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Compositional Effects on the Shock Compression and Release Properties of Alumina-Filled Epoxy[1] MARK ANDERSON, DAVID COX, STEPHEN MONTGOMERY, ROBERT SETCHELL, Sandia National Laboratories — Alumina-filled epoxy is used for encapsulation in explosively driven pulsed power devices. Its shock compression and release properties have a strong influence on device performance. Previous studies using a baseline material containing 43% by volume alumina showed a complex behavior characterized by extended wave profiles and high release-wave velocities. In recent studies, these properties have been examined while changing the total alumina volume fraction, the alumina particle size and morphology, and the epoxy constituents. Reducing the alumina volume fraction in steps from 43% to 0% had anticipated effects on Hugoniot states, compressive wave profiles and velocities, and release-wave velocities, although release velocities changed more rapidly. Only minor effects were observed when the alumina volume fraction was held constant while varying alumina particle characteristics or the host epoxy. Thin-pulse experiments showed combined compression and release effects resulting from decreasing the alumina volume fraction.

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