Goldschmidt Medal Abstract

Deuterium- and ^{15}N-signatures of organic globules in Murchison and Northwest Africa 801 meteorites

MINAKO HASHIGUCHI[1*], SACHIO KOBAYASHI[2], HISAYOSHI YURIMOTO[2]

[1] Japan Aerospace Exploration Agency (JAXA) , Sagamihara, 252-5210, Japan. (*hashiguchi@planeta.sci.isas.jaxa.jp)
[2] Hokkaido University Sapporo 060-0810, Japan

Organic materials are one of the important starting materials of solar system, and are preserved in primitive extraterrestrial samples. Many studies have reported significant isotopically anomalous organic materials with deuterium (D)- and/or ^{15}N enrichments in primitive meteorites [e.g. 1-3]. They are believed to be primitive organic materials. Their H and N isotopic compositions are heterogeneous, thus, investigation of characteristics of each of them provides us important information of origin and/or evolution history of the extraterrestrial organic materials [2, 3].

We surveyed isotopically anomalous organic materials in polished thin sections of Murchison (CM2) and Northwest Africa (NWA) 801 (CR2) by in situ H and N isotope ratio imaging using HokuDai isotope microscope system [4]. Then, identification and observation of the organic materials were performed using FE-SEM-EDS.

Organic materials with significant D- and/or ^{15}N-enrichments were identified in the matrix of Murchison and NWA 801. They occur as a submicron-sized globule or aggregate of several globules or particles. Maximum value of their D- and ^{15}N-enrichments of were 2,920‰ and 2,620‰ for Murchison, and 7,920‰ and 2,150‰ for NWA 801, respectively. In both meteorites, the D- and ^{15}N-enrichment are uncorrelated in a organic material. Proportion of D-rich organic materials in Murchison is smaller than that in NWA 801. These results show that the D-enrichments are easily modified during aqueous alteration processes on the parent body compared with ^{15}N-enrichments. We also concluded that the heterogeneous H and N isotopic composition of the organic materials are result from various origin of the isotope anomaly and secondary alteration. No obvious correlation between the morphology and the H and N isotopic compositions of the organic materials were shown, suggesting that their morphology might have been formed before and/or during accretion of the parent bodies of these meteorites.

[1] Nakamura-Messenger *et al.* (2006) *Science* **314**, 1439-1442. [2] Hashiguchi *et al*. (2013) *GCA* **122**, 306–323. [3] Hashiguchi *et al*. (2015) *Geochem. J*. **49**, 377–391. [4] Yurimoto *et al*. (2003) *Appl. Surf. Sci*. **203-204**, 793–797.