

Abstract Submitted
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Surface Specularity as an Indicator of Shock-Induced Solid-Liquid Phase Transitions¹ G.D. STEVENS, S.S. LUTZ, W.D. TURLEY, L.R. VEESER, NSTec Special Technologies Laboratory, P.A. RIGG, B.J. JENSEN, R.S. HIXSON, Los Alamos National Laboratory — When highly polished metal surfaces melt upon release after shock loading, they exhibit a number of features that suggest that significant surface changes accompany the phase transition. The reflection of light from such surfaces changes from specular (pre-shock) to diffuse upon melting. A familiar manifestation of this phenomenon is the loss of signal light in velocimetric measurements typically observed above pressures high enough to melt the free-surface. Unlike many other potential material phase-sensitive diagnostics (e.g., reflectometry, conductivity), changes in the specularity of reflection provide a dramatic, sensitive indicator of the solid-liquid phase transition. Data will be presented from multiple diagnostics that support the hypothesis that specularity changes indicate melt. These diagnostics include shadowgraphy, infrared imagery, high-magnification surface images, interferometric velocimetry, and most recently scattering angle measurements.

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