

# Partitioning coefficients in the Allende meteorite at high pressures obtained by laser heated diamond anvil cell experiments

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The purpose of our study is to clarify the partitioning behavior of siderophile and light elements between metallic and silicate liquids up to 60 GPa. It has been suggested that moderately siderophile element (e.g., Ni, Co) abundances in Earth's upper mantle were established by liquid metal-liquid silicate equilibrium at the base of the terrestrial magma ocean at depths in the range 700-1500 km and pressure of 30-60 GPa. But experimental data of partitioning coefficients above 30 GPa are still quite few. It is therefore crucial to examine the validity of this estimation through partitioning experiments at 30-60 GPa. Here we report the preliminary results of melting experiments on a carbonaceous chondrite composition using a laser-heated diamond anvil cell. This work is a joint research with L. S. Dubrovinsky, D. C. Rubie, F. Langenhorst, D. J. Frost in Bayerisches Geoinstitut.

A powdered sample of the Allende meteorite, mixed with metallic Fe (weight ratio 7:3), was sintered at 20 GPa and 1600 deg.C for 1 hour using a multi-anvil press, and then a thin pellet was made from the recovered sample. We used the pellet as a starting material for laser heated diamond anvil cell experiments. Argon is used as the pressure medium. We conducted melting experiments at 26, 40, and 60 GPa, and temperatures in the range 2300-3000 deg.C. In the run products at 40 and 60 GPa, metallic spherules sufficiently large for microprobe analysis were not observed. Electron microprobe analysis was conducted on the recovered sample from the 26 GPa experiment.

The values of partitioning coefficients obtained using the electron microprobe are reasonably consistent with results of previous studies of the Allende meteorite (Agee et al., JGR, 100, B9, 17725, 1995; Asahara et al., PEPI, 143, 421, 2004) obtained using a multi-anvil apparatus. We also performed chemical analysis using TEM on same sample, but the sample heterogeneity is too large for TEM analysis; for example, the region of quenched silicate liquid consisted of majorite- and magnesio-wüstite-quench crystals and we could not obtain an average composition that is representative of the bulk silicate liquid composition. Experiments in simpler systems are required to obtain partitioning data with a diamond anvil cell and TEM analysis.