

Abstract Submitted
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Detailed Characterization of PBX Morphology for Mesoscale Simulations¹ SCOTT BARDENHAGEN, Wasatch Molecular, Inc., HUIYANG LUO, HONGBING LU, University of Texas at Dallas, RONALD ARMSTRONG, University of Maryland — Plastic-Bonded Explosives (PBXs) are composed of energetic grains embedded in a polymeric binder. The heterogeneity at this material scale serves to localize energy during deformation, determining damage and hot spot development leading to reaction. Accurate determination of PBX morphology is needed to characterize and understand these materials, and is essential input for mesoscale simulations. X-ray microtomography was used to determine the three-dimensional x-ray cross-section of a mock explosive for which all formulation details are known. Specialized image processing routines were used to identify individual features (voids, grains, binder). Mass fractions, void content, and grain size statistics were compared with the formulation. The quantity of material needed to accurately represent the mesostructure in simulations, i.e. representative volume element size, was determined, as well as grain on grain contact density, which may correlate with sensitivity. Preliminary results from computations using these mesostructures will be reported.

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