

(61)

Sample No. : 3TY1  
Locality : Tumurtiin-Ovoo area  
Rock name : Aplitic granite  
Observation note :

This specimen is pale pink, fine-grained aplitic granite, showing a xenomorphic texture. It consists principally of quartz, K-feldspar(orthoclase-microperthite) and plagioclase(oligoclase) and subordinately of biotite, muscovite and opaque oxide. Both quartz and K-feldspar occur as anhedral crystals, about 0.5mm across, while the latter is highly clouded by minute hematite inclusions. Plagioclase is less abundant.

(62)

Sample No. : 3TY4  
Locality : Tumurtiin-Ovoo area  
Rock name : Granite  
Observation note :

This specimen is pale pink, fine to medium-grained granite. It consists principally of quartz, K-feldspar(orthoclase-microperthite), plagioclase and biotite and subordinately of opaque oxide, apatite and zircon. Quartz occurs as subhedral granular crystals, 0.5-1mm across. K-feldspar occurs as subhedral crystals, 0.5-2mm across, clouded by minute hematite inclusions. Plagioclase occurs as subhedral sericitized crystals, 0.5-4mm in length. Biotite, about 1mm in length, is mostly altered to chlorite and epidote.

(63)

Sample No. : 3UN1  
Locality : Olon-Ovoot area  
Rock name : Graphic granite  
Observation note :

This specimen is light brownish gray, medium-grained, leucocratic granite. It consists principally of quartz and sodic plagioclase(albite) and subordinately of biotite, opaque oxide and zircon. Quartz and plagioclase crystals, both 1-3mm across, show a micrographic intergrowth. Biotite is mostly altered to chlorite and sericite.

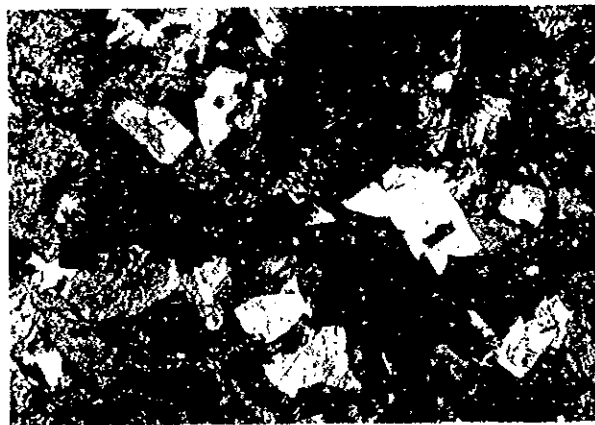
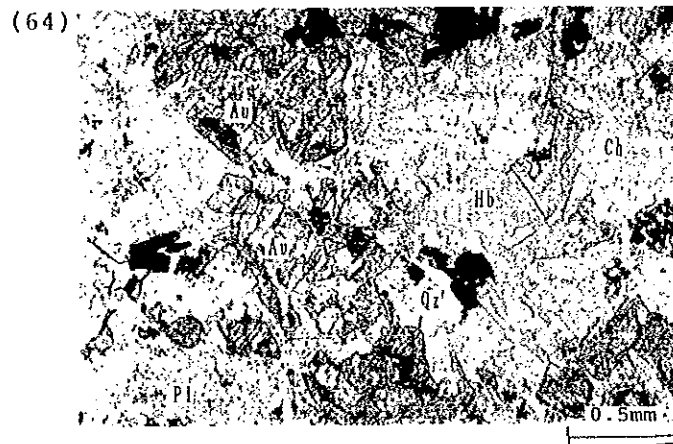
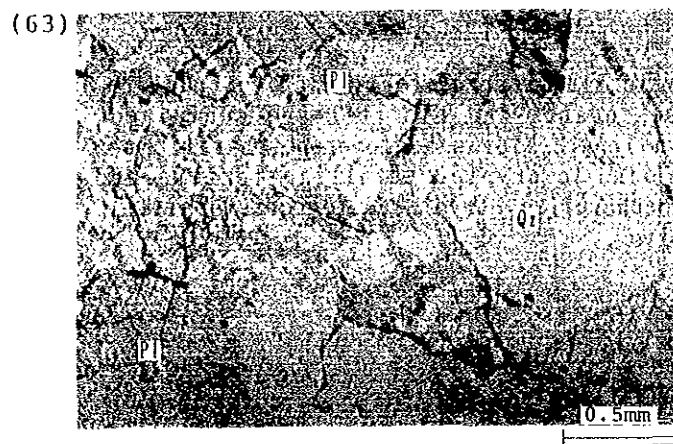
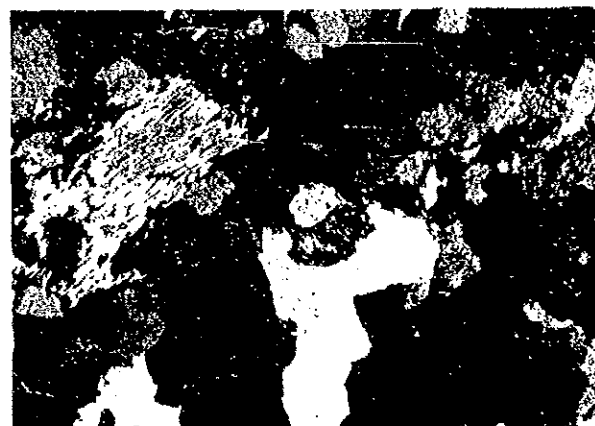
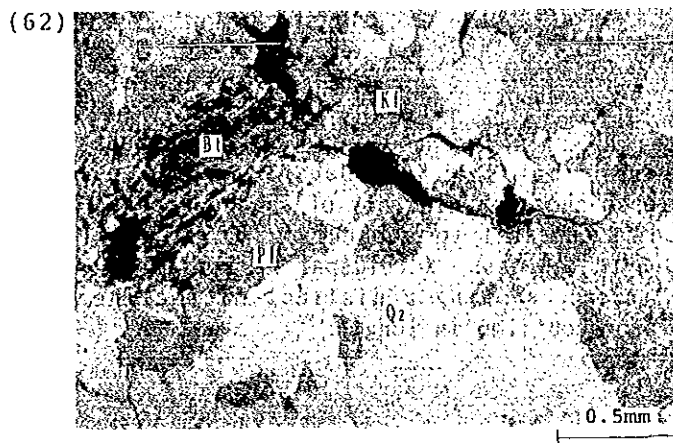
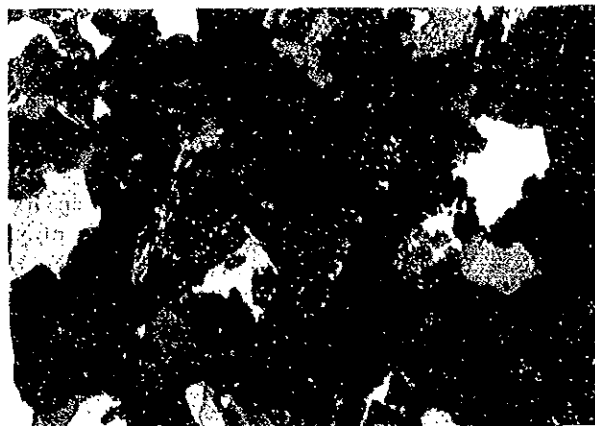
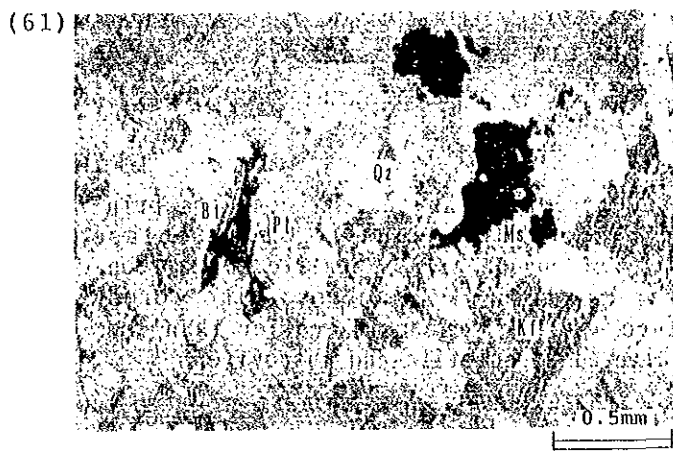
(64)

Sample No. : 3UN2  
Locality : Olon-Ovoot area  
Rock name : Gabbro  
Observation note :

This specimen is dark greenish gray, fine-grained gabbro. It consists principally of plagioclase(labradorite-oligoclase), augite and green hornblende and subordinately of opaque oxide, quartz, K-feldspar and apatite. Plagioclase occurs as euhedral prismatic crystals, 0.2-1mm in length, highly zoned with sericitized core. Augite occurs as euhedral to subhedral crystals, about 0.5mm in length, showing a sector zoning and commonly mantled by hornblende. Quartz and K-feldspar occur interstitially and show a micrographic intergrowth. Mafic minerals are considerably altered to chlorite, epidote and calcite.

Plane polarized light

Crossed polarized light



(65)

Sample No. : 3UN3

Locality : Olon-Ovoot area

Rock name : Granite

Observation note :

This specimen is pale pink, medium-grained granite. It consists principally of K-feldspar(microcline-microperthite), quartz, plagioclase (oligoclase) and biotite and subordinately of opaque oxide, apatite and zircon. K-feldspar and quartz occur as anhedral crystals, 1-4mm across, the former showing a distinct microcline structure. Plagioclase is smaller than 1mm. Biotite, smaller than 0.5mm, is partly altered to chlorite and muscovite.

(66)

Sample No. : 3UN4

Locality : Olon-Ovoot area

Rock name : Granodiorite

observation note :

This specimen is yellowish gray, medium-grained granodiorite. It consists principally of plagioclase(oligoclase), quartz, K-feldspar(microcline-microperthite), biotite and green hornblende and subordinately of sphene, opaque oxide, apatite and zircon. Plagioclase is euhedral to subhedral, 0.5-4mm in length. Quartz is subhedral granular, 0.5-5mm across. K-feldspar is less abundant and anhedral interstitial, 0.5-5mm across, showing a distinct microcline structure. Both hornblende and biotite are about 1mm in length.

(67)

Sample No. : 3UN5

Locality : Olon-Ovoot area

Rock name : Alkali rhyolite

Observation note :

This specimen is pale purple, aphyric alkali rhyolite with flow structure. Small amount of phenocryst(anorthoclase, quartz and biotite) are contained. Anorthoclase phenocryst, about 1mm in length, forms a glomeroporphyritic aggregate. Groundmass shows a microcrystalline to cryptocrystalline texture and consists of quartz, anorthoclase, microspherulite, trydimite (or cristobalite), biotite, opaque oxide, topaz and microlite.

(68)

Sample No. : 3UN7

Locality : Hanbogd

Rocks name : Alkali granite

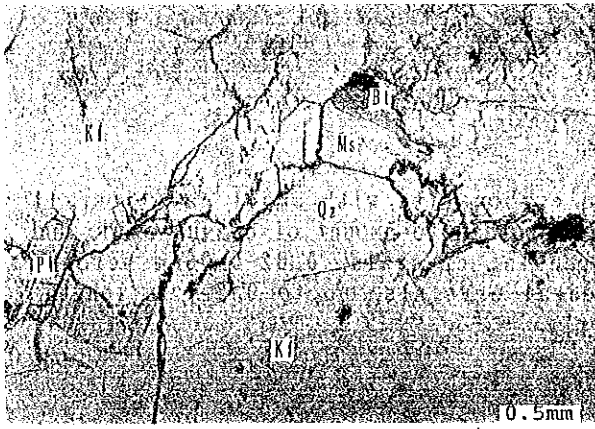
Observation note :

This specimen is light brownish yellow, medium-grained alkali granite. It consists of K-feldspar(microcline-microperthite), quartz, aegirine, arfvedsonite and plagioclase(oligoclase) in a decreasing order. K-feldspar occurs as euhedral to subhedral crystals, 1-5mm in length. Quartz occurs as anhedral interstitial crystals, smaller than 5mm. Aegirine occurs as euhedral to subhedral crystals, smaller than 2mm, giving a pleochroism from yellowish green to green, distinctly zoned. Arfvedsonite occurs as an euhedral to subhedral crystals, smaller than 3mm, gives a pleochroism from yellowish green to blue-gray and shows often an intergrowth with aegirine.

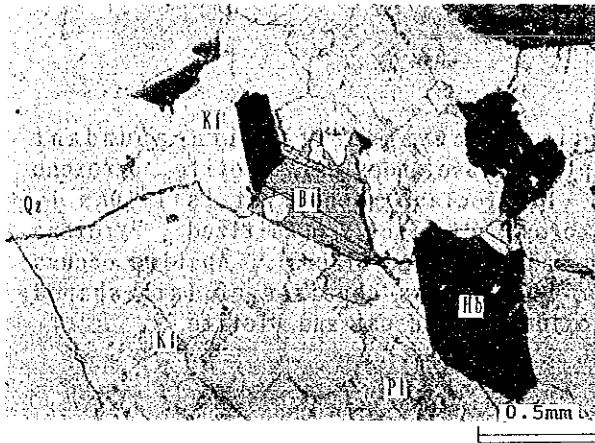
Plane polarized light

Crossed polarized light

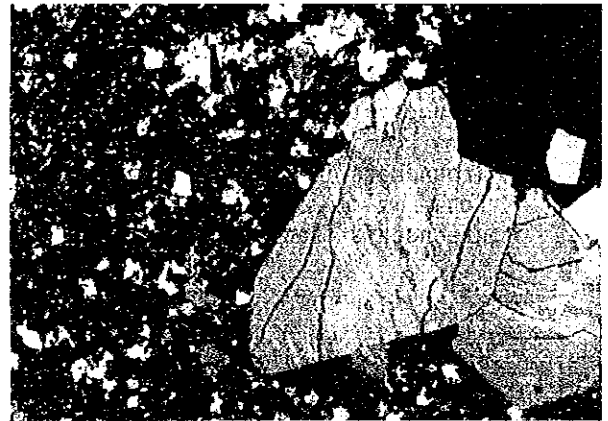
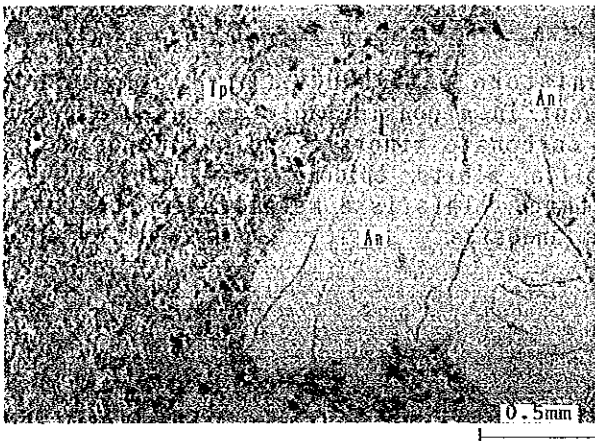
(65)



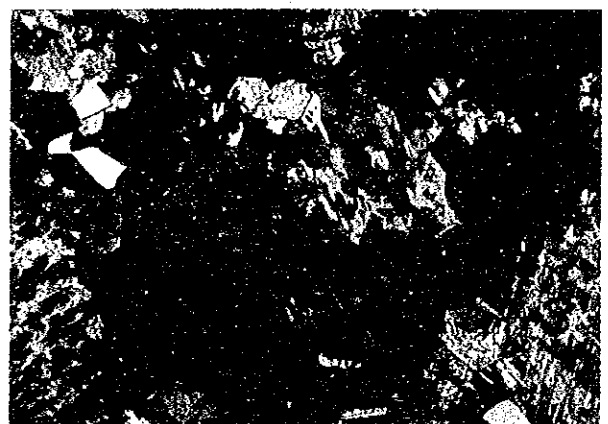
(66)



(67)



(68)



(69)

Sample No. : 3UN18  
Locality : Mushugia-Hudak  
Rock name : Carbonatite  
Observation note :

This specimen is gray, fine-grained carbonatite with small cavities. It consists of calcite and fluorite with subordinate amount of opaque oxide and quartz. Calcite occurs as anhedral granular crystals, 0.02-0.05mm across. Fluorite occurs as euhedral to subhedral crystals, up to 0.2mm in length, larger ones being colorless with pruple rim.

(70)

Sample No. : 3UN19  
Locality : Mushugia-Hudak  
Rock name : Trachyandesite  
Observation note :

This specimen is gray porphyritic trachyandesite with abundant phenocrysts. Phenocryst minerals are plagioclase(andesine), biotite, pyroxene (pseudomorph), apatite and opaque oxide. Plagioclase phenocryst is 1-10mm in length. Biotite phenocryst is 0.5-1mm across, distinctly opacitized. Pyroxene phenocryst is wholly altered to smectite and carbonate mineral. Apatite occurs as relatively large crystals, up to 1mm. Goundmass consists of lath-shaped plagioclase(smaller than 0.1mm), opaque oxide, K-feldspar and biotite.

(71)

Sample No. : 3UN19  
Locality : Mushugia-Hudak  
Rock name : Meta-andesite  
Observation note :

This is dark greenish gray, schistose meta-andesite. Plagioclase phenocrysts, 0.5-2mm in length, are present in a considerable amount but now they are wholly replaced by clay and carbonate minerals and opaque oxide. Groundmass is recrystallized into actinolite, albite, epidote and opaque oxide, forming an evident schistose structure. This is a metamorphic rock of greenschist facies, probably derived from andesite.

(72)

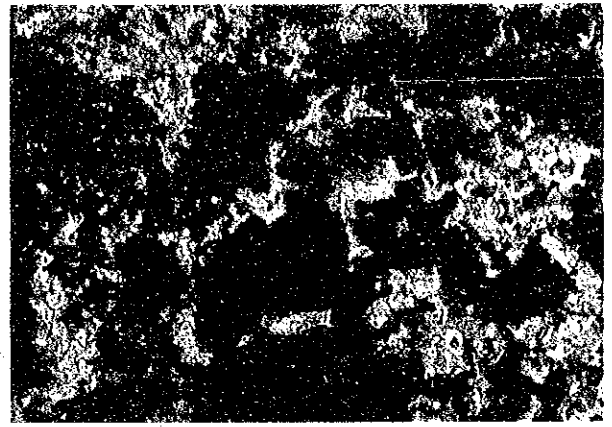
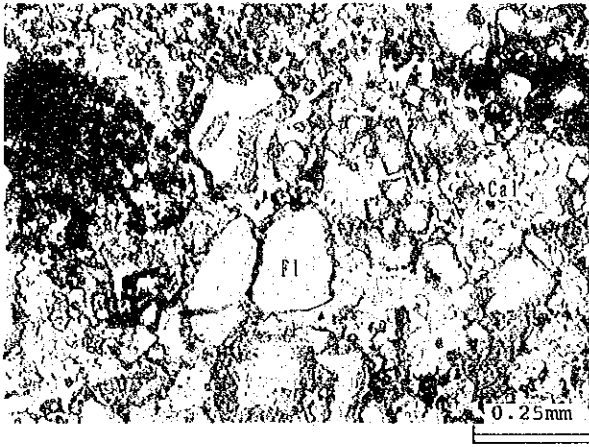
Sample No. 3US9  
Locality : Mushugia-Hudak  
Rock name : Carbonatite  
Observation note :

This specimen is reddish brown to black carbonatite with large hematite crystals. It consists of celestite, fluorite, calcite, quartz, hematite and goethite. Celestite occurs as colorless anhedral granular crystals, 0.1-0.5mm across. Small cavities, up to 1mm, are present in a considerable amount.

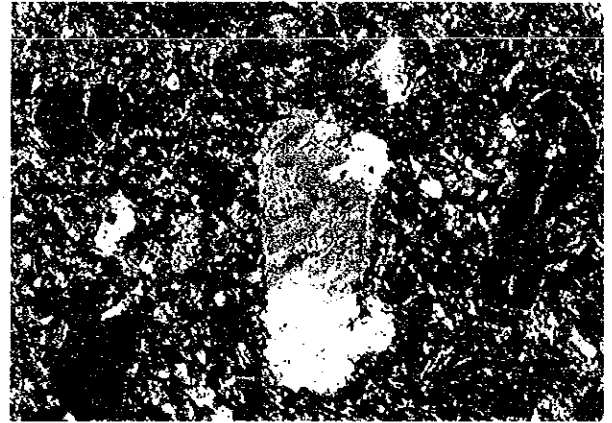
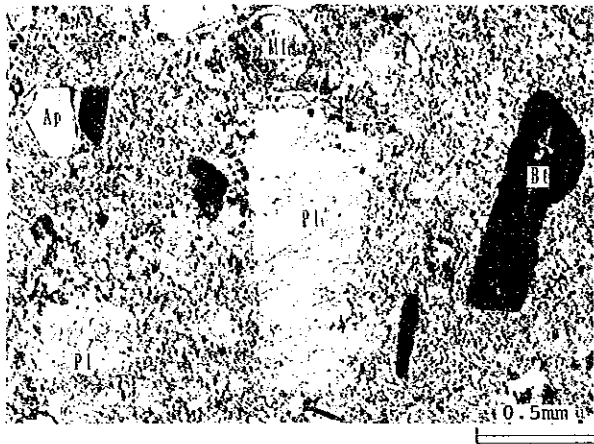
Plane polarized light

Crossed polarized light

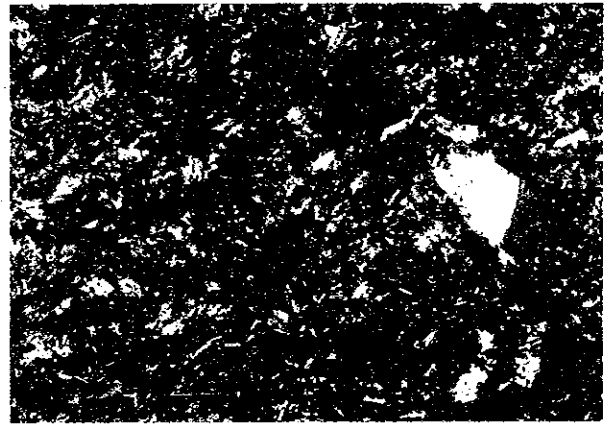
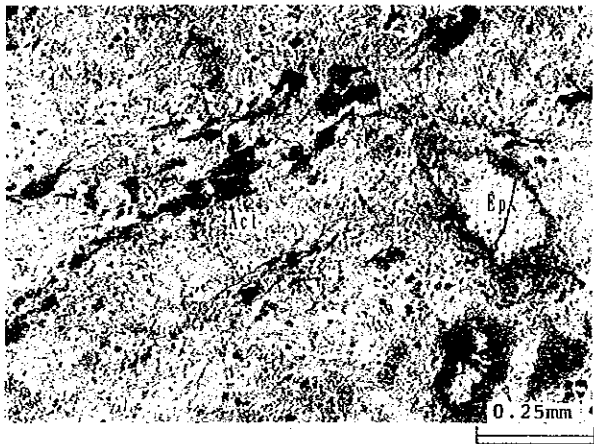
(69)



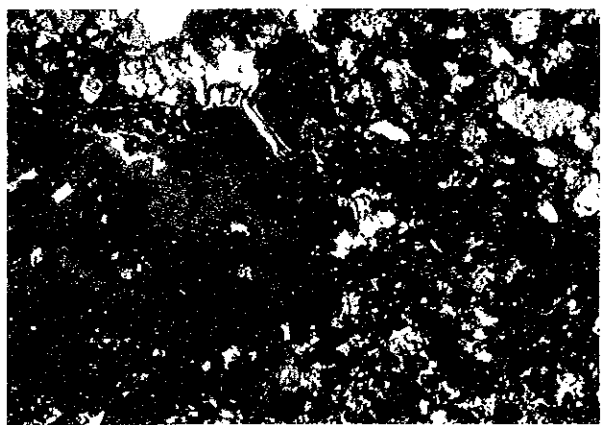
(70)



(71)



(72)



(73)

Sample No. : 3US19

Locality : Mushugia-Hudak

Rock name : Syenite

Observation note :

This specimen is yellowish gray, porphyritic syenite. It consists of K-feldspar (probably microcline), clinopyroxene and small amount of plagioclase (oligoclase), biotite, phlogopite, sphene, apatite and opaque oxide. K-feldspar occurs mostly as large phenocrysts, up to 2cm in length, and also as small granular crystals, usually 0.2-0.5mm across, both showing a microperthitic structure. Clinopyroxene, probably sodian augite, occurs as euhedral to subhedral crystals, smaller than 2mm, giving a pale green color. Small amount of zeolite, probably laumontite, are present as cavity-filling minerals.

(74)

Sample No. : 3US22

Locality : Mushugia-Hudak

Rock name : Gabbro

Observation note :

This specimen is dark gray, fine-grained gabbro showing an ophitic texture. It consists of principally of plagioclase (labradorite-andesine) and augite and subordinately of olivine (pseudomorph), actinolite, sphene, opaque oxide and apatite. Plagioclase is slender prismatic, 0.5-1mm in length. Augite occurs as anhedral, sometimes poikilitic crystals, up to 3mm in length, replaced partly by actinolite. Olivine is wholly changed into actinolite and chlorite.

(75)

Sample No. 3US24

Locality : Mushugia-Hudak

Rock name : Phonolite

Observation note :

This specimen is gray porphyritic phonolite. Phenocryst minerals are of plagioclase (andesine), augite, biotite, olivine, apatite and opaque oxide. Plagioclase phenocrysts, up to 5mm in length, show often a distinct zoning. Augite phenocrysts, probably sodian augite, up to 2mm in length, give a pale green color. Groundmass consists of nepheline, K-feldspar, clinopyroxene, biotite and opaque oxide. Nepheline is most abundant in the groundmass as anhedral crystals, smaller than 0.5mm across.

(76)

Sample No. 3US36

Locality : Olon-Ovoot

Rock name : Quartz vein

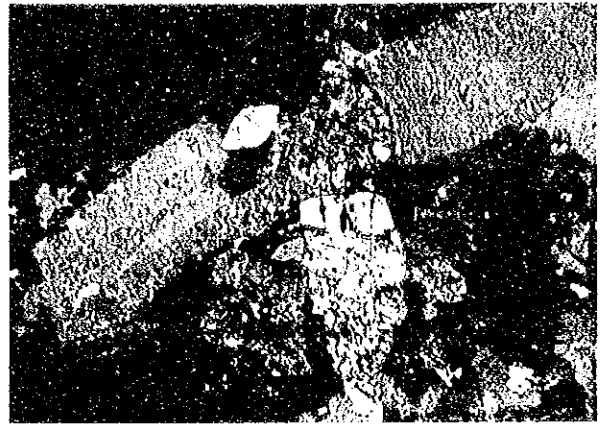
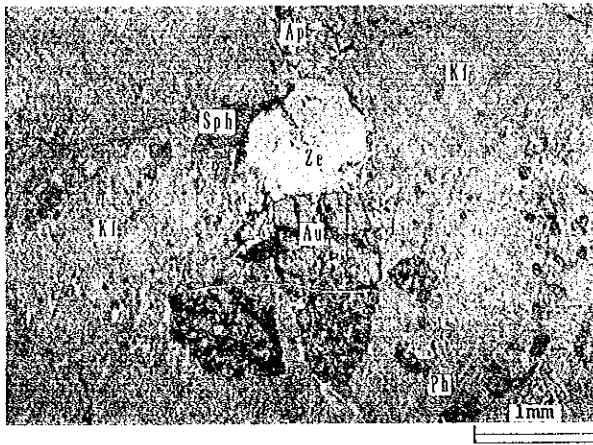
Observation note :

This specimen is pale brownish white quartz vein with calcite and hematite veinlets. It is made up of quartz subgrain which shows an undulatory extinction and sutured structure.

Plane polarized light

Crossed polarized light

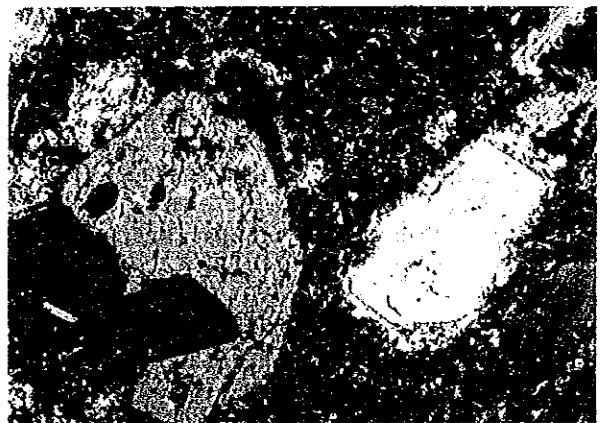
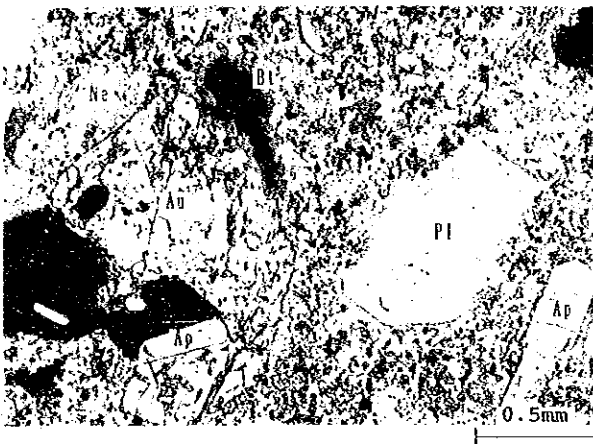
(73)



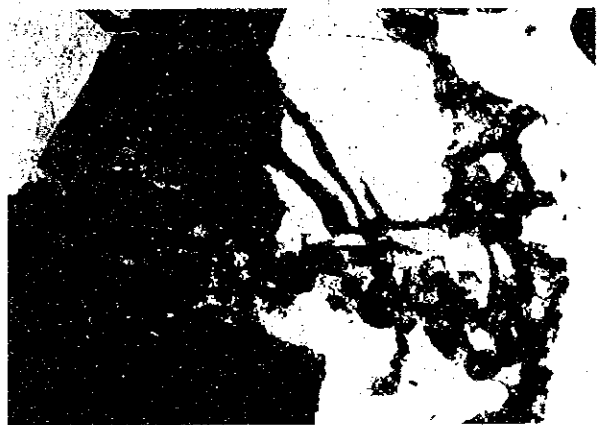
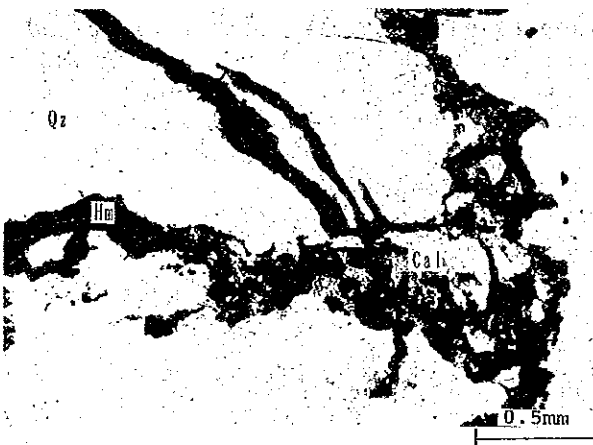
(74)



(75)



(76)





(77)

Sample No. 3US40

Locality : Olon-Ovoot

Rock name : Quartz vein

Observation note :

This specimen is pale brownish white quartz vein with hematite veinlets. It is made up of quartz subgrain which shows an undulatory extinction and sutured structure.

(78)

Sample No. : 3US52

Locality : Olon-Ovoot

Rock name : Meta-dolerite

Observation note :

This specimen is dark greenish gray meta-dolerite. It consists primarily of plagioclase, mafic mineral and opaque oxide, showing an ophitic texture. Plagioclase occurs as long prismatic crystals, 0.5-2mm in length, now largely replaced by chlorite and epidote. Mafic minerals, probably pyroxene or hornblende, are wholly changed into chlorite, actinolite and epidote. This rock is injected by epidote veinlet.

(79)

Sample No. : 3US83

Locality : Bayan-Hoshoo

Rock name : Apatite-biotite rock

Observation note :

This specimen is brownish black, fine to medium-grained apatite-biotite rock with small cavities. It shows a banded structure due to the difference in grain size. The photomicrograph is taken from coarse-grained band. Biotite, up to 5mm in length, is randomly oriented, showing a decussate texture. Apatite is anhedral granular crystal, up to 0.5mm across, showing a granoblastic texture. An apatite veinlet is also recognized in this rock. Small amount of fluorite and carbonate mineral are present.

(80)

Sample No. : 3US101

Locality : Bayan-Hoshoo

Rock name : Monzonite

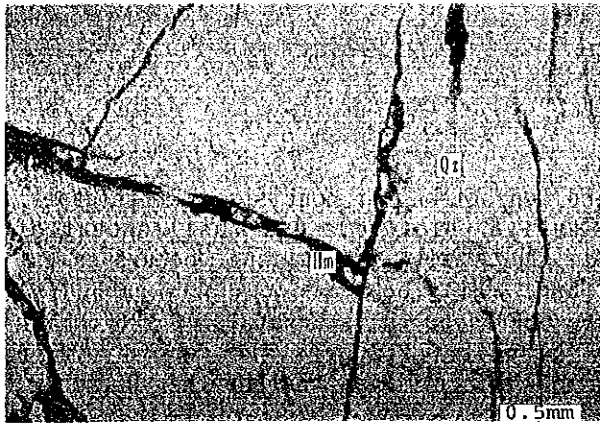
Observation note :

This specimen is gray, medium-grained monzonite. It consists of plagioclase (andesine-oligoclase), K-feldspar, clinopyroxene, biotite, opaque oxide and apatite with a small amount of sphene and green hornblende. Plagioclase is subhedral crystal, up to 5mm, distinctly zoned and mantled by K-feldspar. K-feldspar occurs mostly as anhedral granular crystals, smaller than 1mm, clouded by hematite inclusions. Clinopyroxene, probably sodian augite, occurs as euhedral to subhedral crystals, up to 2mm in length, giving a pale green color. Biotite(or phlogopite) gives a pleochroism from very pale yellow to pale brown. Apatite is rather abundant, up to 2mm in length.

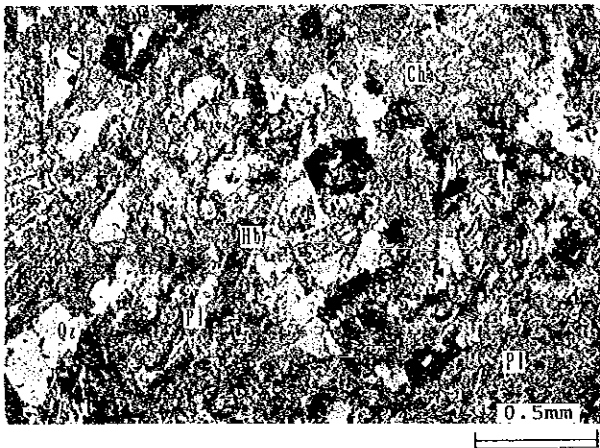
Plane polarized light

Crossed polarized light

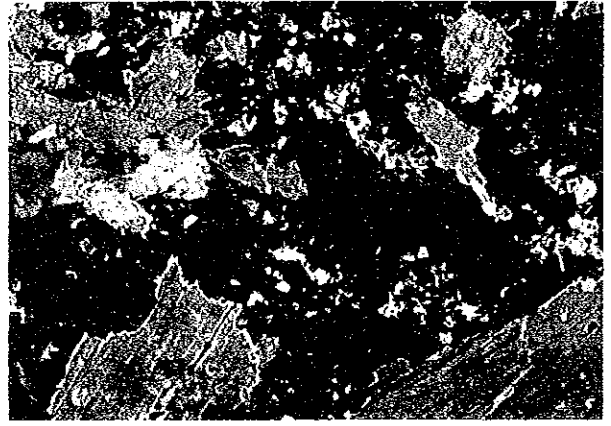
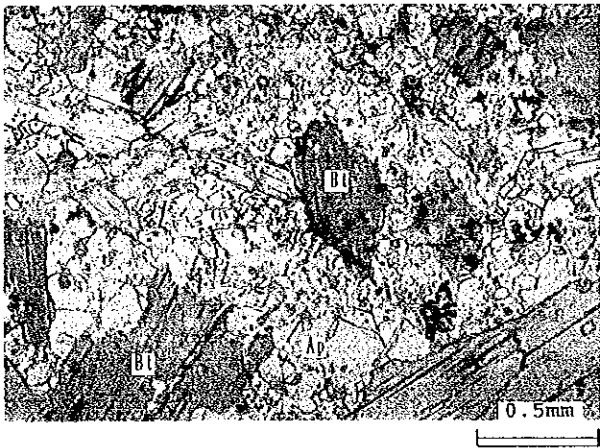
(77)



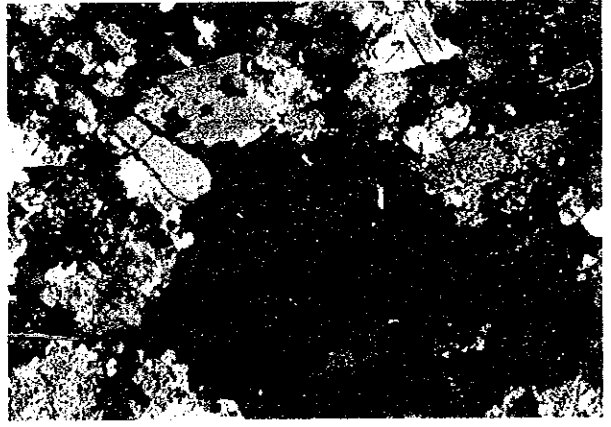
(78)



(79)



(80)



(81)

Sample No. : 3US104  
Locality : Bayan-Hoshoo  
Rock name : Monzonite  
Observation note :

This specimen is gray, fine-grained monzonite. It consists of K-feldspar, (orthoclase), plagioclase(oligoclase), augite, biotite and a small amount of quartz, green hornblende, opaque oxide and apatite. K-feldspar occurs as anhedral granular crystals, smaller than 5mm. Plagioclase occurs as subhedral crystal, about 1mm in length. Augite occurs as small crystals, 0.2-0.5mm in length. Biotite(or phlogopite) occurs as poikilitic crystals, up to 2mm in length. Quartz occurs as anhedral interstitial crystals, smaller than 0.2mm.

(82)

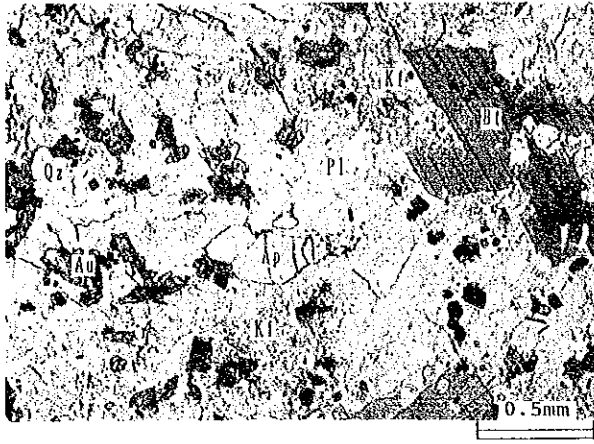
Sample No. : 3UY5  
Locality : Tsogt-Ovoo  
Rock name : Granite  
Observation note:

This specimen is pale reddish brown, fine-grained granite showing a micrographic texture. It consists of plagioclase(oligoclase), K-feldspar (orthoclase-microperthite), quartz, biotite, green hornblende and a small amount of opaque oxide and apatite. Plagioclase occurs as euhedral prismatic crystals, 0.5-3mm in length, often mantled by K-feldspar and highly saussuritized. K-feldspar occurs usually as subhedral to anhedral crystals, often intergrown with quartz, showing a micrographic texture. Biotite and green hornblende, both 0.2-3mm in length, are mostly chloritized.

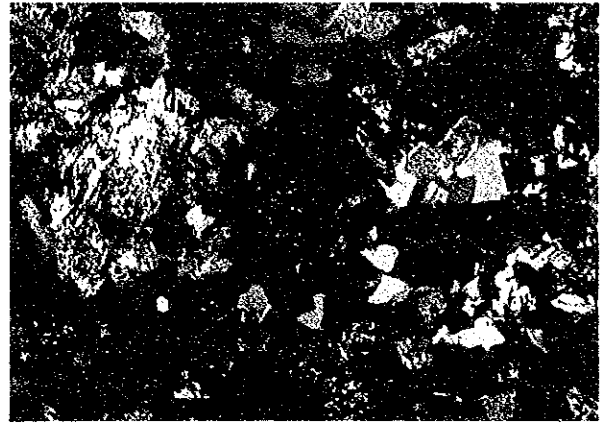
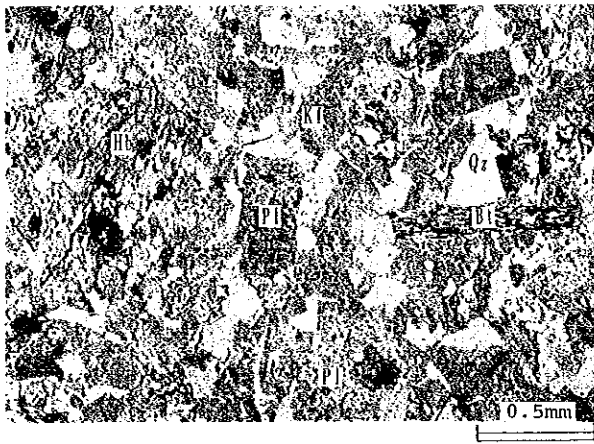
Plane polarized light

Crossed polarized light

(81)



(82)

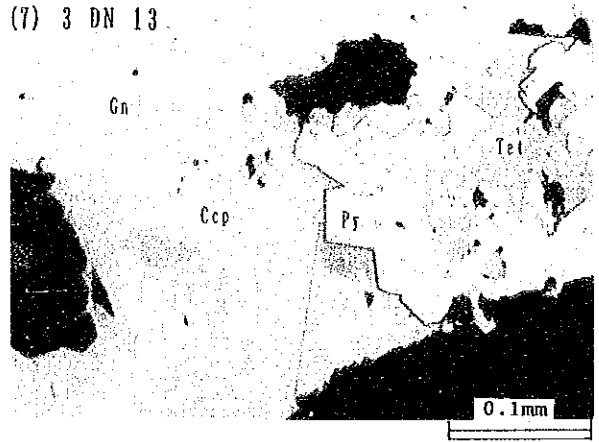
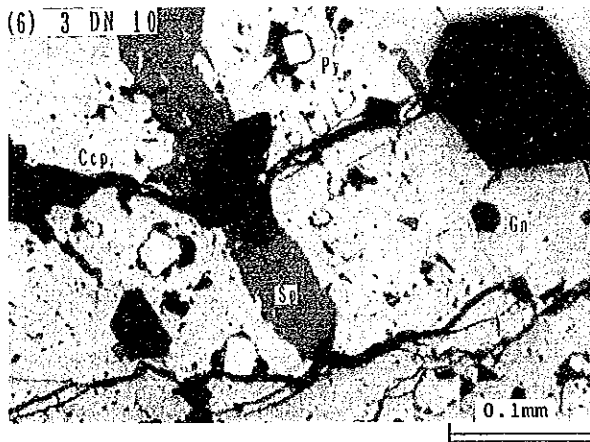
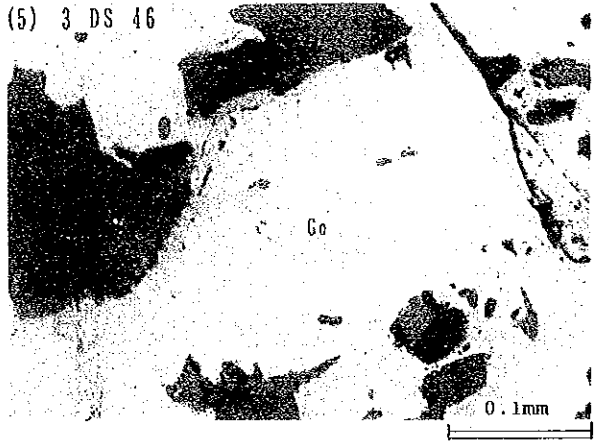
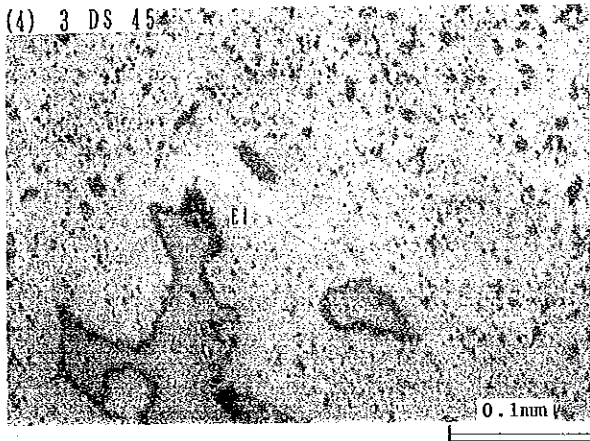
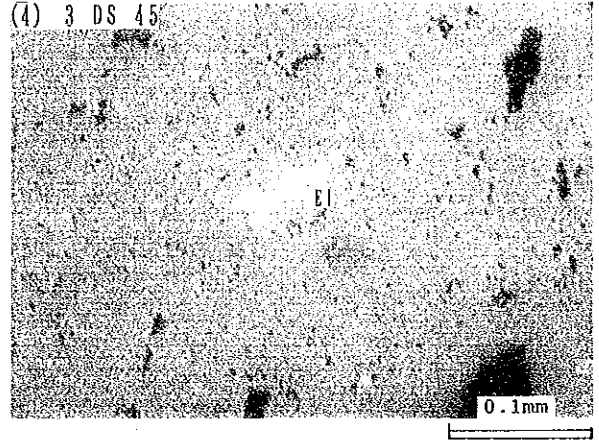
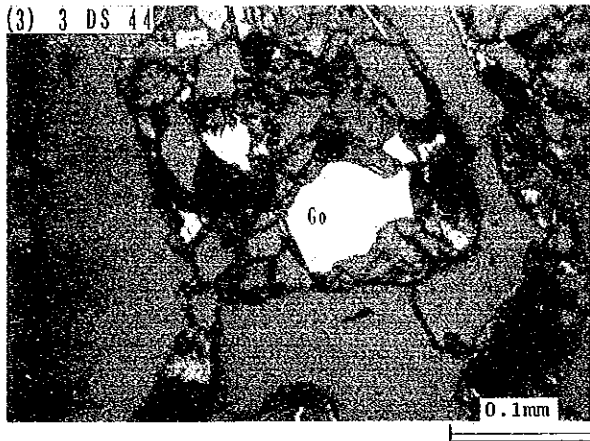
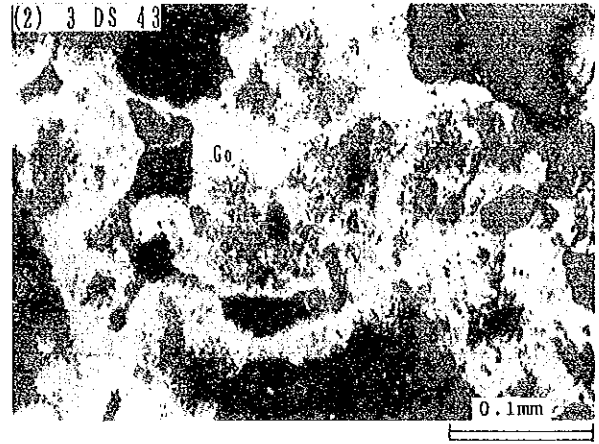
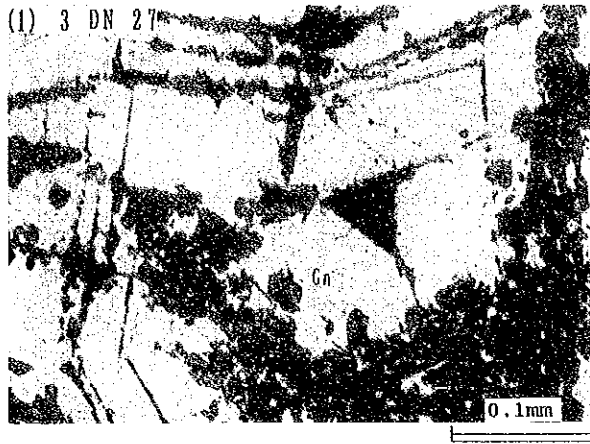




# A p p e n d i x 7

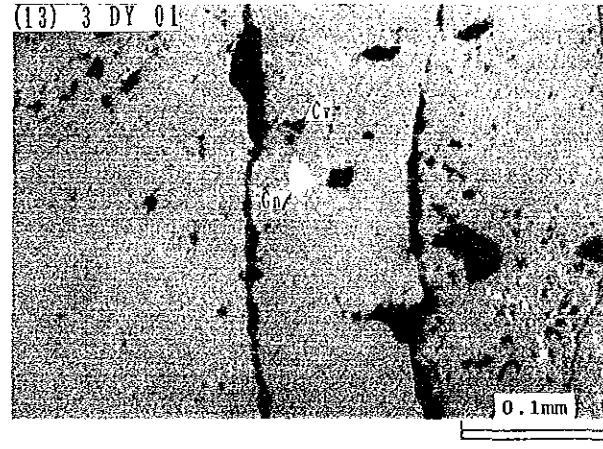
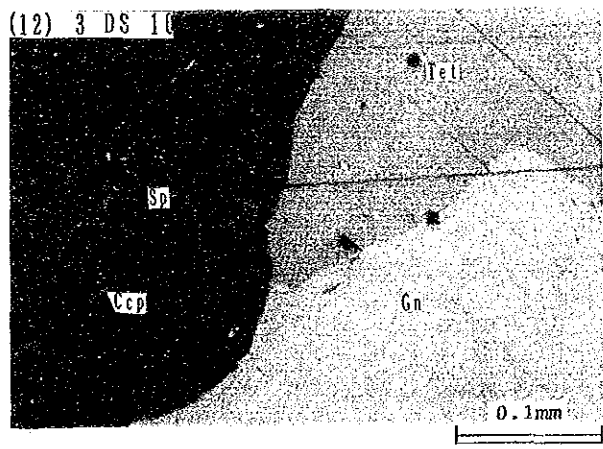
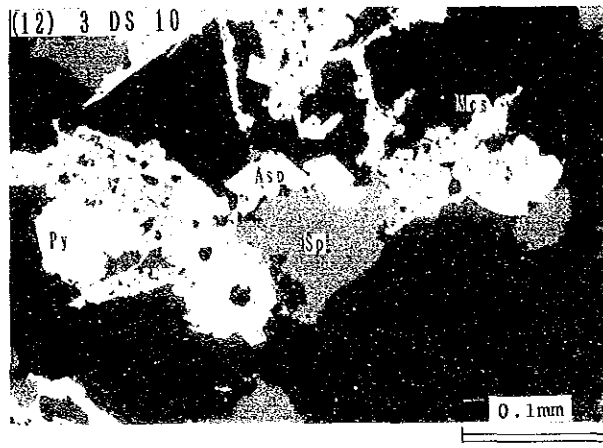
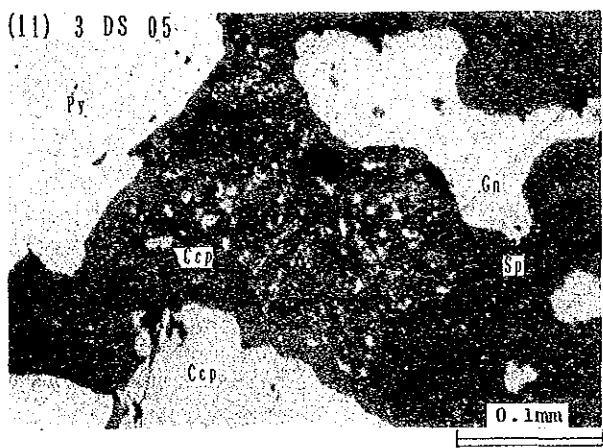
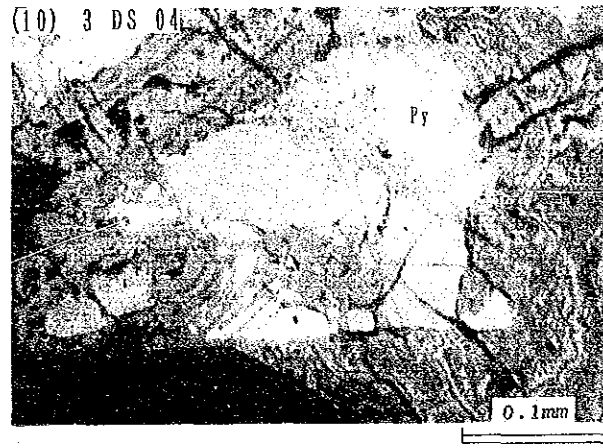
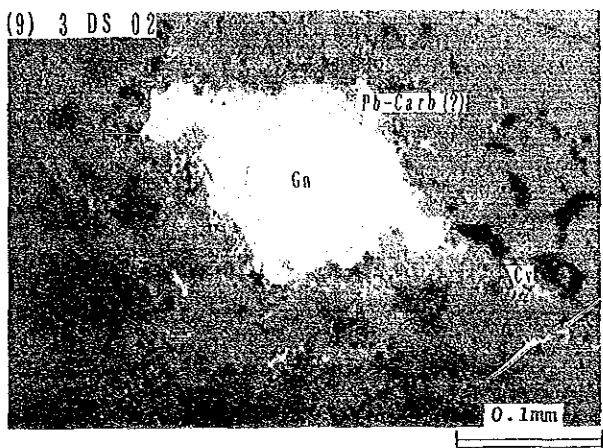
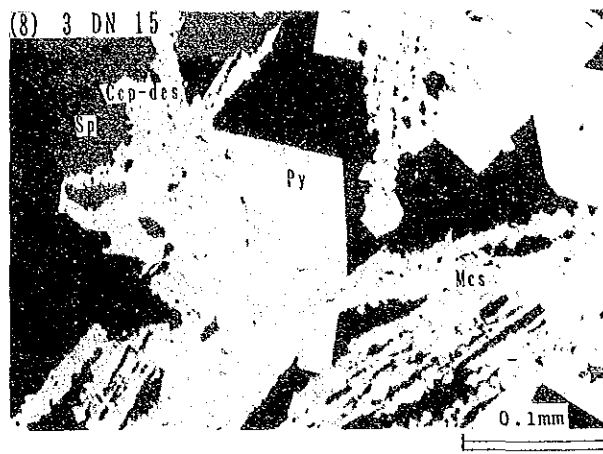
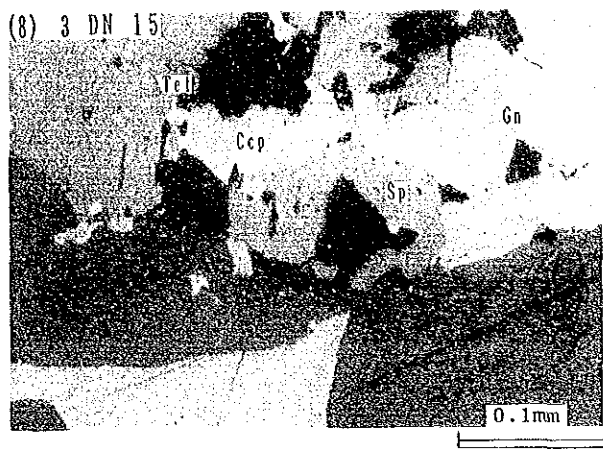
Microscopic Observations and Photomicrographs (Polished Section)



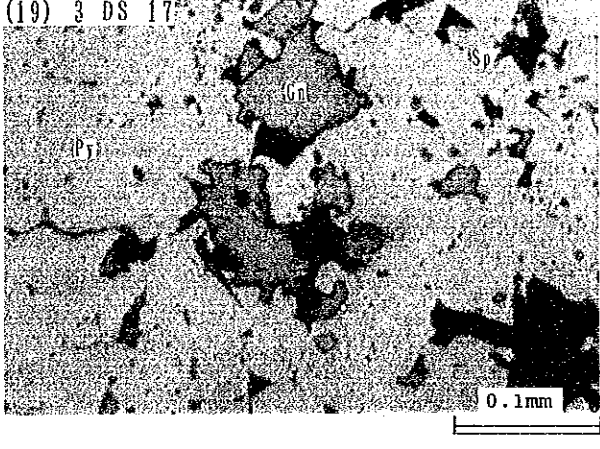
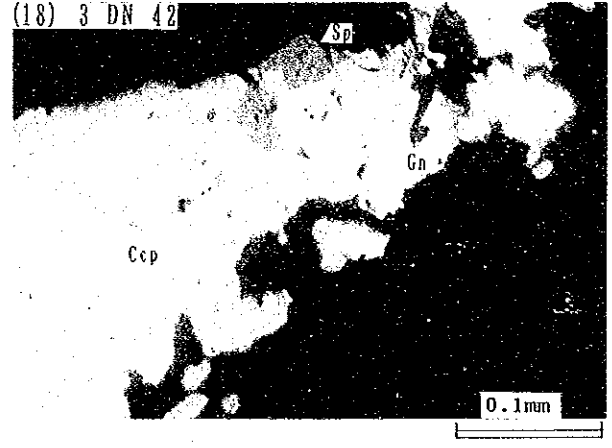
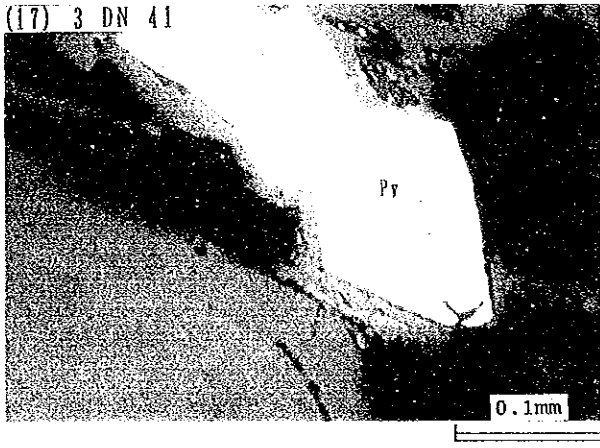
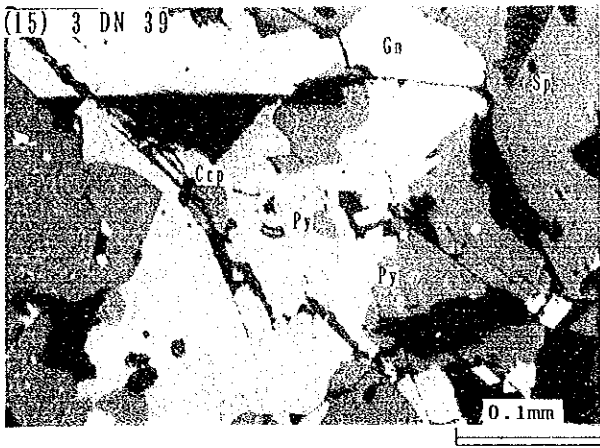
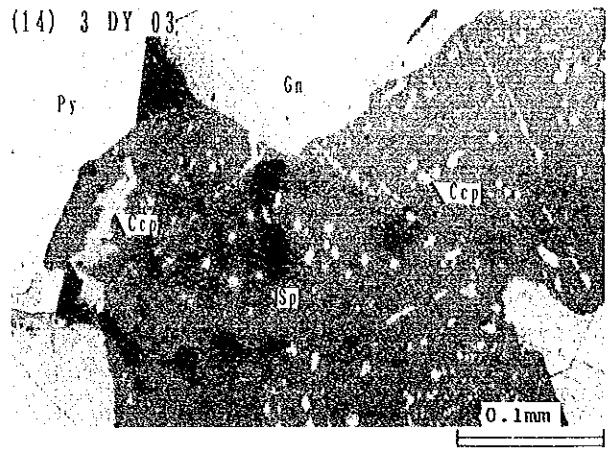
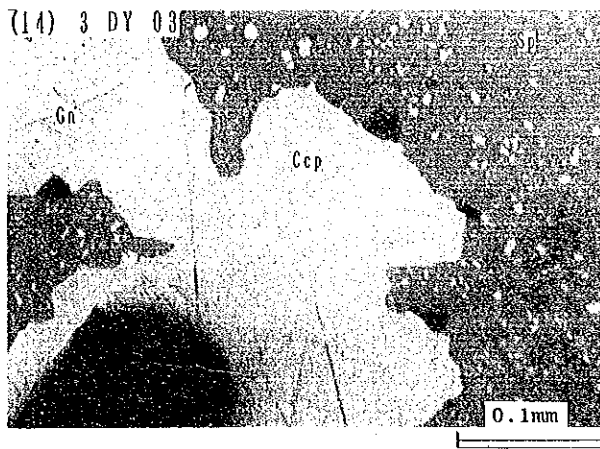






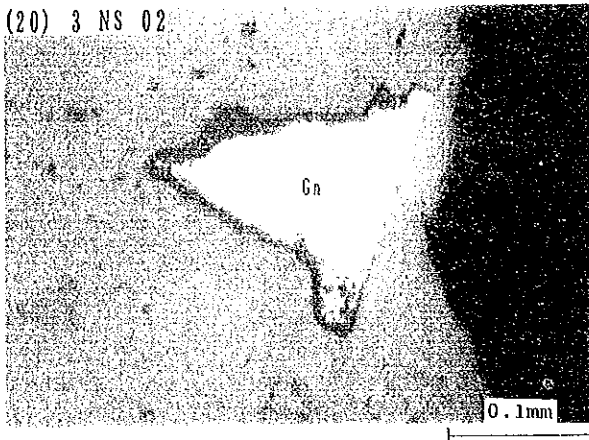




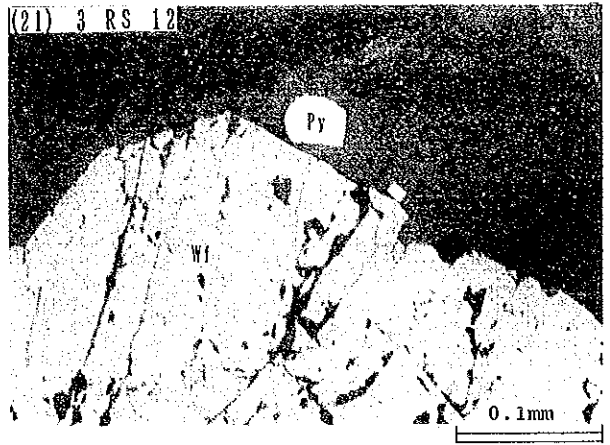




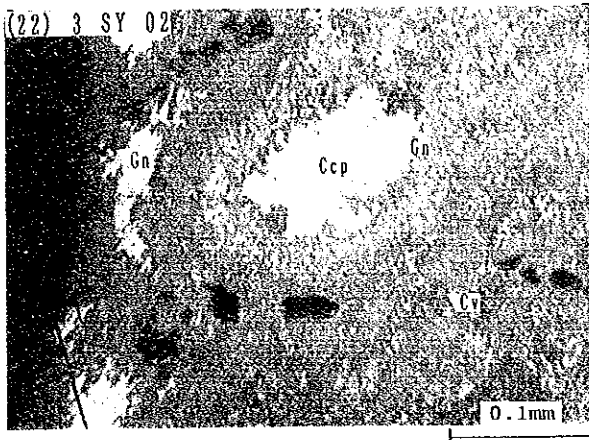
(20) 3 NS 02



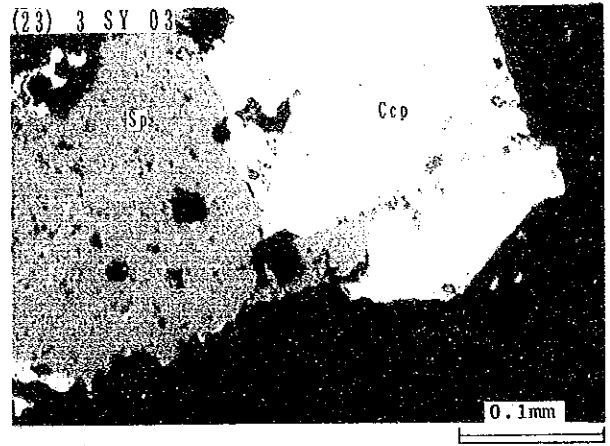
(21) 3 RS 12



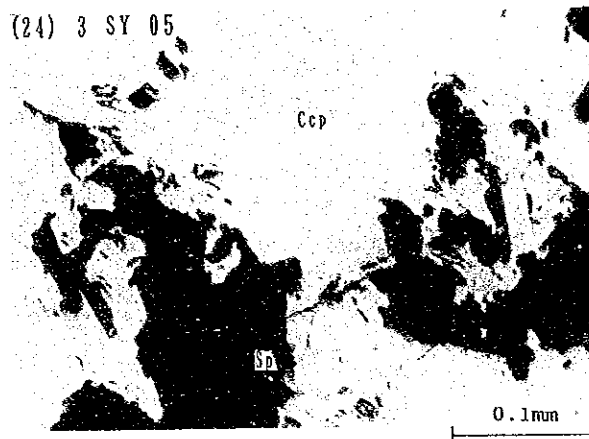
(22) 3 SY 02



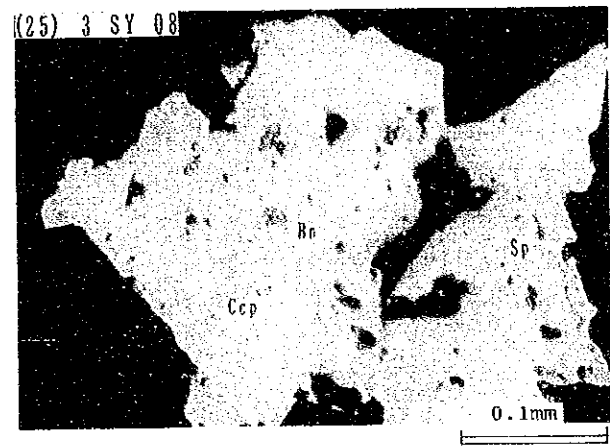
(23) 3 SY 03



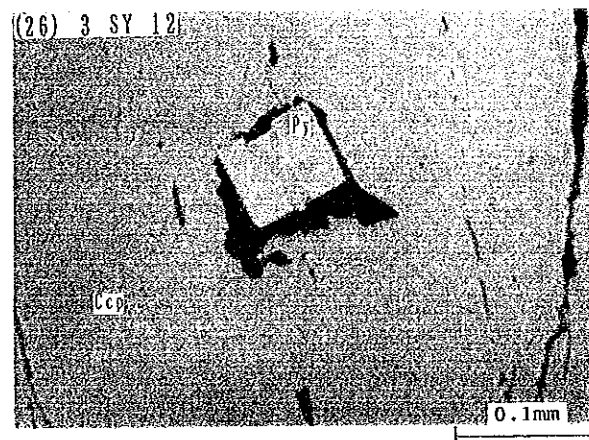
(24) 3 SY 05



(25) 3 SY 08



(26) 3 SY 12



(26) 3 SY 12

