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A Study of Binder Materials Subjected to Isentropic Compression Loading CLINT HALL, MEL BAER, Sandia National Laboratories, RICK GUSTAVSEN, DANIEL E. HOOKS, E. BRUCE ORLER, STEVE SHEFFIELD, Los Alamos National Laboratory, GERRIT SUTHERLAND, Naval Surface Warfare Center — Binders such as Estane, Teflon, Kel F and HTPB are typically used in heterogeneous explosives to bond polycrystalline constituents together as an energetic composite. Combined theoretical and experimental studies are underway to unravel the mechanical response of these materials when subjected to isentropic compression loading. Key to this effort is the determination of appropriate constitutive and EOS property data at extremely high stress-strain states as required for detailed mesoscale modeling. The Sandia Z accelerator and associated diagnostics provides new insights into mechanical response of these nonreactive constituents via isentropic ramp-wave compression loading. Several thicknesses of samples, varied from 0.3 to 1.2 mm, were subjected to a ramp load of ~ 42 Kbar over 500 ns duration using the Sandia Z-machine. Profiles of transmitted ramp waves were measured at window interfaces using conventional VISAR. Shock physics analysis is then used to determine the nonlinear material response of the binder materials. In this presentation we discuss experimental and modeling details of the ramp wave loading ICE experiments designed specifically for binder materials.

John Torczynski
Sandia National Laboratories

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