

Abstract Submitted
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Studying Ta material strength under high pressure and high strain rate using plasma drives¹ HYE-SOOK PARK, N.R. BARTON, R.M. CAVALLO, B.R. MADDOX, M.J. MAY, S.M. POLLAINÉ, S.T. PRISBREY, B.A. REMINGTON, R.E. RUDD, LLNL, A.J. COMLEY, AWE — We are studying material strength under high pressures (>1 Mbar) and high strain rates ($10^6 - 10^8 \text{ sec}^{-1}$) in Ta. The strength is inferred from the growth measurements of the pre-imposed sinusoidal ripples on the sample via Rayleigh-Taylor (RT) instability properties. The material strength can greatly suppress RT growth rate [1]. Our recent experiments include the study of any grain size dependence of strength under these high pressures and strain rates. There are neither existing experimental data nor theoretical predictions of the expected Hall-Petch effect under the extreme conditions of our RT experiments. Three different samples of $0.25 \mu\text{m}$, $15 \mu\text{m}$ and $90 \mu\text{m}$ average grain sizes are fabricated and their corresponding RT-induced ripple growth factors are measured. The details of the measurements, target characteristics, analysis, and final results will be presented. Designs that extend this experiment by an order of magnitude in pressure on NIF will also be presented

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

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Hye-Sook Park
LLNL

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