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Deformation Mechanisms in Aluminum Nitride Under Shock Loading GUANGLI HU, Department of Mechanical Engineering, Johns Hopkins Univeristy, CYRIL WILLIAMS, Department of Mechanical Engineering, Johns Hopkins Univeristy and Army Research Laboratory, Aberdeen Proving Ground, CHANGQIANG CHEN, K.T. RAMESH, Department of Mechanical Engineering, Johns Hopkins Univeristy, J.W., MCCAULEY, Army Research Laboratory, Aberdeen Proving Ground — Aluminum nitride (AlN) in armor applications involve not only high strains and stress rates, but also complicated stress states, such as multiaxial loading. Using a shock recovery technique, the specimens were shock loaded in a well controlled experiment and recovered for microstructural analysis. The recovered specimens were used to characterize the deformation mechanisms involved in AlN using TEM and HRTEM. The deformation mechanisms are expected to be dislocation dominated, which can be predicted through micromechanics at high pressures. Furthermore, a mechanism based constitutive model, incorporating the fracture mechanism and plasticity, is being developed to capture the dynamic response of general brittle material systems, such as AlN, alumina and silicon carbide.

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