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Multiphysics Simulations of Hot-Spot Initiation in Shocked Insensitive High-Explosive[1] FADY NAJJAR, W.M. HOWARD, L.E. FRIED, Lawrence Livermore National Laboratory (LLNL) — Solid plastic-bonded high-explosive materials consist of crystals with micron-sized pores embedded. Under mechanical or thermal insults, these voids increase the ease of shock initiation by generating high-temperature regions during their collapse that might lead to ignition. Understanding the mechanisms of hot-spot initiation has significant research interest due to safety, reliability and development of new insensitive munitions. Multi-dimensional high-resolution meso-scale simulations are performed using the multiphysics software, ALE3D, to understand the hot-spot initiation. The Cheetah code is coupled to ALE3D, creating multi-dimensional sparse tables for the HE properties. The reaction rates were obtained from MD Quantum computations. Our current predictions showcase several interesting features regarding hot spot dynamics including the formation of a "secondary" jet. We will discuss the results obtained with hydro-thermo-chemical processes leading to ignition growth for various pore sizes and different shock pressures.

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