

Abstract Submitted  
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**Real-time Mesoscale Visualization of Dynamic Damage and Reaction in Energetic Materials under Impact**<sup>1</sup> WAYNE CHEN, MICHAEL HARR, NICHOLAS KERSCHEN, JESUS MARIS, ZHERUI GUO, NIRANJAN PARAB, Purdue University, TAO SUN, KAMEL FEZZAA, Argonne National Laboratory, STEVEN SON, Purdue University — Energetic materials may be subjected to impact and vibration loading. Under these dynamic loadings, local stress or strain concentrations may lead to the formation of hot spots and unintended reaction. To visualize the dynamic damage and reaction processes in polymer bonded energetic crystals under dynamic compressive loading, a high speed X-ray phase contrast imaging setup was synchronized with a Kolsky bar and a light gas gun. Controlled compressive loading was applied on PBX specimens with a single or multiple energetic crystal particles and impact-induced damage and reaction processes were captured using the high speed X-ray imaging setup. Impact velocities were systematically varied to explore the critical conditions for reaction. At lower loading rates, ultrasonic excitations were also applied to progressively damage the crystals, eventually leading to reaction.

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