Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Influence of hot spot features on the shock initiation of heterogenous nitromethane DANA DATTELBAUM, STEPHEN SHEFFIELD, DAVID STAHL, ANDREW DATTELBAUM, Los Alamos National Laboratory — The shock initiation sensitivity of heterogeneous explosives is known to be strongly related to the confluence of "hot spots" or localized regions of high pressure and temperature. Physical origins of hot spots within a material include dynamic pore collapse, friction from motion along closed cracks, and wave reflections from other *in situ* interfaces. A complex interplay among numerous physical and chemical factors, spanning several length scales, determines whether or not a hot spot will quench or lead to initiation. To further elucidate key features of hot spots on energetic materials sensitivity and initiation mechanisms, we have intentionally introduced well-defined particles into the homogeneous liquid explosive nitromethane which has been gelled so the particles are somewhat stationary. Gas-gun driven shock initiation experiments using embedded electromagnetic gauging methods have been performed on these materials, revealing new insights into the role of heterogeneities on the sensitivity of the explosives through shock input-to-run distance relationships (Pop-plots), and reactive chemistry growth in and behind the incident shock front. By logically mapping out these relationships, the data provide a scientific foundation for the development of predictive capabilities for modeling new formulations, and designing next-generation energetic materials.

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Date submitted: 19 Feb 2009 Electronic form version 1.4