Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Laser Shock Compression Studies of Phase Changes in Ce_3Al Metallic Glass[1] ALEX BRYANT, Georgia Institute of Technology, CHRISTOPHER WEHRENBERG, Lawrence Livermore National Laboratory, FAISAL ALAMGIR, Georgia Institute of Technology, BRUCE REMINGTON, Lawrence Livermore National Laboratory, NARESH THADHANI, Georgia Institute of Technology — Laser shock-compression of Ce_3Al metallic glass (MG) was performed to probe pressure-induced phase transitions. Ce_3Al MG has been previously shown to crystallize into a single crystal FCC phase during static compression at 25 GPa. In the present work, experiments were performed using the 3J Nd:YAG pulse laser at Georgia Tech and the high energy laser at the OMEGA facility. Characterization of shock compressed samples recovered from the OMEGA laser experiments were performed using XRD and PDF measurements at the NSLS-2 synchrotron at Brookhaven National Lab. The results showed evidence of a permanent polyamorphous phase change at pressures $>\tilde{}10$ GPa and crystallization at pressures $>\tilde{}75$ GPa. Particle velocities were measured using VISAR in experiments performed at Georgia Tech and simulated using Hyades and Abaqus to create an empirical equation of state and correlate with results obtained from XRD and PDF characterization. The results attained to-date in terms of the evolution of the high pressure amorphous and crystalline phases and their correlations with the shock conditions will be presented.

[1]This work is supported in part by ARO Grant No. W9HNF-09-1-0403 and the National Science Foundation Graduate Research Fellowship Program awarded to Alex Bryant under Grant No. 0946809

Alex Bryant
Georgia Institute of Technology

Date submitted: 20 Feb 2017 Electronic form version 1.4