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Mechanochemistry for Shock Wave Energy Dissipation WILLIAM SHAW, YI REN, ZHI SU, JEFFREY MOORE, KENNETH SUSLICK, DANA DLOTT, University of Illinois at Urbana-Champaign — Using our laser-driven flyer-plate apparatus we have developed a technique for detecting mechanically driven chemical reactions that attenuate shock waves. In these experiments 75 μm laser-driven flyer-plates travel at speeds of up to 2.8 km/s. Photonic Doppler velocimetry is used to monitor both the flight speed and the motions of an embedded mirror behind the sample on the supporting substrate. Since the Hugoniot of the substrate is known, mirror motions can be converted into the transmitted shock wave flux and fluence through a sample. Flux shows the shock profile whereas fluence represents the total energy transferred per unit area, and both are measured as a function of sample thickness. Targets materials are micrograms of carefully engineered organic and inorganic compounds selected for their potential to undergo negative volume, endothermic reactions. In situ fluorescence measurements and a suite of post mortem analytical methods are used to detect molecular chemical reactions that occur due to impact.

William Shaw
University of Illinois at Urbana-Champaign

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