Metal–silicate partitioning behavior of Pd and Ag at Earth's core formation conditions

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The differing metal–silicate partitioning behaviours of Pd and Ag, coupled with the decay of ^{107}Pd to ^{107}Ag (with a half-life of 6.5 Myr), make these elements sensitive tracers of core–mantle differentiation. The excess ε^{107}Ag of the Bulk Silicate Earth (BSE) also likely records information about volatile addition and loss during Earth's accretion [1]. Quantifying the metal–silicate partitioning behaviour of Pd and Ag at deep magma ocean conditions is therefore key to understanding a number of processes in the primitive Earth, but they have previously only been studied to ~ 20 GPa and 2400 K [2, 3]. We have performed a suite of metal–silicate partitioning experiments in a laser-heated diamond anvil cell at pressures (*P*) of 35 to 70 GPa and temperatures (*T*) up to ~ 4800 K, covering a wide range of conditions relevant to terrestrial core formation. Preliminary measurements from energy dispersive X-ray spectroscopy (EDS) and wavelength dispersive X-ray spectroscopy (WDS) indicate that the partitioning coefficients are in good agreement with the predictions of lower *P–T* studies [2, 3]. These results will be applied to understanding the evolution of the BSE Pd/Ag ratio and to assessing volatile accretion and loss.

References:
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