Abstract Submitted
for the SHOCK05 Meeting of
The American Physical Society

The Color of High Energy Density Gold Y. PING, T. AO, H. TAM, UBC, K. WIDMANN, D. PRICE, A. NG, LLNL — The study of non-equilibrium phase transitions is a rapidly developing field. Non-thermal melting has been observed in femtosecond laser heated semiconductors such as silicon. This is thought to result from the excitation of valence electrons to the conduction band, giving rise to anti-bonding states. In metals, the process of melting under ultrafast laser excitation is not clearly understood. In our experiment, we measure the broadband (400-800nm) optical reflectivity and transmissivity of freestanding, 30nm-thick gold foils heated with 150fs, 400nm laser light. Prior to laser excitation the sample shows strong reflectivity for wavelengths above 500nm. This is due to interband (d to s/p) transitions, thus giving gold its characteristic color. The reflectivity and transmissivity spectra of the heated sample (hence the color of gold) change substantially with laser excitation energy densities. Such spectral signatures offer a new means of probing electronic and structure behaviors associated with non-equilibrium phase transitions. *Work performed under the auspices of the U.S. Department of Energy by the University of California LLNL under contract #W- 7405-ENG-48. This research was also supported by NSERC, Canada.

Yuan Ping
LLNL

Date submitted: 21 Apr 2005 Electronic form version 1.4