Abstract Submitted
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EOS determination through microscopy- interferometry measurements: A low symmetry energetic materials case study[1] ELISSAIOS STAVROU, JOSEPH ZAUG, JONATHAN CROWHURST, SORIN BASTEA, MIKE ARMSTRONG, Lawrence Livermore National Laboratory, Material Science Division — Measuring equation of state (EOS) of solid specimens under pressure usually involves the determination of the primitive cell volume using x-ray diffraction (XRD) measurements. However, in the case of low symmetry (e.g. triclinic) materials with twining features and large primitive cells, this can be problematic and ambiguous. In order to address this issue we examine the possibility of a direct approach which is based on measuring the surface area and thickness with microscopy and optical interferometry respectively. To test the validity of this approach applied to a crystalline material, we first compared our results from Triamino-Trinitrobenzene (TATB, SG P-1) with the published EOS, as determined with XRD measurements, by Stevens et al. (Propellants Explos. Pyrotech. 33, 286 (2008)). A near perfect match between the two sets of data has been observed. We also present the results of our study on the energetic material 5-nitro-2,4-dihydro-1,2,4,-triazol-3-one (a-NTO) which crystallizes as a four-component twin (Bolotina et al. ActaCryst. B61, 577 (2008)) with triclinic symmetry. No high-pressure XRD data have been published on a-NTO, probably due to its highly complex crystal structure, making this technique a viable way to probe the cold compression EOS of such compounds.

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