Abstract Submitted
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Strength of Shock-Loaded Single-Crystal Tantalum [100] Determined using In-Situ Broadband X-ray Laue Diffraction[1] A.J. COMLEY, AWE, B.R. MADDOX, R.E. RUDD, S.T. PRISBREY, J.A. HAWRELIAK, D.A. ORLIKOWSKI, S.C. PETERSON, J.H. SATCHER, A.J. ELSHOLZ, H.-S. PARK, B.A. REMINGTON, LLNL, N. BAZIN, J.M. FOSTER, N. PARK, P.A. ROSEN, S.D. ROTHMAN, AWE, A. HIGGINBOTHAM, M. SUGGIT, J.S. WARK, University of Oxford — We report on recent experiments to determine the strength of shock-loaded single-crystal tantalum [100] using in-situ broadband x-ray Laue diffraction to measure the strain state of the compressed crystal, and elastic constants calculated from first principles. The experiments were conducted at the OMEGA laser facility in Rochester NY, USA. The inferred strength reaches 35 GPa at a shock pressure of 181 GPa and is in excellent agreement with a multiscale strength model (N. R. Barton et al. J. Appl. Phys. 109, 073501 (2011)), which employs a hierarchy of simulation methods over a range of length scales to calculate strength from first principles.

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