APPLYING EXPERIMENTAL PARTITIONING RESULTS TO IRON METEORITES: A TEST OF HENRY'S LAW. N. L. Chabot[1], A. J. Campbell[2], M. Humayun[2], C. B. Agee[3], [1]Mail Code SN2, [3]Mail Code AC, NASA Johnson Space Center, Houston, TX, 77058. (nchabot@ems.jsc.nasa.gov). [2]Department of the Geophysical Sciences, The University of Chicago, 5734 S. Ellis Ave., Chicago, IL, 60637. (acampbel@midway.uchicago.edu).

Experimentally determined partition coefficients are commonly used to model the crystallization of magmatic iron meteorites, which are believed to be samples from metallic cores of asteroid-sized bodies [1-5]. However, most of the partitioning data are from experiments doped with trace elements near wt% levels, concentrations much higher than those measured in iron meteorites. Concern has been expressed over whether the experiments obey Henry's Law and the partitioning values are independent of trace element concentrations, or if the high trace element levels make the experimental partitioning data inapplicable to iron meteorites [6-7]. We present new experimental data that provide a direct test of Henry's Law applicability for Ir partitioning.

A series of solid metal-liquid metal partitioning experiments were performed at 1470°C with varied concentrations of trace Ir. The resulting liquid metal contained an atomic concentration of S of 0.04, as determined by electron microprobe. Analysis of Ir was done using laser ablation ICP-MS [8-10], allowing measurements to much lower concentrations than can be achieved using the electron microprobe.

Figure 1 plots the solid metal-liquid metal weight ratio partition coefficient for Ir (D(Ir)) against the concentration of Ir in the solid metal of the experiments. Over the three orders of magnitude range of Ir concentrations, D(Ir) shows no significant variation. Further, the concentrations of Ir in some of the experiments are at similar levels to those in iron meteorites, as shown by the shaded region in Fig.1. These results support our previous work [10] and indicate the experimental partition coefficients are indeed free of deviations from Henry's Law and can be applied to iron meteorites.

As also shown in Fig.1, at the S-content of the experiments, there are large differences between the D(Ir) values used in recent iron meteorite crystallization models [6-7] and the experimental data. D(Ir) predicted from the parameterization of the previous experimental data [11] is also shown and is in rough agreement with our new experimental results. Our results indicate Henry's Law concerns do not validate the use of D(Ir) values different from those of the experimental data when modeling the crystallization of iron meteorites.

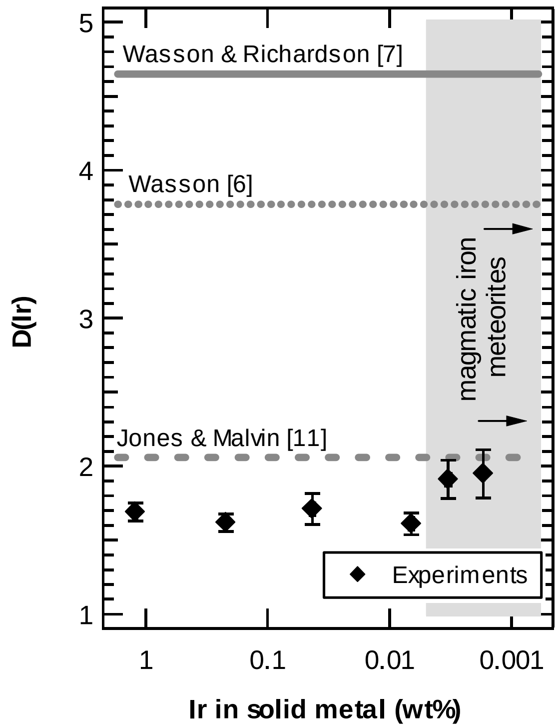

Fig.1. Solid metal-liquid metal D(Ir) versus Ir.

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