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Ultrafast laser diagnostics for understanding hot spot initiation in energetic materials IAN KOHL, DARCIE FARROW, SEAN KEARNEY, ROBERT KNEPPER, JEFFREY KAY, Sandia Natl Labs — Ultrafast laser diagnostics have opened new pathways for investigation of shock physics and initiation of energetic materials. Recent work (Bolme LANL/Armstrong LLNL) has demonstrated that short laser pulses can be utilized for direct laser drive and coupled with imaging, spectroscopic, and interferometric tools for studies of dynamic shock loading on picosecond time scales. At Sandia, we are developing diagnostic platforms which extend this earlier work by combining Ultrafast Shock Interferometry (USI) (Armstrong LLNL) and femtosecond transient absorption spectroscopy for tabletop measurement of Hugoniot/Equation-of-state data and characterization of shock structure in heterogeneous materials with micron spatial resolution while probing shock-induced changes in the electronic structure, which have been proposed to drive rapid chemical changes behind the shock front. We will describe the details of our measurement systems, as well as recent progress toward new laser-diagnostic data on inert/explosive thin-film samples.

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