Abstract Submitted
for the APR08 Meeting of
The American Physical Society

Time-Resolved Third Order Harmonic Generation on Shocked Silicon Crystals D.A. DALTON, W. GRIGSBY, H. QUEVEDO, A.C. BERNSTEIN, T. DITMIRE, Texas Center for High Intensity Laser Science, University of Texas-Austin — We are using nonlinear optical diagnostics to probe the shock-induced melt transition in silicon. Pump-probe shock experiments on [100] Si crystals were carried out using the Ti:Sapphire THOR laser (800 nm, 1 J, 600 ps-chirped, 40 fs-compressed). Two dimensional interferometry was used to map rear surface displacement at discrete times to infer a peak shock pressure. Third order harmonic generation (THG) is used to probe the bulk material's long range order, while a reflectivity diagnostic is used in conjuction with the THG diagnostic to determine it's validity. Preliminary evidence shows the anomalous response that at shock pressures <100 kbar (∼elastic limit) the THG signal does not decrease; however, at higher pressures of ∼300-400 kbar the THG signal falls dramatically indicating fast crystalline disordering.

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Date submitted: 11 Jan 2008 Electronic form version 1.4