

ON THE PHYSICAL SEPARATION OF A SMALL FRACTION ENRICHED IN NOBLE GASES FOR NWA2086 (CV3).

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Introduction: The fraction that is enriched in the heavy noble gases in meteorites was first obtained by dissolving more than 99 percent of an Allende fragment [1]. This chemical separation procedure can apply to any meteorites from different compositional groups. Matsuda et al. [2] has shown that the fraction that floats on the surface of the water (“floating fraction”) during the freeze-thaw disaggregation shows the similar isotopic and elemental abundances to those of the residues prepared using the chemical separation procedure [see also 3, 4]. Advantages of this physical technique include that the major portion of the fragment used for the separation can be saved for other studies.

This physical separation method had previously been applied to two ordinary chondrites (H/L3.2 and L4~6) [5] and Murchison (CM2) [6]. The floating fractions obtained from these chondrites were not enriched in the primordial heavy noble gases compared with the bulk meteorites. Up to date Allende is the only meteorite that the physical separation method can be successfully applied to. This method was unsuccessful in separating gas-rich fractions even when applied to Murchison, which is a primitive carbonaceous chondrite as Allende, with a different petrologic type (CM2).

To examine whether this physical method is applicable not only to Allende but also to other CV3 chondrites, we applied the method to NWA2086 (CV3). The shock classification and the weathering grade of NWA2086 are S1 and W1, respectively.

Results and discussion: We started from 1.964 g of five chips of NWA2086. After 300 cycles of the freeze-thaw disaggregation, 0.23 mg of the floating fraction was finally recovered. This yield (0.012%) is smaller than the yield (0.068%) obtained after 216 cycles of Allende [4].

The elemental abundances and the isotopic compositions of noble gases in the floating fraction and the bulk chondrite have been determined with the VG5400 mass spectrometer in Osaka University. The noble gas concentrations in the floating fraction were 3-25 times higher than those in the bulk meteorite, but they were lower than those observed in the Allende floating fractions, where 10-130 times enrichments compared to the bulk meteorite have been achieved [2]. EDX analysis and the Raman spectroscopy of the floating fraction indicate that the floating material of NWA2086 is mainly carbon. Especially, the Raman spectra of the floating fraction showed only G and D bands of carbon, which made possible to estimate the average in-plane crystallite size. The obtained size for NWA2086 carbon is slightly larger than that of Allende, but is smaller than that of Murchison.

References: [1] Lewis R. S. et al. 1975, *Science* 190: 1251-1262. [2] Matsuda J. et al. 1999. *Meteoritics & Planetary Science* 34:129-136. [3] Zaizen S. et al. 2000. *Antarctic Meteorite Research* 13:100-111. [4] Amari S et al. 2003. *Geochim. Cosmochim. Acta* 67: 4665-4677. [5] Nishimura C. et al. 2004, *Meteoritics & Planetary Science* 39:A78. [6] Matsuda M. et al. 2006, *Meteoritics & Planetary Science* 41:A115.