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Thermodynamics of Shock Waves in Ice-Sand Mixtures: Peak and Post-Shock Temperature Measurements[1] RICHARD KRAUS, SARAH STEWART, Harvard University, ACHIM SEIFTER, ANDREW OBST, Los Alamos National Laboratory — Understanding the partition of energy in shocked mixtures of widely varying impedance is necessary to predict a wide range of phenomena, including phase changes, temperatures, and chemical reactions. In particular, we are interested in understanding the evolution of temperatures and internal energies from initial shock loading to equilibration. Subjected to an ideal strong shock, the mixture will initially load to a constant pressure; however, the temperature of each component will depend on its equation of state and loading path. Here, we present shock and release temperatures in a fine-grained 40:60 mixture of SiO_2 and H_2O ice subjected to planar shock. We find that the apparent temperatures are dominated by the more compressible component of the mixture. The shock temperatures are consistent with both components reaching the same pressure determined by the Hugoniot of the mixture. This is a challenging system to model because of the complicated wave interactions and dependence on length scales. We compare the experimental results to analytical and numerical solutions using a new equation of state for H_2O ice.

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