

EET 14017: NEWLY RECOVERED LL3.0 CHONDRITE FROM VICTORIA LAND, ANTARCTICA

Changkun Park and Jong Ik Lee*

Korea Polar Research Institute, Incheon, Korea

changkun@kopri.re.kr

ABSTRACT

Chondrites are classified into type 1 to 6 that refer to aqueous alteration (type 1-2) and thermal metamorphism (type 4-6) of the originally primitive chondrites (type 3) on their parent bodies. Type 3 chondrites are subclassified into 3.0 to 3.9 by the metamorphic grade, the most primitive 3.0 to mildly metamorphosed 3.9. Type 3.0 chondrites are of great interest in chosmochemistry because they preserve chemical and isotopic records of the early Solar System. Here we report a newly recovered type 3.0 ordinary chondrite.

Elephant Moraine 14017 (EET14017) was recovered from Elephant Moraine, Victoria Land, Antarctica, 2014/15 season by Korea Expedition for Antarctic Meteorites. A polished thin section of EET14017 was studied using optical microscopy, X-ray mapping, and electron microprobe analysis.

EET14017 is classified as an LL chondrite based on large chondrules (0.9mm in average, up to 2mm) and low metal abundance (<1 vol %). Olivines and pyroxenes within chondrules show sharp extinction on cross-polarized light, indicating a low shock grade (S1). Moderate oxidation of metal by terrestrial weathering is observed (W2). Mesostases of chondrules are mostly glassy with variable amounts of nucleates, indicating petrologic type 3. Relict forsterites are observed in some Fe-rich chondrules. Ferroan olivine grains in chondrules contain 0.44 ± 0.18 (1s.d.) wt% of Cr_2O_3 which characterizes EET14017 as one of the most primitive chondrite (type 3.0). Because Cr rapidly exsolves from olivine during heating (Grossman & Brearley, 2005), such amount of Cr in olivine indicates that EET14017 have avoided even weak thermal metamorphism on the parent body. Chromium is present in some Fe-Ni metal grains of magnesian chondrules, also supporting that EET14017 is the type 3.0 chondrite based on the fact that Cr is easily oxidized from metal grains even at low degree of thermal metamorphism (Zanda et al., 1994). An Al-rich chondrule consists of dendrites of olivine and Ti-bearing pyroxene and glassy mesostasis. Sodium in the mesostasis is concentrically zoned, with enrichments in the chondrule rim, possibly due to aqueous alteration on the parent body (Grossman et al., 2002).

EET14017 is the most primitive chondrite in the collection of the Korea Curation of Antarctic Meteorites. It is expected that the chondrite give us great chances to study primitive signatures of the early Solar System, including presolar grains in the matrix, extinct radionuclides (^{26}Al and ^{60}Fe) in chondrule minerals, relict olivines in Fe-rich chondrules, and aqueous alteration phases.