EXAMINATION OF TRACE ELEMENT PARTITIONING BEHAVIOR IN THE FE-NI SYSTEM. N. L. Chabot[1], S. A. Saslow[2], and W. F. McDonough[2], [1]Johns Hopkins University Applied Physics Laboratory. Nancy.Chabot@JHUAPL.edu. [2]University of Maryland.

Experimental studies of element partitioning in solid metal/liquid metal system have been used to investigate a number of planetary science topics, such as the solidification of iron meteorites, the crystallization of Earth's core, and the evolution of ureilites. Recent studies using laser ablation ICP-MS provide very complete datasets for trace element partitioning in the Fe-Ni-S, Fe-Ni-C, and Fe-Ni-P systems [1,2,3].

The Fe-Ni system, with negligible light element contents (such as S, C, and/or P), should yield a common solid metal/liquid metal partitioning value (D_o). Generally, the D_o value for the Fe-Ni system is determined by fitting the partitioning data as a function of the light element and locating where the fit intercepts for a zero value of the light element concentration. In some cases, the D_o value as determined by different light element systems do not agree. For example, in the Fe-Ni-S system, D_o(Au)=0.25 for S=0 wt% [1], while in the Fe-Ni-P system, D_o(Au)=0.51 for P=0 wt% [3]. Using different D(Au) partitioning values for iron meteorite can lead to significant differences in the fractional crystallization trends generated in models [4,5].

Through experiments, a fully consistent value for D_o can be established directly, rather than relying on extrapolations of fits to data. Results will be presented on new solid metal/liquid metal experiments conducted in the light-element-free Fe-Ni system for this purpose. Experiments were conducted at 1 atm in evacuated silica tubes. Previous discussion noted that experiments at the high temperature required to produce coexisting solid metal and liquid metal in the Fe-Ni system (~1500°C) would cause the silica tube, and hence the experiment, to fail. We propose that our experimental success was due to the high purity of the silica that we used.

Electron microprobe analyses for Fe and Ni coupled with analyses of 25 trace elements by laser ablation ICP-MS provide the first experimental determinations of solid metal/liquid metal D_o values for many of these trace elements. We will introduce our new results and compare them to previous data and fits from the Fe-Ni-S, Fe-Ni-C, and Fe-Ni-P systems. This new experimental dataset has implications for topics such as modeling the crystallization of iron meteorites, understanding partitioning behavior in metallic systems, examining the history of planetary cores, and unraveling the evolution of metal-bearing meteorites.

References: [1] Chabot N. L. et al. 2003. *Meteoritics & Planetary Science* 38, 181-196. [2] Chabot N. L. et al. 2006. *Geochimica et Cosmochimica Acta* 70, 1322-1335. [3] Corrigan C. M. et al. 2009. *Geochimica et Cosmochimica Acta* 73, 2674-2691. [4] Wasson J. T. 1999. *Geochim. Cosmochim. Acta* 63, 2875-2889. [5] Chabot N. L. 2004. *Geochimica et Cosmochimica Acta* 68, 3607-3618.