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Sonocrystallization as a tool for controlling crystalline explosive morphology and inclusion content CHAD STOLTZ, BRYAN MASON, COLIN ROBERTS, Indian Head Division Naval Surface Warfare Center, STEVEN HIRA, GEOFFREY STROUSE, Florida State University — It is well known that reduced-sensitivity versions of cyclotrimethylene trinitramine (RDX) powder have been reported such that the resulting plastic-bonded explosive (PBX) formulations containing this RDX become less sensitive to shock initiation than those formulated with standard RDX. While the reasons for the reduction in shock sensitivity are debated in the energetic materials community, we have recently reported correlations between PBX shock sensitivity and RDX void content by Small Angle Neutron Scattering (SANS). The obvious next step in understanding the effects of crystalline explosive microstructure is to control defect type and quantity, as well as particle size and morphology during energetic material crystallization. To this end, uniform crystallite morphology, narrow particle size distribution, and tailored inclusion content have been achieved for RDX explosive recrystallization by a combination of simple ultrasonic agitation and solvent evaporation. Optical and confocal microscopy imaging show significantly reduced inclusion content in crystallites grown using sonocrystallization with slow solvent evaporation while particle size distributions are considerably narrower using sonocrystallization with any evaporation rate.

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