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Measurements of Thermal diffusivity anisotropy in the laser-heated diamond anvil cell ABBY KAVNER, NATHALIE CONIL, Earth and Space Sciences Dept., UCLA — Heat transport within the Earth and planets is limited by the diffusive heat flow at thermal boundaries. Diffusive heat transport is controlled by a material propertythermal conductivitythat is currently not very well constrained for materials at the high pressures and temperatures relevant to planetary interiors. We have measured thermal diffusivity anisotropy of graphite in the laser heated diamond anvil cell, by examining the hotspot ellipticity generated by laser heating a highly oriented graphite crystals. At ambient pressures, the thermal diffusivity ratio inferred from hotspot ellipticity measurements is in good agreement with independent measurements. In addition, we provide the first measurements of pressure dependence of thermal diffusivity anisotropy of graphite. We compare the observed hotspot ellipticity with models of the heat flow behavior in the diamond anvil cell to examine the temperature dependence of thermal conductivity of graphite. These experiments provide a proof-of-concept for high pressure/ high temperature relative thermal diffusivity measurements in the laser heated diamond anvil cell, with applications for a wide variety of Earth and Planetary materials.

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