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Shock response near the elastic to plastic transition in single crystal and porous silicon J. MATTHEW LANE, TRACY J. VOGLER, Sandia National Labs — We use molecular dynamics simulation methods to study the onset of the plastic wave transition in single crystal silicon, and characterize the altered response due to various degrees of porosity from 5 to 50 percent. Non-elastic response near onset of plasticity follows a mechanism similar to one shown previously in germanium, in which a propagating densification transition is driven by the release of shear stress in the material. This transition mechanism can be characterized as a partial transition from the ambient diamond structure to a distorted body center tetragonal (β-tin) structure. We show that this onset region is strongly influenced by porosity and large scale defects. Sandia National Laboratories is a multi program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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