Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

**Hot Spot Chemistry in Several Polymer-bound Explosives under Nanosecond Shock Conditions** WILL BASSETT, Lawrence Livermore Natl Lab, BELINDA JOHNSON, University of Illinois at Urbana Champaign, HARRY SPRINGER, Lawrence Livermore Natl Lab, DANA DLOTT, University of Illinois at Urbana Champaign — Initial hot spot temperatures and temperature evolutions for 4 polymer-bound explosives under shock compression by laser-driven flyer plates at speeds from 1.5 – 4.5 km $s^{-1}$ are presented along with mesoscale simulations in the multi-physics hydrocode ALE3D. The PBX formulations studied here consist of either pentaerythritol tetranitrate (PETN), 1,3,5-trinitro-1,3,5-triazinane (RDX), 2,4,6-trinitrotoluene (TNT), or 1,3,5-triamino-2,4,6-trinitrobenzene (TATB) in a 80/20 wt.% mixture with a silicone elastomer binder. The temperature dynamics demonstrate a unique shock strength dependence for each base explosive. The initial hot spot temperature and its evolution in time are shown to be indicative of chemistry occurring within the reaction zone of the four explosives. The number density of hot spots is qualitatively inferred from the spatially-averaged emissivity and appears to increase exponentially with shock strength. An increased emissivity for formulations consisting of TNT and TATB is consistent with carbon-rich explosives. Qualitative conclusions about sensitivity were drawn from the initial hot spot temperature and rate at which the number of hot spots appear to grow.

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Date submitted: 27 Feb 2019 Electronic form version 1.4