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Experimental Comparison of Tantalum Material Strength between Single Crystal [100] and [111] Samples at High Pressure and Strain Rates[1] CHRISTOPHER PLECHATY, HYE-SOOK PARK, ROB CAVALLO, SHON PRISBREY, ROBERT RUDD, CHRISTOPHER WEHRENBERG, CHANNING HUNTINGTON, BRIAN MADDOX, MARK MAY, BRUCE REMINGTON, Lawrence Livermore National Laboratory — Experiments were performed using the OMEGA laser to investigate Ta material strength at high pressure (1 Mbar), and high strain rates (10^6- 10^8 s^{-1}). To achieve these pressures and strain rates in experiment without melting the sample, a quasi-isentropic drive [1] was employed to drive the growth of pre-imposed sinusoidal perturbations embedded on the surface of the Ta sample, via the Rayleigh-Taylor (RT) instability. By measuring the ripple amplitude using face-on high energy ($\sim$ 22 KeV) radiography [2], the strength of the Ta sample was inferred from the amount of RT growth observed. Under these experimental conditions, the Ta material strength can be modeled by the Multiscale (MS) model [3], developed at LLNL. In this study, we performed a side-by-side comparison of the ripple growth on [100] and [111] orientated single-crystal Ta samples for the same shot and drive conditions. The objective was to determine if a difference in the growth predicted by the MS model could be observed at the high pressure and strain rates present in our experiments, and within the error bars of the experimental technique. [1] H.S. Park, et al., PRL **104**, 135504 (2010). [2] H.S. Park, et al., POP **15**, 072705 (2008). [3] N. R. Barton, et al., JAP **109** (7), 073501 (2011).

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Christopher Plechaty
Lawrence Livermore National Laboratory

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