Abstract Submitted for the Forty-Ninth Annual Meeting
Division of Plasma Physics
November 12–16, 2007, Orlando, Florida

Category Number and Subject:

[ ] Theory [X] Experiment

Laser Heating of Solid Matter by Light Pressure-Driven Shocks at Ultra-Relativistic Intensities,* K.U. Akli, R.B. Stephens, *General Atomics*; A.J. MacKinnon, P.K. Patel, M.H. Key, S.B. Hansen, A.J. Kemp, *Lawrence Livermore National Lab.*; R.R. Freeman, D. Clark, K. Highbarger, N. Patel, L. Van Woerkom, R. Weber, *The Ohio State U.*; F. Beg, T. Ma, *UCSD*; D. Hey, *UC-Davis*; K. Lancaster, *Rutherford Appleton Lab.;* C. Stoeckel, M. Storm W. Theobald, *U. Rochester-LLE* – Heating by irradiation of a solid surface in vacuum with 5×10^{20} W cm^{-2}, 0.8 ps, 1.05 micron wavelength laser light is studied by x-ray spectroscopy of the K-shell emission from thin layers of Ni, Mo and V. A surface layer is heated to ~5 keV with an axial temperature gradient of 0.6 μm scale length. Images of Ni Lyα show the hot region has a ~25 μm diameter. Collisional particle-in-cell simulations based on density profiles from hydro-models suggest that light pressure compresses the preformed plasma and drives a shock into the solid.

*Supported by the US DOE under DE-FG02-05ER54834 and W-7405-ENG-48.