Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Hot-spot ignition in a layer of widely-spaced HMX powders subjected to a falling weight impact FENGLEI HUANG, YANQING WU, Beijing Institute of Technology, BEIJING INSTITUTE OF TECHNOLOGY TEAM — A micromechanics approach based on heating equations, the kinematic and deformation description for a thin layer of HMX energetic powders under drop-weight impact is presented. The work focuses on the thermal and mechanical processes that act to transfer the input kinetic energy into the localized high-temperature ignition sites. By considering contact plastic work, frictional heating, fragmentation energy, chemical reaction, and melting at a single particle level, localized deformation and temperature can be predicted. Effects of drop height and particle size on the ignition process are analyzed. The analyses of localized dissipated energy rate as well as radial expansion help to understand the physical process that leads to ignition. In the case of non-ignition, no sudden rise occurs in the dissipated energy rate until the end of the impact loading. Two sharp decreases in pressure appear due to breakage and melting at contact zone with impact loading proceeds.

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Date submitted: 23 Feb 2011 Electronic form version 1.4