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Forsterite and Enstatite Shock Temperatures: Implications for Planetary Impact Melting ERIK DAVIES, University of California, Davis, SETH ROOT, Sandia National Laboratories, RICK KRAUS, Lawrence Livermore National Laboratory, DYLAN SPAULDING, SARAH STEWART, University of California, Davis, STEIN JACOBSEN, Harvard University, THOMAS MATTSSON, RAY LEMKE, Sandia National Laboratories — We present experimental results on enstatite and forsterite to probe extreme conditions in the laboratory in order to examine melting and vaporization of rocky planet mantles upon shock and release. Flyer plate impact experiments are carried out on the Z-Machine at Sandia National Laboratory. Planar, supported shock waves are generated in single crystal samples, permitting observation of both compressed and released states. Shock velocity of the sample is measured using laser interferometry, and the pressure and particle velocity are derived through impedance matching to the aluminum flyer. Temperature of the shocked state is measured with a streaked visible spectrum and calibrated with a quartz standard, mounted downrange from the sample. Preliminary analysis shows that current equation of state models underestimate the entropy gain, which suggests that for shock pressures above 250 GPa, a higher degree of impact vaporization will be reached. Sandia National Laboratories is a multiprogram laboratory managed and operated by Sandia Corporation for the U.S. DOE's National Nuclear Security Administration under Contract No. DE-AC04-94AL85000. This work was performed under the auspices of the U.S. DOE by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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