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Probing Shock Compressed Silicon Metallization using VIS/NIR Reflectivity SUZANNE ALI, Univ. of California, Berkeley, CYNTHIA BOLME, Los Alamos National Lab, RAYMOND JEANLOZ, Univ. of California, Berkeley, GILBERT COLLINS, Lawrence Livermore National Lab — Broadband reflectivity measurements provide detailed information about the optical and electronic properties of shocked matter, complementing other spectroscopic techniques and increasing the accuracy of pyrometric measurements, which is vital for improving models of planetary cores. A time resolved broadband VIS/NIR reflectivity diagnostic was constructed and used to observe the metallization of shock compressed single crystal <111> silicon at Jupiter Laser Facility at Lawrence Livermore National Lab. A 50-100 fs 800 nm pulse was first sent through a pulse stacker and then an intense white light pulse with wavelengths from ∼400 nm to ∼1200 nm was generated by focusing the stacked pulses into a water cell. The white light pulses were then sent into the chamber and reflected from the target surface. The reflected light was dispersed using a custom spectrometer which was coupled to a streak camera. On transition to the β-Sn phase a dramatic increase in reflectivity was observed in the NIR, and to a lesser extent in the visible. This is congruent with the decrease in resistivity that accompanies closure of the silicon band gap and metallization.

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