Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Monitoring heat energy transfer in condensed phases using ultrafast transient spectroscopies NHAN DANG, JENNIFER GOTTFRIED, Army Research Laboratory — The primary motivation for this work is the desire to observe the initial evolution of temperature transfer into a solid explosive on the picosecond timescale following indirect ultrafast flash heating, which may provide insight the role of temperature in the shock-induced initiation mechanism in explosives. In this presentation, we describe the methods of indirect flash heating on glass-gold-sample substrates using femtosecond laser pulses; and the methods of monitoring the sample response under the influence of the heat transferred from the heated gold layer through the sample using time-resolved visible transient absorption (TA) spectroscopy and coherent Raman spectroscopies. Data presented here are the evolution of heat energy transfer in a drop-cast thin film of unreacted cyclotrimethylene trinitramine (RDX) monitored using visible TA and surface-enhanced coherent anti-Stokes Raman spectroscopy. The method of nonequilibrium temperature measurement using femtosecond-stimulated Raman spectroscopy reported in [Phys. Rev. Lett., 2011, 107, 043001; J. Raman Spectrosc., 2013; 44 (3) 433-439.] will be also discussed here for the application of monitoring and measuring temperature in real-time.

Nhan Dang
Army Research Laboratory

Date submitted: 28 Jan 2015 Electronic form version 1.4