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Thermal Emission Determination of Argon under Extreme Pressure and Temperature D. ALLEN DALTON, MICHAEL WONG, ALEXANDER F. GONCHAROV, JULIUS OJWANG, VIKTOR V. STRUZHKIN, Geophysical Laboratory, Carnegie Institution of Washington, ZUZANA KONOPKOVA, PETER LAZOR, Department of Earth Sciences, Uppsala University — Argon is a common pressure-transmitting medium in diamond anvil cell (DAC) experiments, and is often used as thermal insulation in the laser heated DAC. A more thorough understanding of the thermal properties of argon under extreme conditions is essential for measuring thermal properties of materials under similar conditions. A transient heating technique was applied to a symmetric DAC up to 50 GPa and 2500 K. A 1 μm thick iridium foil positioned within a recessed gasket hole filled with argon served as a laser absorber to pump thermal energy into the sample. Pump pulses of 6 μs temporal width were provided from an electronically modulated Yb-based fiber laser. We determined the temperature of the coupler with 500 ns time resolution by applying a Planckian fit to the thermal emission spectrum. Finite element calculations were also used to simulate thermal diffusion in the DAC cavity. The experimental results show slightly larger thermal conductivity with theory, but the results converge in the limit of high temperature. This work is supported by NSF EAR 1015239, NSF-REU, Carnegie Institution of Washington, and DOE-NNSA (CDAC).

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