Abstract Submitted
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Study of Plastic flow at high pressures and strain rates via the Rayleigh-Taylor instability[1] HYE-SOOK PARK, J. BELOF, K. BLOBAUM, R. CAVALLO, B. MADDOX, C. PLECHATY, S. PRISBREY, B. REMINGTON, R. RUDD, C. WEHRENBERG, M. WILSON, LLNL — We present the results from study of tantalum material strength at high pressures and high strain rates using the Omega laser system. The Ta sample is maintained in the solid state via a quasi-isentropic ramped drive using a reservoir-gap-sample configuration at high pressures ($>$ 1 Mbar) and high strain rates (10^6 - 10^8 $\sec^{-1}$). The strength is inferred by measurement of Rayleigh-Taylor induced growth in pre-imposed sinusoidal ripples on a Ta sample [1]. Our study of the samples with single crystal, 0.25, 15 and 90 micron average grain sizes shows that there is no obvious Hall-Petch effect under such extreme conditions. We also show that RT growth is linear as long as the RT growth is below 0.15 of the original sample thickness. We show a comparison of experimental results with the recently developed Livermore Multiscale model that integrates the atomistic scale physics to macro hydro flow simulations. The NIF experimental design will also be presented

[1] H. S. Park et al., PRL. 104, 135504 (2010).

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