Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Mesoscale simulations of shock initiation in energetic materials characterized by three-dimensional nanotomagraphy AARON BRUNDAGE, RYAN WIXOM, ALEXANDER TAPPAN, GREGORY LONG, Sandia National Laboratories — Three-dimensional reverse ballistic shock simulations of energetic materials have been conducted to improve our understanding of initiation at the mesoscale. Vapor-deposited films of PETN and pressed powders of HNS were characterized with a novel three-dimensional nanotomographic technique. Detailed microstructures were constructed experimentally from a stack of serial electron micrographs obtained by successive milling and imaging in a dual-beam FIB/SEM. These microstructures were digitized and imported into a multidimensional, multimaterial Eulerian shock physics code. The simulations provided insight into the mechanisms of pore collapse in PETN and HNS samples with distinctly different three-dimensional pore morphology and distribution. This modeling effort supports the novel design and development of microenergetic devices and elucidates mechanisms governing initiation of secondary explosives.

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Date submitted: 12 Feb 2009 Electronic form version 1.4