

Abstract Submitted
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Dynamic behavior of reactive aluminum nanoparticle-fluorinated acrylic (AIFA) polymer composites CHRISTOPHER A. CROUSE, AFRL/RXLM and UES, Inc., BRAD WHITE, Georgia Institute of Technology, JONATHAN E. SPOWART, AFRL/RXBC — The dynamic behavior of aluminum nanoparticle-fluorinated acrylic (AIFA) composite materials has been explored under high strain rates. Cylindrical pellets of the AIFA composite materials were mounted onto copper sabots and impacted against a rigid anvil at velocities between 100 and 400 m/s utilizing a Taylor gas gun apparatus to achieve strain rates on the order of 10^4 /s. A framing camera was used to record the compaction and reaction events that occurred upon contact of the pellet with the anvil. Under both open air and vacuum environments the AIFA composites demonstrated high reactivity suggesting that the particles are primarily reacting with the fluorinated matrix. We hypothesize, based upon the compaction history of these materials, that reaction is initiated when the oxide shells on the aluminum nanoparticles are broken due an interparticle contact deformation process. We have investigated this hypothesis through altering the particle loading in the AIFA composites as well as impact velocities. This data and the corresponding trends will be presented in detail.

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