Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Mechanisms of laser-induced photocatalytic decomposition of high explosives ANATOLY MITROFANOV, ANTON ZVEREV, Kemerovo State University, Russia, SERGEY RASHKEEV, ROMAN TSYSHEVSKY, University of Maryland, MAIJA KUKLJA, National Science Foundation — Using laser irradiation for triggering explosive decomposition of high density energy materials opens up new opportunities in design of safe optical detonators by removing primary explosive from the devices. Precise tuning of sensitivity to initiation of detonation via photo-excitation appears challenging because all secondary explosives are insulators with the band gap of 4-8 eV. We will discuss our combined experimental and theoretical studies that suggest feasible mechanisms of photocatalytic decomposition of explosives triggered by the laser excitation with the energy of 1.17 - 2.3 eV and the wavelength of 1064-532 nm. The first approach considers tuning the optical absorption via the controlled modification of the electronic structure of the explosive-metal oxide interfaces. The second approach involves incorporating photoactive organic molecules in the crystalline matrix of the explosive material.

Maija Kukla
National Science Foundation

Date submitted: 23 Nov 2015 Electronic form version 1.4