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Heat propagation in energetic materials in the first 50 pico-seconds NHAN DANG, JENNIFER GOTTFRIED, FRANK DELUCIA, US Army Rsch Lab - Aberdeen — Under dynamic shock conditions, pressure, temperature and strain rate can be convoluted into the material response, therefore complicating studies of the importance and role of each factor. Our focus here is to determine the role of temperature (T) jump in the initial events using the indirect flash heating technique coupled with transient visible absorption spectroscopy. Previously we have shown that the thermal energy from T-jump (from a femto-second laser-heated gold (Au) layer) couples into explosive molecules by changing electronic configurations of the molecules in the excited state [Appl. Opt. 56, B85 (2017)], and the changes are T-jump dependent [Proceedings for the 16th International Detonation Symposium (2018)]. In this work we expand the previous studies to investigate how and how fast thermal energy from T-jump (generated by a 35 fs laser pulse with an energy density of 20 mJ cm^{-2} on 110 nm thick films of Au) transfers and propagates throughout 5μm thick films of RDX, PETN and HMX in the first 50 pico-seconds. The evidence of heat propagation through the samples will be reported in terms of transient absorption intensities and the propagation rates will be discussed.

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