SIDEROPHILE ELEMENTS IN THE Si-BEARING IRON METEORITES: HORSE CREEK, MT. EGERTON, AND TUCSON

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Introduction: Si-bearing iron meteorites constitute a small, but diverse, group of anomalous irons with possible links to the enstatite chondrite clan. The meteorites Horse Creek and Mt. Egerton have been linked to the enstatite chondrite clan [1, 2]. The Tucson iron contains about 8% silicates dispersed within a rapidly cooled Ni-rich metallic matrix [3]. The silicates in Tucson are linked by oxygen isotope composition to carbonaceous chondrite-like precursors [4]. The Tucson metal was previously reported to have very low volatile element contents [2]. Here, I report new laser ablation ICP-MS siderophile element analyses of the metal in Tucson (USNM 386b), Horse Creek (USNM 1237b), and Mt. Egerton (USNM 3272c), and discuss the possible genetic relations of these meteorites to chondritic groups.

Results and Discussion: Twenty-four elements, including Si P, and S, were determined by LA-ICP-MS [5].

Horse Creek and Mt. Egerton. Due to sub-solidus exsolution of phosphides, the siderophile element abundances in Horse Creek and Mt. Egerton are variable from track to track. However, low-P (P~1000-2000 ppm) kamacites from both meteorites exhibit a very similar siderophile element pattern. Both meteorites exhibit positive Au-As anomalies characteristic of E-chondrite metal. Both meteorites exhibit enrichments of the compatible siderophile elements, Re, Os, Ir, Ru, and Pt, relative to Ni and Pd, and are compositionally similar to metal in NWA 2526, indicating residual solid metal [6], although with some variability [7].

Tucson. Metal from Tucson is strongly depleted in the volatile elements: Sb, Ga, Ge, and Sn, and lacks the Au-As peak characteristic of E chondrite metal. The depletion pattern in Tucson is an order of magnitude larger than that observed in Tafassassett, a CR chondrite-like meteorite with a large metallic vein. Compared with volatile-depleted irons, Tucson lacks the refractory element enrichment of IVB irons, has lower Ni and higher Au [8], but forms a good match to the Ni-Co and Cu-Ga-Ge of IVA irons [9]. Volatile loss from the Tucson melt during emplacement [3] is not supported by a complementary enrichment of the refractory elements. Therefore, the volatile element depletion was likely inherited from the source material of the Tucson metal [10]. Tucson metal exhibits a closer chemical affinity to metal from C chondrites or IVA irons than to E chondrite metal.

References: [1] Wasson J. T. and Wai C. M. 1970. *Geochimica et Cosmochimica Acta* 34, 169-184. [2] Wasson J. T. 1970. *Geochimica et Cosmochimica Acta* 34, 957-964. [3] Nehru C. E. et al. 1982. *Journal of Geophysical Research* 87 (supplement): A365–A373. [4] Clayton R. N. and Mayeda T. K. 1996. *Geochimica et Cosmochimica Acta* 60, 1999-2017. [5] Humayun M. et al. 2007. *Geochimica et Cosmochimica Acta* 71, 4609-4627. [6] Humayun M. et al. 2009. Abstract #1744. 40th Lunar & Planetary Science Conference. [7] van Acken D. et al. 2010. Abstract #1153. 41th Lunar & Planetary Science Conference. [8] Campbell A. J. and Humayun M. 2005. *Geochimica et Cosmochimica Acta* 69, 4733-4744. [9] Wasson J. T. and Richardson J. W. 2001. *Geochimica et Cosmochimica Acta* 65, 951-970. [10] Humayun M. and Clayton R. N. 1995. *Geochimica et Cosmochimica Acta* 59, 2131-2148.