In situ quantitative analysis of trace elements in metal grains from H, L and LL ordinary chondrites using galvanometric LA-ICPMS

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Iron-nockel metal is one of the main component of primitive meteorite. Especially ordinary chondrites (OCs) are the most abundant class of the meteorites, and these contain 8-20% by weight of metallic minerals. The fact implies that the Fe-Ni metal is commonly existed in the early solar system. Despite the simple apperance of the Fe-Ni metal grainsin OCs, abundance pattern of trace siderophile elements is largely fractionating in each metal grain [1]. These elemental fractionation revealed by laser ablation ICP-mass spectrometry (LA-ICPMS), and it impries that Fe-Ni metal grains has complex formation sequence on the early solar system.

This study is focused on the difference of chemical behavior of siderophle element to identifying origin and/or formation sequence of Fe-Ni metal grains. Femto second laser ablation system (fs-LA) and galvanometric optics [2], are used for the achieving reliable analysis of individual metal grains by LA-ICPMS.

The 15 siderophile elements (Cr, Co, Ni, Cu, Ge, Mo, Ru, Pd, Rh, W, Re, Os, Ir, Pt and Au) are measured from three OCs: Salaices H4, Julesberg L3.6 and Richfield LL3.7. Abundance patterns (normarized by CI chondrite) of volatile siderophile elements of individual grains are not exhibit significant difference in each chondrite. This can be interpreted as abundances of volatile elements in individual metal grains depend on the genetic composition of the each host rock. On the other hands, unequilibrated ordinary chondrites (UOCs) show linearly correlated inter-grain variations in the refractory siderophile elements Re and pratinum group elements (PGEs, except Ru and Rh) by 2 or 3 orders magnitude. Abundance patterns can be clearly divide that Re and heavy PGEs (Os, Ir and Pt) “depleted” and “unfractionated”. Large depletion of Re and heavy PGEs is not depended on the volatility of the elements. Similar depletion patterns are only reported from investigation of Fe-Ni metal and schreibersite of Fremdlinge in Evremovka CV3 chondrite [3].

[1] Campbell and Humayun (2003), *GCA*., **67**, 2481-2495. [2] Yokoyama, T.D. et al. (2011), *Anal. Chem*., **83**, 8892-8899. [3] Campbell, A et al. (2003), *GCA*., **67**, 3119-3134.