Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Solid phase of aluminum at high energy densities[1] V. SAMETOGLU, University of Alberta, Z. CHEN, Univesrity of Alberta, Y.Y. TSUI, University of Alberta, S.E. KIRKWOOD, University of Ottawa, T. AO, Sandia National Laboratory, Y. PING, Lawrence Livermore National Laboratory, A. NG, University of British Columbia — Recently, there is a growing interest in using isochoric heating of solids induced by an intense, ultrafast energy source to produce gradient-free, high-energy-density matter in the laboratory. Of central importance in such an approach is the persistence of the heated material in its solid phase. In previous experiments a solid phase of gold was found to last from ∼20 ps after being heated by a 400 nm, 150 fs laser pulse to an energy density of 10^{10} J/m^3 to ∼2 ps for an energy density of ∼4x10^{11} J/m^3 [T. Ao *et. al*, PRL 96, 055001 (2006); Y. Ping *et. al*, PRL 96, 255003 (2006)]. In this paper, we report on observations made on aluminum isochorically heated by a 400 nm, 40 fs laser pulse. The experiment was performed at the Advanced Laser Light Source (ALLS) in Quebec. Aluminum was chosen for its free-electron like density of states in contrary to the hybridized 5d-6s/p states in gold. Interestingly, under such ultrafast laser excitation, aluminum also appeared to remain solid on a ps time scale at an energy density of ∼10^{11} J/m^3.

[1]This work is supported by the Natural Sciences & Engineering Research Council of Canada and Canadian Institute for Photonic Innovations.

Ying Tsui
University of Alberta

Date submitted: 17 Jul 2010 Electronic form version 1.4