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Thermodynamics of MgO shocked to 250 GPa and 9000 K O.V. FAT'YANOV, P.D. ASIMOW, T.J. AHRENS, Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA 91125 U.S.A. — Plate impact experiments in the 200-250 GPa pressure range were done on <100> single-crystal MgO preheated before compression to 1850 K. Hot Mo(driver)-MgO targets were impacted with Ta flyers launched by the Caltech two-stage light-gas gun up to 7.5 km/s. Radiative temperatures and shock velocities were measured with 3-5% and 1-2% respective uncertainty by a 6-channel pyrometer with 3 ns time resolution, over 500-900 nm spectral range. MgO shock front reflectivity was determined in additional experiments at 220 and 250 GPa using ~50/50 high-temperature sapphire beamsplitters. Shock temperatures and preheated MgO Hugoniot data reported here are in good agreement with the corresponding values calculated using Mie-Grüneisen equation of state with γ_0=1.4 and constant γ/V. Our experiments showed no evidence of MgO melting up to 250 GPa and 9.2 kK. The highest shock temperatures exceed the extrapolated melting curve of Zerr & Boehler by >3000 K at 250 GPa, which seems too much for any realistic superheating.

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