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Microenergetic Shock Initiation Studies on Deposited Films of PETN ALEXANDER S. TAPPAN, RYAN R. WIXOM, WAYNE M. TROTT, GREGORY T. LONG, ROBERT KNEPPER, AARON L. BRUNDAGE, DAVID A. JONES, Sandia National Laboratories — Films of the high explosive PETN (pentaerythritol tetranitrate) up to 500-μm thick have been deposited through physical vapor deposition, with the intent of creating well-defined samples for shock-initiation studies. PETN films were characterized with surface profilometry, scanning electron microscopy, x-ray diffraction, and focused ion beam nanotomography. These high-density films were subjected to strong shocks in both the in-plane and out-of-plane orientations. Initiation behavior was monitored with high-speed framing and streak camera photography. Direct initiation with a donor explosive (either RDX with binder, or CL-20 with binder) was possible in both orientations, but with the addition of a thin aluminum buffer plate (in-plane configuration only), initiation proved to be difficult due to the attenuated shock and the high density of the PETN films. Mesoscale models of microenergetic samples were created using the shock physics code CTH and compared with experimental results. The results of these experiments will be discussed in the context of small sample geometry, deposited film morphology, and density.

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