

Abstract Submitted
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Photoexcitation, Reaction Localization and Energy Dissipation in Single beta-HMX Crystals subjected to 20 GPa Shock and PBX Detonation¹ IGOR PLAKSIN, L. RODRIGUES, S. PLAKSIN, R. MENDES, J. CAMPOS, ADAI/LEDAP, Univer. Coimbra, P. SIMOES, Dept. Ch. Eng., Univer. Coimbra — We present experimentally revealed highly anisotropic dynamics of the detonation conversion occurring in beta-HMX crystals. Panoramic observation of 1-mm single b-HMX crystal surrounded by different binder materials (HTPB, GAP, water) and by fine-grained PBX (HMX 85/15 GAP as a dirty binder) performed by mean of Multi-Channel Optical Analyzer (96 optical fibers) provided spatially resolved measurements of reaction spots onset/growth and a post-detonation ejecta of reaction products via the radiance registration carried out with 100 μ m-spatial and 0.2ns-temporal accuracy in a spectral range 450-850nm. Experimental evidences obtained in more than 20 tests with b-HMX crystals subjected to a 20GPa shock and to the PBX detonation (51GPa-VN spike at entering to a crystal and 21.5GPa-CJ pressure), demonstrate that independently on orientation crystal vs. input front, a major reaction spots are localized in crystal vertexes/edges and the emitted reaction radiance induces photoexcitation in the crystal bulk causing a radiation-induced precursor of the major reaction front. Further reaction spots dissipation is attended by origination of the reaction products' longitudinal/transversal ejecta moving behind the leading front with the 20-30 micron/ns speed.

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