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Ramp compression of magnesium oxide to 234 GPa[1] JUE WANG, Princeton University, RAYMOND F. SMITH, FEDERICA COPPARI, JON H. EGGERT, LLNL, THOMAS R. BOEHLY, LLE, GILBERT W. COLLINS, LLNL, THOMAS S. DUFFY, Princeton University — Periclase, MgO, is of fundamental importance for geophysics as the end-member of the ferropericlase, (Mg,Fe)O, solid solution. It is also of interest for understanding the interiors of extrasolar planets. In this work, we report a study of MgO using laser-based ramp compression. Ramp wave loading can be used to obtain equation-of-state data in the region of thermodynamic space lying between the principal isentrope and Hugoniot. Ramp compression experiments were performed using the Omega laser at LLE of the University of Rochester. A series of three steps were lithographically etched into a single-crystal MgO wafer that was then polished to the requisite thickness. A planar compressive wave was launched into the sample with high-powered ramp-shaped laser pulse. The free surface velocities of different sample thicknesses were measured using a line-imaging VISAR. The velocity profiles were integrated to obtain the stress-density response using a Lagrangian analysis technique. Our experiments reached a maximum pressure of 234 GPa, and the measured equation of state is consistent with previous shock and static studies.

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