# ABUNDANCES AND DISTRIBUTION OF SIDEROPHILE TRACE ELEMENTS IN METAL OF AN UNEQUILIBRATED ORDINARY CHONDRITE

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**Introduction:** The Fe-Ni metal is one of the major components in ordinary chondrite. However, it is among the first phases to condense in the solar nebula, but it formation processes have been still debated [1-4]. Unequilibrated ordinary chondrite provides a unique means of studying the first solid material in the early solar system as they experienced only very mild parent body metamorphism [5]. The siderophile element abundances in metal phases reflect the origin of the metal and partitioning processes controlled by geochemical affinity of the elements and the state of chemical equilibrium between different phases. Therefore, the distribution of the highly siderophile between different magnetic fractions is useful to understand the origin and evolution of the precursors of chondrite components. In this study, we report NanoSIMS in situ siderophile element abundances in individual Fe-Ni metal grains in unequilibratd ordinary chondrits Sharps (type H3.4).

**Methods:** Associated kamacite and taenite of metals grains were analyzed for elemental concentrations of Fe, Ni, Co, Cu, Pt, Ir, W and Au by using Cameca NanoSIMS-50. Metal grains were mapped over areas $15x15µm^2$ of 128x128 pixels using a 2µm primary Cs+ beam. We used NIST SRM 663, 661 and synthetic alloy 30% and 51.5% Ni FeNi as standards to calibrated our data for kamacite and taenite.

**Resultats and discussion:** Firstly we found that most the metal grains content tow adjacent phases kamacite and taenite which is a feature that have been accomplished during the parent body process [6]. The quantification of the NanoSIMS ion images for each element show a large range of chemical variations among the metal particles in Sharps, which is consistent with the unequilibrated nature of unequilibrated chondrite [7]. The calculated partition coefficients between kamacite and taenite Dk/t(E) display preferential affinities of Cu, Pt, Ir and Au to taenite, but Co and W to kamacite.The elemental ratios of Cu/Ni, Pt/Ni, Ir/Ni, W/Ni and Au/Ni in all the metal grains we analyzed show a nonsolar (mostly super-solar) ratios suggesting the Fe-Ni grains could have formed, as for the Krymka metal [6], from distinct precursors of nonsolar compositions or had their compositions modified subsequent to chondrule formation events. We also plots $[\text{element/Ni}]_{\text{taenite}}$ as a function of $[\text{element/Ni}]_{\text{kamacite}}$ for each grain, we noticed a correlation trend only for Co, Pt and W. We explain these correlations by the fact that all the metal grains in this unequilibrated chondrite are equilibrated at the same temperature. By using the slope of the correlating Co/Ni between kamacite and taenite we can determine the equilibrium temperature between kamacite and taenite.

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