Characterizing the Pore Structure and Effects of Ratchet Growth on PBX 9502
DARLA THOMPSON, GEOFF BROWN, JOSEPH MANG, BRIAN PATTERSON, RICHARD GUSTAVSEN, SALYER TERRY, Los Alamos National Laboratory, RACCI DELUCA — PBX 9502 is a plastic bonded explosive containing 95 wt% TATB (2,4,6-trinitro-1,3,5-benzenetriamine). Pressed composites of TATB have long been known to undergo “ratchet growth” (irreversible volume change) when subjected to thermal cycling. This behavior relates to the unique graphitic structure of the TATB crystal and its strongly anisotropic coefficient of thermal expansion (CTE), however, the mechanism responsible for the behavior is not understood. In our present study, we have used micro x-ray computed tomography and ultra-small angle neutron scattering to characterize the micro-structure of ratchet grown PBX 9502 under various conditions. We have used these techniques to distinguish ratchet-grown and as-pressed specimens of equivalent density. Our results allow us to understand and interpret observed changes in engineering and sensitivity/performance metrics of the ratchet-grown PBX.

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