

Abstract Submitted
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Structural changes in shock compressed silicon observed using time-resolved x-ray diffraction at the Dynamic Compression Sector STEFAN TURNEAURE, E. ZDANOWICZ, N. SINCLAIR, T. GRABER, Y.M. GUPTA, Wash. State Univ. — Structural changes in shock compressed silicon were observed directly using time-resolved x-ray diffraction (XRD) measurements at the Dynamic Compression Sector at the Advanced Photon Source. The silicon samples were impacted by polycarbonate impactors accelerated to velocities greater than 5 km/s using a two-stage light gas gun resulting in impact stresses of about 25 GPa. The 23.5 keV synchrotron x-ray beam passed through the polycarbonate impactor, the silicon sample, and an x-ray window (polycarbonate or LiF) at an angle of 30 degrees relative to the impact plane. Four XRD frames (~ 100 ps snapshots) were obtained with 153.4 ns between frames near the time of impact. The XRD measurements indicate that in the peak shocked state, the silicon samples completely transformed to a high-pressure phase. XRD results for both shocked polycrystalline silicon and single crystal silicon will be presented and compared. Work supported by DOE/NNSA.

Stefan Turneaure
Wash. State Univ.

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