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Near-Isentropic, High Pressure Laser-Driven Deformation Response of Copper J.M. MCNANEY, B. TORRALVA, J.S. HARPER, Lawrence Livermore National Laboratory, M.S. SCHNEIDER, University of California, San Diego, E.M. BRINGA, B.A. REMINGTON, M. WALL, Lawrence Livermore National Laboratory, M.A. MEYERS, University of California, San Diego — We have developed a new platform for investigating deformation of a material under dynamic high pressure, quasi-isentropic loading. The technique uses a laser to generate a strong shock in a reservoir material. Unloading of the shockwave at the back of the reservoir creates a plasma that stretches across an evacuated gap and induces a quasi-isentropic pressure wave in the solid sample to be investigated. As this wave propagates through the solid material, it steepens and eventually becomes a shock. The large size of the sample minimizes the effect of wave reflection from boundaries. We have used this platform to investigate the response of single crystal copper loaded to a peak pressure of 25 GPa. Transmission electron microscope evaluation of the residual microstructure reveals a distinct difference between the shockless (dislocation cells) and shocked region (stacking faults). This work was performed under the auspices of the U.S. Department of Energy by University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

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