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Oxygen isotopic compositions of silicate grains associated with D-rich carbonaceous matters in a carbonaceous chondrite

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Organic matters enriched in D and/or 15N in chondrites are believed to have formed in cold molecular cloud and/or outer protoplanetary disk. The organic matters would be produced in ice coatings on interstellar dust grains in the cold interstellar cloud [e.g. 1].

In our previous study, we discovered D-rich carbonaceous matters in NWA 801 (CR2) carbonaceous chondrite using hydrogen isotope imaging, and classified their morphology [2]. Hydrogen isotopic compositions of these carbonaceous matters are 1360-11000 permil of delta-D. Some D-rich carbonaceous matters in the NWA 801 are ring shaped globules containing a silicate grain in the center (ring globule), and aggregates with silicate grains (globule aggregate).

In this study, we focus on the silicate grains associated with D-rich carbonaceous matters. Their oxygen isotope compositions were measured by isotope imaging using isotope microscope in Hokkaido University [3].

Oxygen isotopic compositions of the silicate grains analyzed here are not different from the isotopic composition of solar system. The results suggest that these silicate grains have formed in the solar system. Therefore, it is plausible that the ring globules and the globule aggregates were formed on the silicate grains in outer protoplanetary disk in the early solar system. However, it is difficult to reject a possibility that most presolar grains in the colud molecular cloud have similar oxygen isotopic compositions with materials formed in the solar system and the ring globules and globule aggregates have formed in the cold molecular cloud.

In the future work, we will measure the oxygen isotopic compositions of more numbers of ring globules or globule aggregates. The dataset will be helpful to reveal formation region of D-rich carbonaceous matters in meteorites.

References

[1] Li, A. and Greenberg, J. M. (1997) Astron. Astrophys., 323, 566
[2] Hashiguchi, M. et al. (2010) 73rd Annual Meeting of the Meteoritical Society., 5181
[3] Yurimoto, H. et al. (2003) Appl. Surf. Sci., 203, 793

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