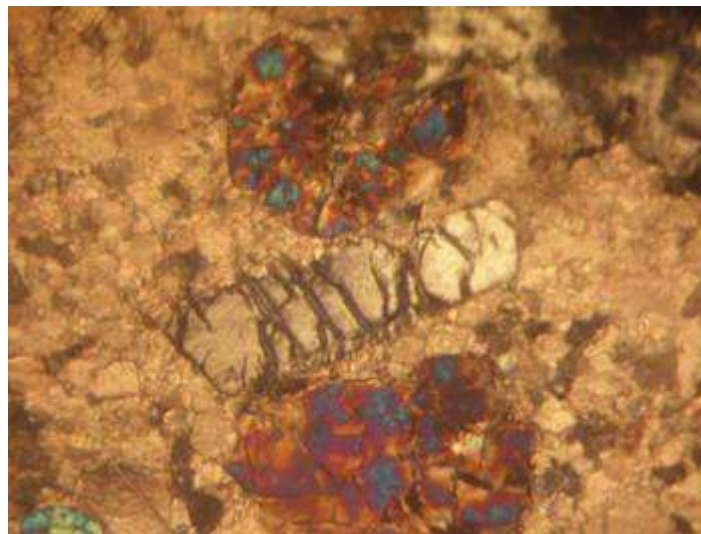
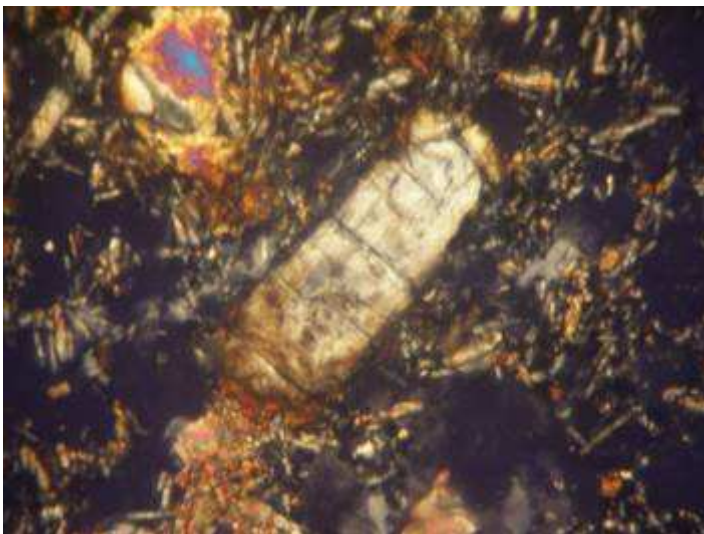
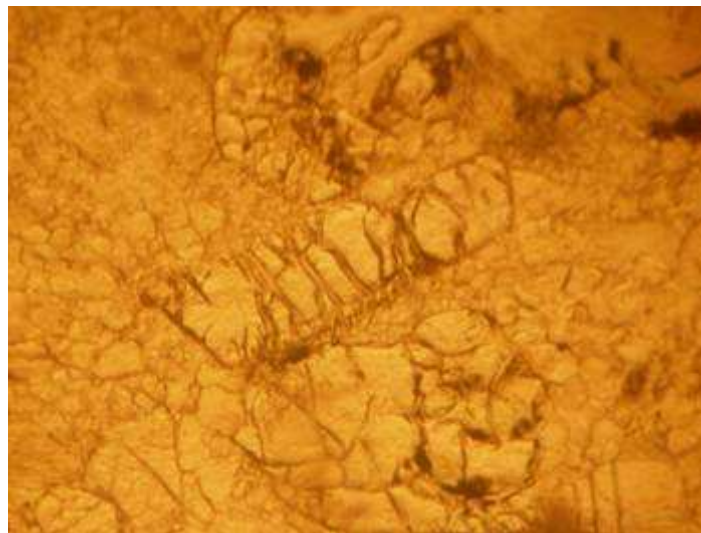
KLINOZOISIT $\text{Ca}_2\text{Al}_3[\text{SiO}_4 \mid \text{Si}_2\text{O}_7]\text{O}(\text{OH})$

- visokog reljefa
- bezbojan
- niskog dvoloma – siva do žuta boja 1. reda
(anomalne: siva = plavkasta, žuta = žutozelena)
- čest mineral u kontaktno-metamorfnim i regionalno-metamorfnim stijenama
- produkt izmjene bazičnih plagioklasa (sosiritizacija), te kloritizacije hornblende i biotita

bazalt



kontaktno-metamorf. stijena



ZOISIT

- $\text{Ca}_2\text{Al}_3(\text{Si}_2\text{O}_7|\text{SiO}_4)\text{O}(\text{OH})$
- $2/m\ 2/m\ 2/m$
- izduženi štapići (duž osi b), kristalne plohe slabo izražene
- kalavost vrlo dobra duž $\{010\}$
- lučenje po $\{001\}$
- boja: sivkasta, žućkasta, sivkasto-zelenkasta
- mutan i neproziran

MIKROSKOPSKA SVOJSTVA

- bezbojni štapići, kalavost se dobro vidi
- poprečni presjeci: romb, šesterokut (pseudo)
- reljef visok:

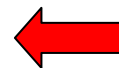
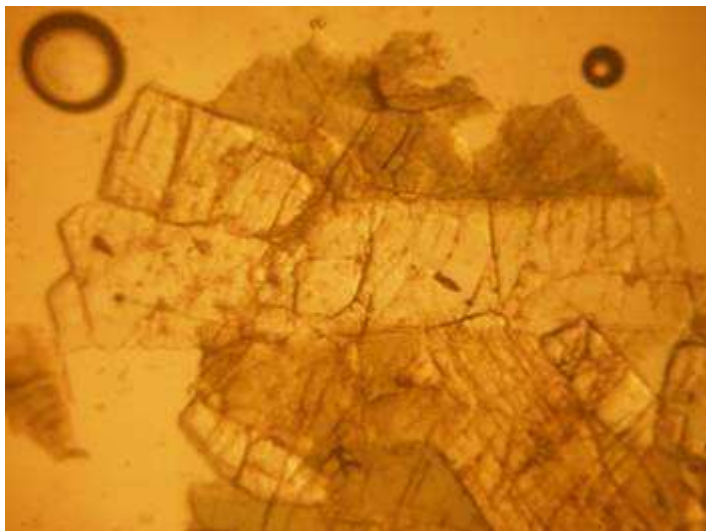
$$n_x=1,696-1,700 \quad n_y=1,696-1,703 \quad n_z=1,702-1,718$$

- dvolom malen do umjeren: $n_z - n_x = 0,006-0,018$

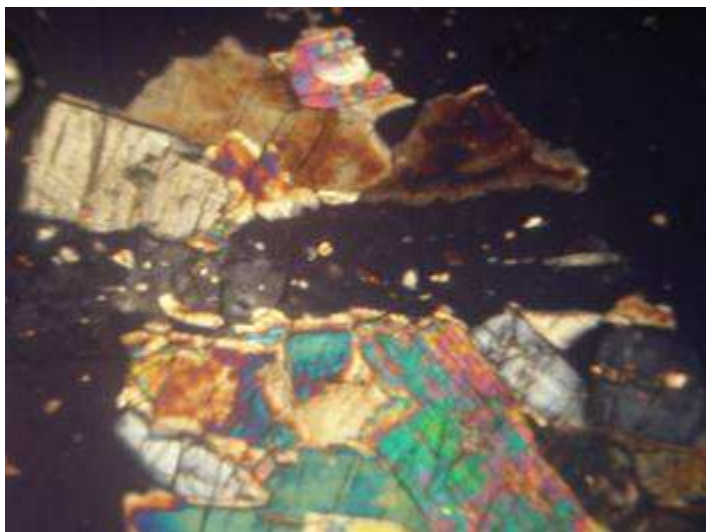
anomalna indigo-plava interferencijska boja
(kod zoisita s nešto Fe = siva boja 1. reda,
plava boja 2. reda)

- potamni paralelno

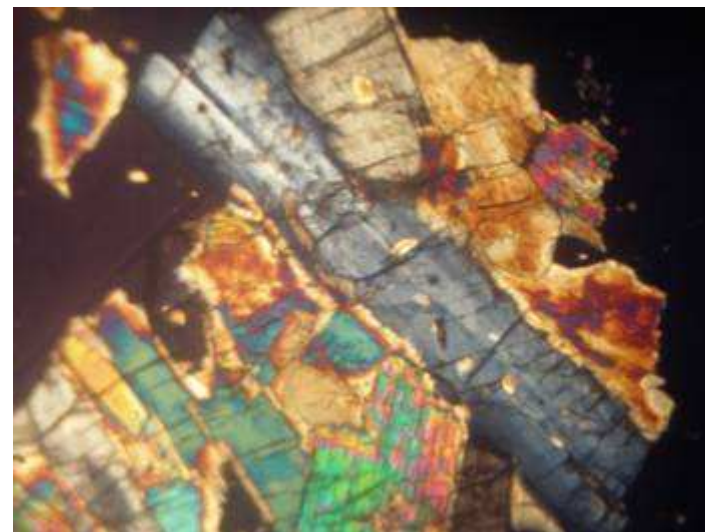
- ravnina optičkih osi || (010)
- optički pozitivan, $2V = 0 - 60^\circ$



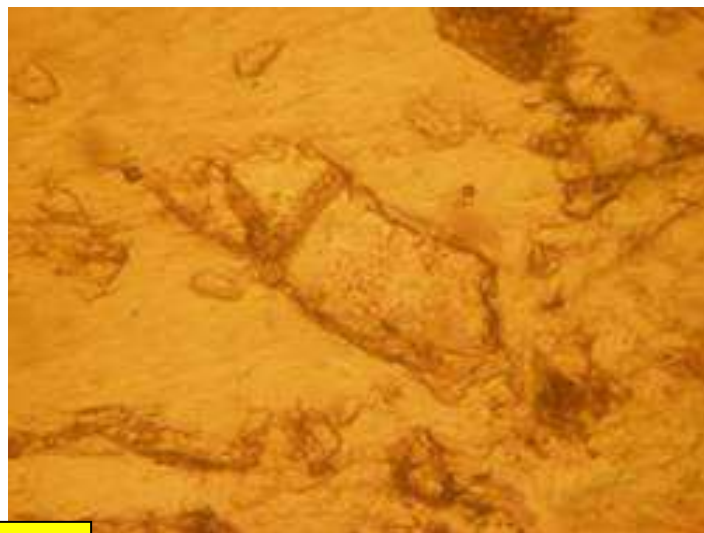
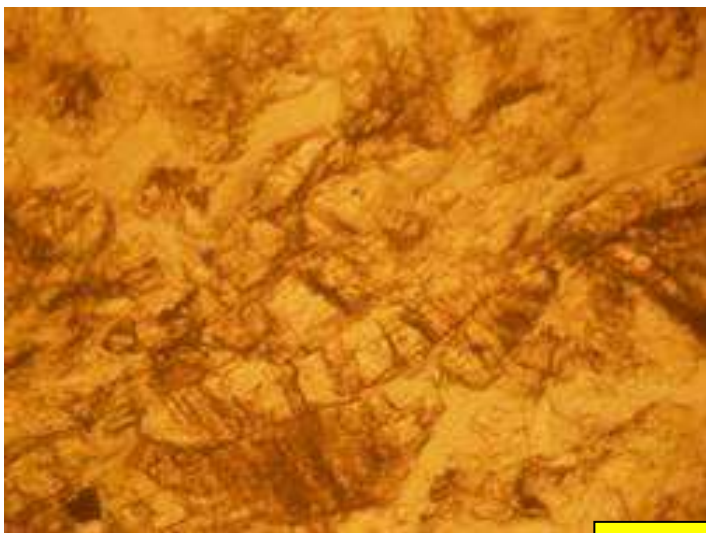
bez analizatora



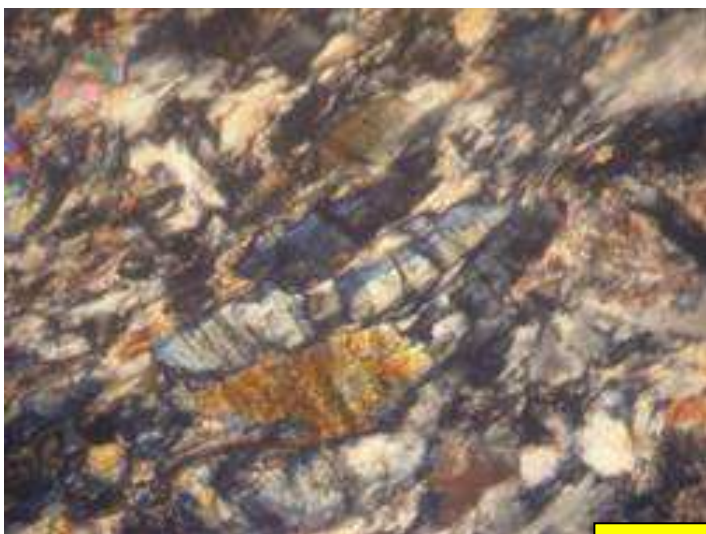
paralelno potamnjenje



**anomalna interferencijska
boja**



bez analizatora



s analizatorom

Izmjene:

- nisu poznate, rezistentan mineral

Pojavljivanje:

- zoisit se javlja u amfibolitu, eklogitu
- sastavni dio je SOSIRITA, mineralne nakupine nastale alteracijom bazičnih plagioklasa (sosiritski gabro, sosiritski bazalt).

KLORITI

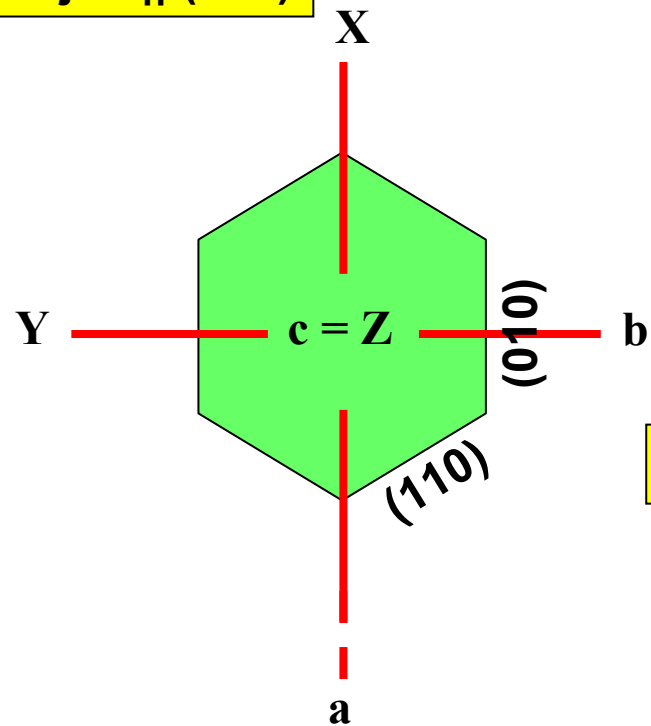


- 2/m (mogu biti trikl. i rompski)
- pločice klorita su pseudoheksagonskog habitusa
- savršena kalavost po {001}
- najčešće u listićavim i ljuskavim agregatima
- tamnozelene boje

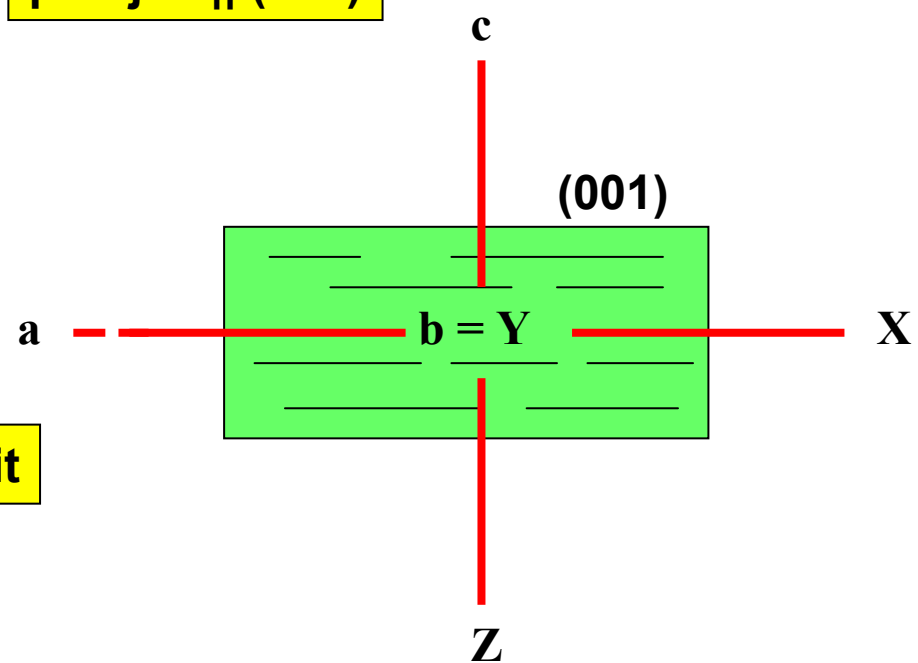
MIKROSKOPSKA SVOJSTVA

- zelene boje, obično jasni pleokroizam
 - slabo izraženog reljefa, indeksi loma obično nešto viši od indeksa loma kanadskog balzama (1, 575-1,6); indeks loma raste s porastom Fe
 - nizak dvolom: 0,001-0,011
- siva do žuta boja 1. reda
- (Mg-bogati klorit (peninit) pokazuje anomalnu lavendulasto-plavu boju)
- potamne paralelno ili gotovo paralelno prema kalavosti po (001) (iznimka je klinoklor koji potamni koso $X:(001) = 2-9^\circ$)

presjek || (001)



presjek || (010)

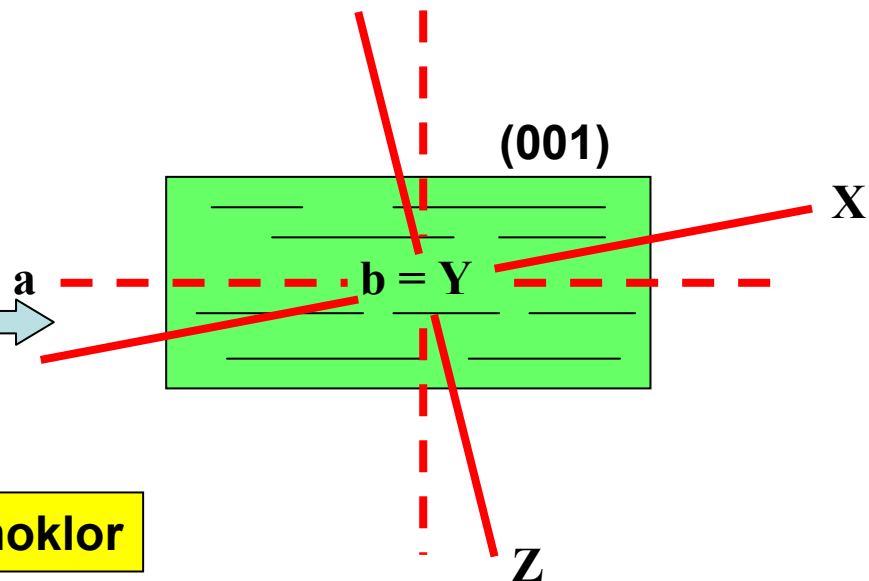


peninit

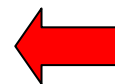
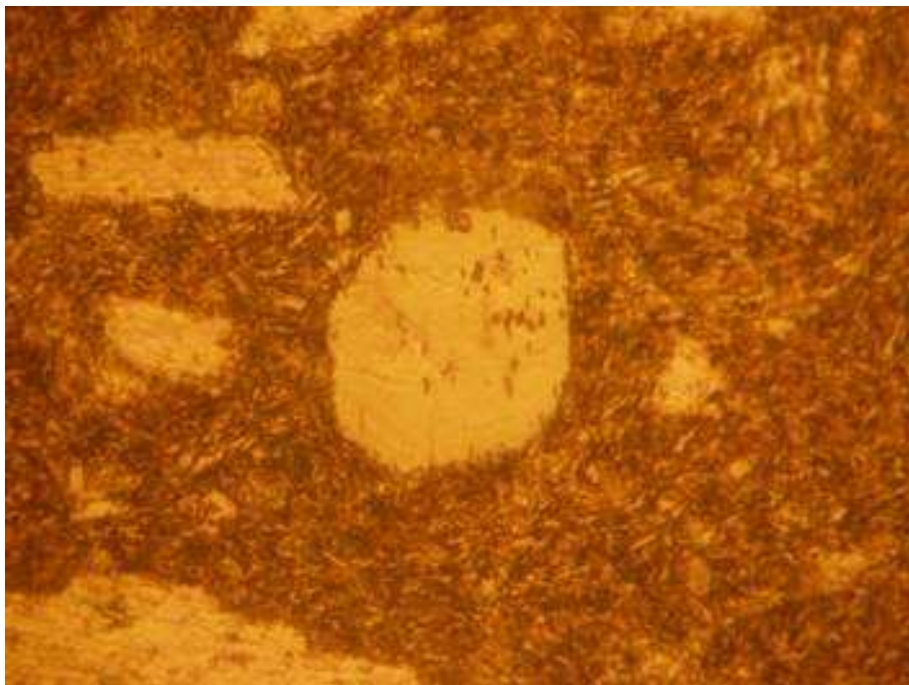
kut kosog potamnjenja
2-9°



klinoklor



- ravnina optičkih osi $\parallel \parallel (010)$
- uglavnom optički pozitivni
- kut optičkih osi obično malen ($2V = 0 - 30^\circ$) i promjenljiv

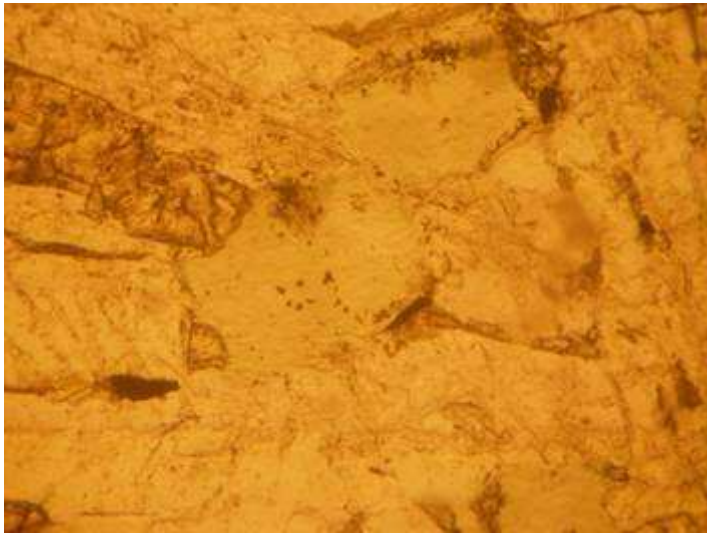
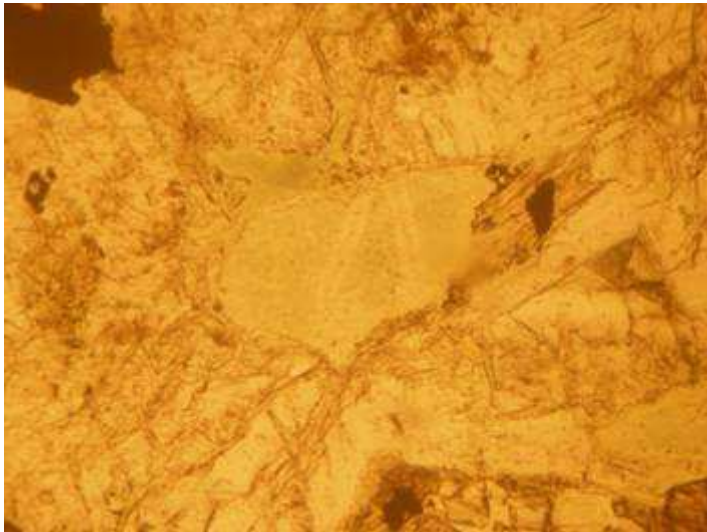


bez analizatora

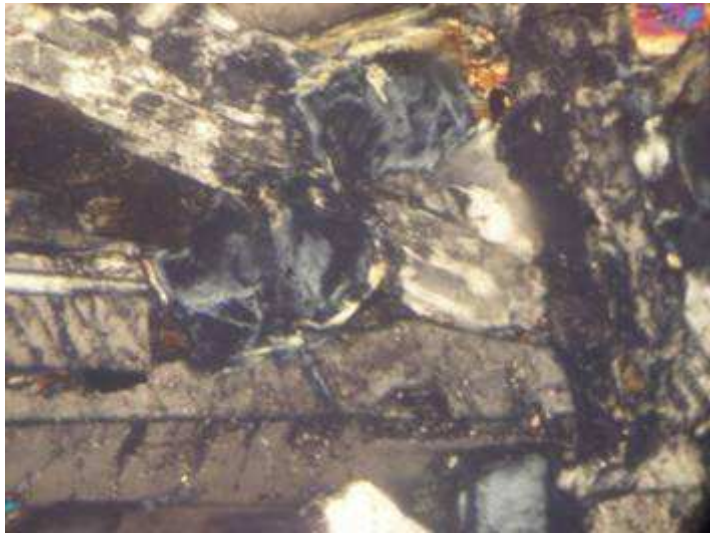
s analizatorom



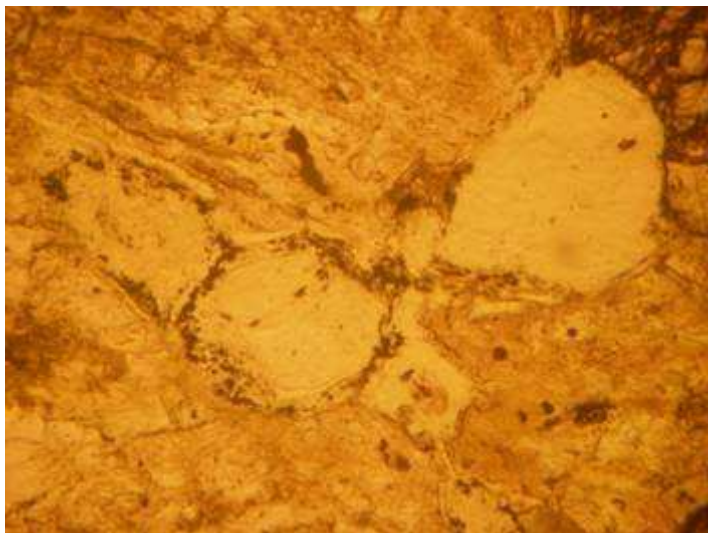
bez analizatora



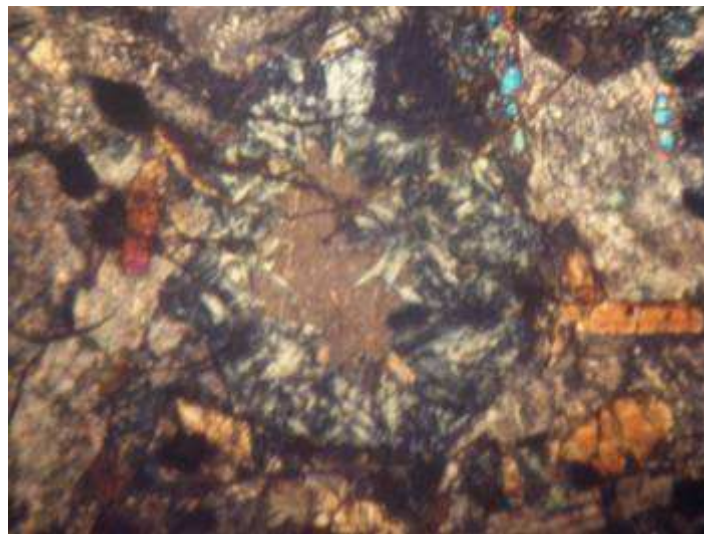
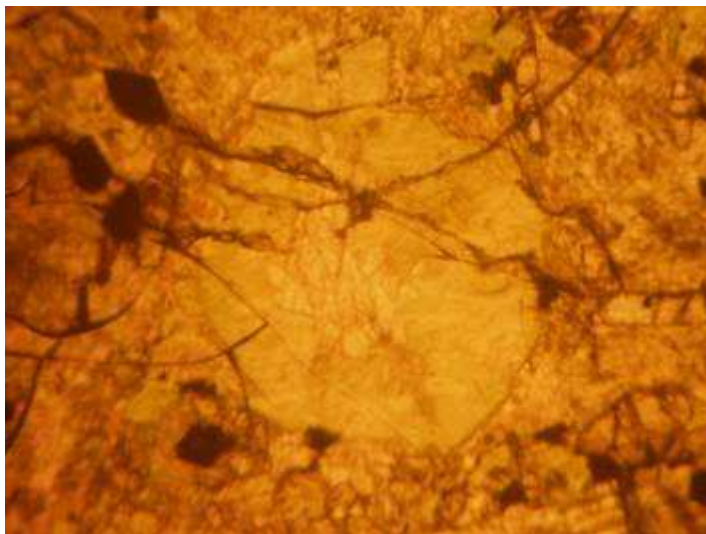
s analizatorom

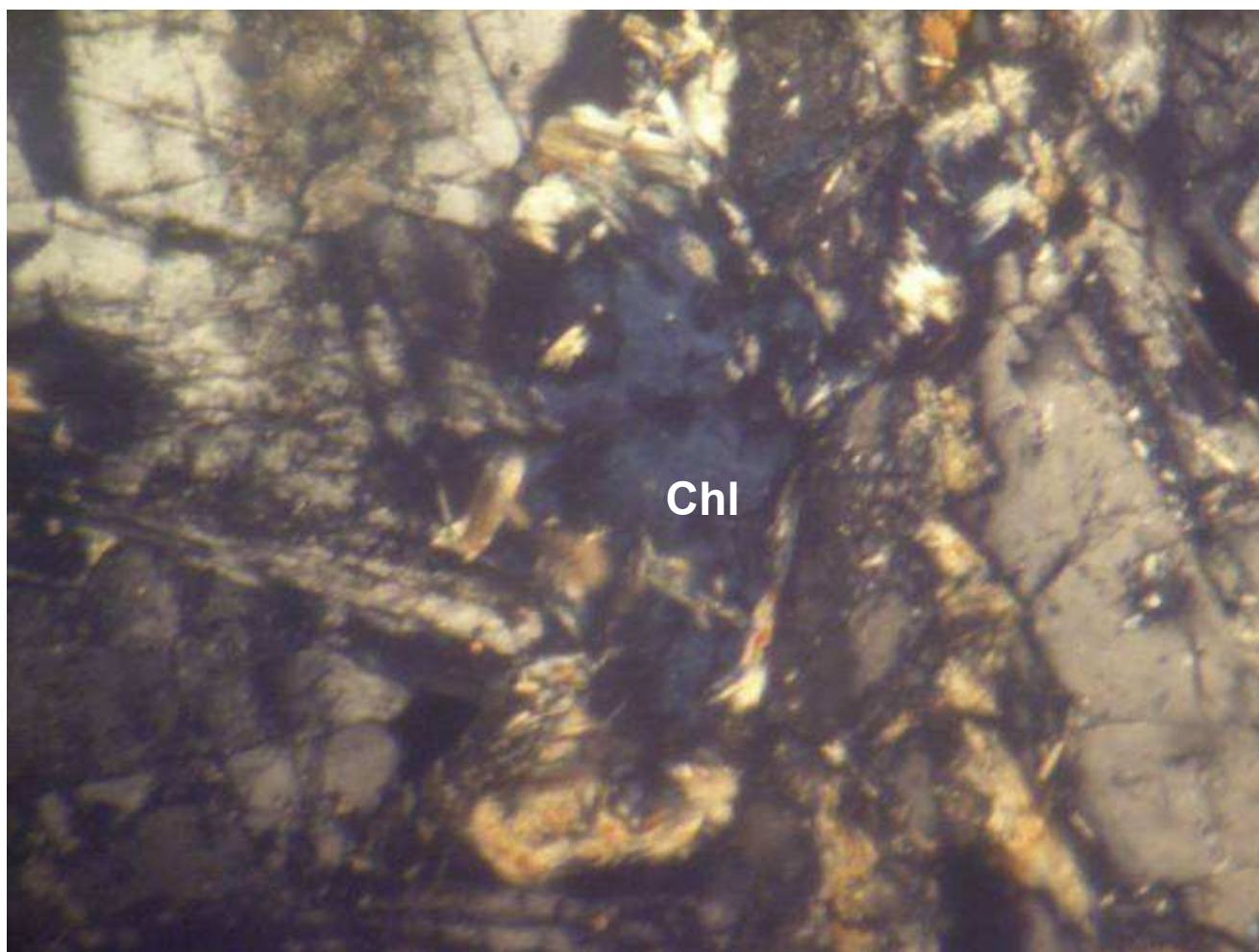


bez analizatora



s analizatorom





anomalna interferencijska boja

Pojavljivanje:

- uglavnom sekundarni minerali
- nastaju pri niskoj temperaturi djelovanjem hidrotermalnih otopina izmjenom feromagnezijskih minerala (olivin, amfibol, granat, piroksen, biotit)