

## IMPACT INITIATED REACTIONS IN INTERMETALLIC-FORMING REACTIVE MIXTURES: INSTRUMENTED EXPERIMENTS AND MESO-SCALE SIMULATIONS

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### **Abstract**

Impact initiation of reactions in intermetallic-forming reactive materials (powder mixtures, compacts, and laminates) under uniaxial-strain and uniaxial-stress loading with the gas gun will be discussed. Instrumented experiments, employing stress gauges, velocity interferometry, and high-speed digital imaging are used to measure the stress profiles, shock velocity, and transient deformation states, to provide evidence of reaction initiation. Meso-scale simulations of wave propagation through discretely represented constituents (with real imported microstructures) are also performed using the multi-material CTH Eulerian code to investigate the effects of reactant morphology on the deformation and mixing in the powder mixtures, compacts, and foils. Observations of particle level processes reveal the heterogeneous nature of the effects of wave propagation through the reactants of dissimilar properties and morphological characteristics. The information generated is useful for understanding the reaction mechanisms and controlling the characteristics of their initiation and resulting energy release.

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