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Fragmentation and Constitutive Response of Tailored Mesostructured Aluminum-Based Inert and Reactive Compacts<sup>1</sup> ANDREW MAR-QUEZ, University of California San Diego, CHRIS BRAITHWAITE<sup>2</sup>, Cambridge University, TIMOTHY WEIHS, NICK KRYWOPUSK, DAVID GIBBINS, Johns Hopkins University, MARC MEYERS, University of California San Diego — The fragmentation and constitutive response of tailored aluminum-based compacts is examined under dynamic conditions. Mesostructured compacts with tailored interfaces between the powders (with sizes of 40, 100, and 400  $\mu$ m) were produced by swaging. In addition to these, reactive Ni-Al mixtures were prepared by the same technique; the Ni/Al layer thicknesses within the powders were varied to control the reaction rate between Ni and Al. The fragmentation produced in the explosively-driven rings expanded at a velocity of approximately 100 m/s was captured by high-speed photography. The fragment size distributions obtained varied widely and correlated with the interfacial strength of the compacts as well as with powder size. Experimental results are compared with fragmentation theories to characterize the behavior of reactive powders based on material mesostructure.

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