Abstract Submitted for the SHOCK05 Meeting of The American Physical Society

Ultrafast Dynamic Ellipsometry Measurements of the Hugoniot of Unreacted HMX DAVID MOORE, DANIEL HOOKS, SHAWN MCGRANE, DAVID FUNK, Materials Dynamics Group, Los Alamos National Laboratory, Los Alamos, NM 87545 USA — Ultrafast interferometric microscopy has been used to measure time resolved surface motion in shocked metal films. However, the shock generally produces changes (via increased pressure and temperature, and/or phase transformation) to the complex refractive index of materials (including metals and transparent dielectrics), to which the interferometry measurements are also sensitive. Obtaining time- resolved interferometric data at two probe angles of incidence and two polarizations, a technique called ultrafast dynamic ellipsometry, allows the shock velocity, particle velocity, and shocked index of refraction to be unambiguously measured. Less than 100 ps worth of data is necessary (as little as 30 ps suffices), so that the shock and particle velocities can be obtained in a reactive material before appreciable reaction occurs, to higher pressures than other slower techniques. We have used ultrafast dynamic ellipsometry to measure the shock state in unreacted, oriented, single crystals of HMX. Details of the experiment and results will be presented.

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Date submitted: 07 Apr 2005

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