LA-ICP-MS STUDY OF METALLIC FE-NI FROM THREE MESOSIDERITES NEWLY FOUND IN GROVE MOUNTAINS, ANTARCTICA.

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Introduction: Mesosiderites consist of subequal amounts of metal and basaltic-pyroxenitic silicates. Previous analyses by neutron activation show possible genetic links of the metal to IIIAB iron meteorites, but with distinct differences in detail [1,2]. In this study, we analyzed in situ highly siderophile elements (HSE) and other trace elements in metallic Fe-Ni from three mesosiderites found in Grove Mountains, Antarctica, in order to clarify genetic relationship of the metallic Fe-Ni with other groups of meteorites.

Results and Discussion: Of the three mesosiderites, GRV 055364 is mild weathered. The silicate portion shows coarse-grained textures, and olivine clasts have coronas decorated by fine-grained chromite. GRV 050212 and GRV 021553 are significant altered, and highly brecciated. Their silicate portions are very heterogeneous and commonly zoned. Exsolution of low-Ca and augite are well developed, especially in GRV 050212.

HSE (Re, Os, Ir, Ru, Pt, Rh, Pd and Au), Ni, Co and other trace elements (W, Mo, As, Cu, Sb, Ga, Ge) of metal clasts from these meteorites were analyzed in situ by LA-ICP-MS. Metal grains from GRV 055364 show a wide range of compositions. There seems a correlation between the concentrations and abundances patterns of HSE. As the concentrations of HSE decrease, their CI-, Ni-normalized abundance patterns vary from refractory-rich (Re/Ni: 3.7 × CI) to flat patterns, and to slightly refractory-depleted (Re/Ni: 0.28 × CI). All of them have negative Pd-anomalies, and are depleted in the moderately volatile elements, including As, Cu, Sb, Ga and Ge. Analyses of GRV 021553 exhibit a relatively narrow range of compositions, with the HSE patterns similar to the refractory grains from GRV 055364. Those from GRV 050212 are the most HSE-enriched, and 6 out of 9 analyses have Ni-normalized abundances of Re of 3.9-5.0×CI. The most HSE-enriched grains show a steep slope of the abundance patterns towards Re.

Except for the HSE-depleted grains from GRV 055364, the HSE patterns of all other analyses from the three meteorites are very similar to those of metallic Fe-Ni from equilibrated H-group chondrites [3,4]. Our analyses confirm a close genetic relationship of metallic Fe-Ni between mesosiderites and H-group chondrites. In contrast, HSE-rich IIIAB irons show no negative Pd-anomaly with lower Re concentrations relative to other HSE [5], different from those of metal from the mesosiderites. The wide variation of HSE of metal Fe-Ni from GRV 055364 is probably due to fractional crystallization of molten metal.

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