Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Transformation pathways and microstructural evolution in shock-loaded and reshocked Zr and Ti BENJAMIN MORROW, DAVID JONES, ELLEN CERRETA, Los Alamos National Laboratory — During shock loading, hcp metals (e.g. zirconium and titanium) can experience a phase transformation from hcp alpha phase to hexagonal omega phase. Omega phase is often retained in the microstructure after unloading, and has a strong influence on subsequent mechanical properties. A systematic study of the microstructural evolution under various shock conditions will be presented. Soft-recovered shocked samples were characterized using electron backscatter diffraction (EBSD) to observe and quantify crystal orientations and microstructural features (including twinning, phase variants formed during deformation, and textures) to determine likely transformation pathways. Additionally, several previously shocked, two-phase samples were reshocked, resulting in a further refinement of the microstructure. Experiments at the Advanced Photon Source were performed to measure diffraction patterns during plate impact experiments of single and two-phase material to study the evolution during transformation. The combination of high-rate, in-situ and post-mortem data allow us to probe the mechanism and kinetics of phase transformations.

Benjamin Morrow
Los Alamos National Laboratory

Date submitted: 27 Feb 2019 Electronic form version 1.4