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Shock Driven Twinning in Tantalum Single Crystals[1] MUKUL KUMAR, JAMES MCNANEY, LUKE HSIUNG, NATHAN BARTON, Lawrence Livermore National Laboratory — Recovery based observations of high pressure material behavior generated under high explosively driven flyer based loading conditions are reported. Two shock pressures, 25, and 55 GPa and four orientations {(100), (110), (111), (123)} were considered. Recovered material was characterized using electron backscatter diffraction along with a limited amount of transmission electron microscopy to assess the occurrence of twinning under each test condition. Material recovered from 25 GPa had a very small fraction of twinning for the (100), (110), and (111) oriented crystals while a more noticeable fraction of the (123) oriented crystal was twinned. Material recovered from 55 GPa showed little twinning for (100) orientation slightly more for the (111) orientation and a large area fraction for the (123) orientation. The EBSD and TEM observations of the underlying deformation substructure are rationalized by comparing with previous static and dynamic results along with the crystal plasticity based hydrodynamic modeling.

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