ANORTHOSITIC GABBRO: CUMULATE METEORITE FROM ANTARCTICA; K. Yanai,
Department of Antarctic Meteorites, National Institute of Polar Research,
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173, Japan

Meteorite Asuka-31 (tentative name) was discovered on the western ice
field of Nansenisen (Nansen Ice Field), 75km south of the Sør Rondane
Mountains (71°-73°S, 21°-29°E) in the Queen Maud Land, Antarctica by Japa-
nese party December 1988. In the field Asuka-31 was collected as one of
unusual specimens of meteorites which were collected over 2,000 specimens
of more in total including Asuka-87 and Asuka-88 meteorites.

General petrography: Asuka-31 is near half kilograms and almost half
stone covered with black-shiny fusion crust and pale brownish gray interi-
or with some black spots and lot of quartz like translucent spots. It
appeared to coarse-grained and unbrecciated stone looks like typical coarse-
grained cumulate eucrite or ureilite meteorites. Preliminary examinations
of thin section of the specimen shows that Asuka-31 is a coarse-grained
and unbrecciated rock, consisting mainly of pyroxene and plagioclase (com-
plete maskelynite) with ilmenite and fine troilite. Asuka-31 is a typical
subhedral granular and has a cumulate texture consisting of chains of py-
roxene and isolated plagioclase crystals, ranging 2-4mm, 1-3mm respective-
ly. Interstitial glass and shock melting glass in situ is not present.
The mode of Asuka-31 is roughly 59% pyroxene, 30% plagioclase, 6% ilmenite
and 5% others including troilite, aggregates and fusion crust. Electron
microprobe analyses indicate that the glass fusion crust is very closed
chemically to the whole rock composition.

Pyroxene: Pyroxene is by far the most abundant component of the rock. It
is almost colorless and occurs as subhedral cataclastic grain showing wavy
extinction do to shock effect. The pyroxene range from En8.5-43.6,
Fs30.7-68.2, Wolf1.6-38.5, showing compositionally heterogeneous, although
not zoned in any manner. Pyroxenes were plotted in wide range of Gabbro-
Ferro-Gabbro region, however no pyroxenes were plotted over En50 (Fig.1).

Plagioclase: Plagioclase appear as complete maskelynite and occur as iso-
lated grains in chains of pyroxene crystals, however twining and zoning
are not recognized. Most of the plagioclase are remarkably Ca-rich (An
85-96, Av 91.9). Only few grain of plagioclase among several dozen ana-
lyzed ran as low as An74, Ab23, Or3.4.

Opaque minerals and fusion crust: Only ilmenite and troilite occur as
opaque minerals. Ilmenite is subhedral-isolate grain within pyroxene and
pyroxene-plagioclase, ranging 2-3mm. Troilite is fine grain of 10-30
microns. Most of troilite and some ilmenite grains were rimmed by
sympylektite like fine pyroxene aggregates. The fusion crust looks like
very fresh shows green color with many fine bubbles.

Discussion: In mineralogy and texture Asuka-31 has many similar features
those of eucrites with cumulate texture than lunar rocks. However the
FeO/MnO ratio of Asuka-31 shows to be plotted within the range of lunar
pyroxenes and lunar whole rocks, which differs markedly from the ratio of
achondrites (Fig.2). Oxygen isotope analysis by R. Clayton also strongly
supported that Asuka-31 is lunar origin. The bulk composition indicate
that Asuka-31 is one of rocks from moon mare region, not highland as Fig.3. and Fig.4. which show FeO-MgO and Al₂O₃-TiO₂ values respectively. It constrains especially related to very low Ti(VLT) lunar mare basalt as Fig.5. which shows Mg/ (Mg+Fe)-TiO₂ value, but the texture is plutonic, not volcanic.

Conclusion: In mineralogy, texture and chemistry Asuka-31 is meteorite that was originated from moon mare region, however it indicates plutonic and no shallow facies. Asuka-31 is preliminary identified as a new type named anorthositic gabbro cumulate meteorite.