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MgO melting curve constraints from shock temperature and rarefaction overtake measurements in samples preheated to 2300 K O.V. FAT'YANOV, P.D. ASIMOW, Division of Geological and Planetary Sciences, Caltech, Pasadena, CA 91125 U.S.A. — In a continuous effort to determine experimentally the melting curve of MgO at 100-200 GPa, we extended our target preheating capability to 2300 K. The limit was primarily caused by intense sublimation of pure MgO in vacuum above ∼2050 K. Completely redesigned Mo capsules holding ∼20 mm long MgO crystals with controlled thermal gradients were impacted by thin Ta flyers launched at 6.5 to 7.5 km/s on the Caltech two-stage light-gas gun. Radiative shock temperatures and rarefaction overtake times were measured simultaneously by a 6-channel pyrometer with 3 ns time resolution, over 440-750 nm spectral range. All our experiments showed smooth pressure dependence of MgO sound speed consistent with the solid phase at 204-239 GPa. Observed temperatures are ∼1000 K lower than those predicted by the solid phase model, but the plot of measured shock temperature versus pressure exhibits a pattern typical of shock melting at the highest pressure investigated. This may suggest that the Hugoniot of MgO preheated to 2300 K crosses its melting line at 220-240 GPa. Sound speed data indistinguishable from the solid phase model do not exclude the possibility of melting there.

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