Material deformation dynamics at ultrahigh pressures and strain rates\textsuperscript{1} B.A. REMINGTON, H.S. PARK, B.R. MADDOX, M.J. MAY, S.M. POLLAIN, S.T. PRISBREY, R.E. RUDD, J.A. HAWRELIAK, T.S. PERRY, LLNL, A.J. COMLEY, AWE, J.S. WARK, Univ. Oxford, M.A. MEYERS, UCSD — Solid-state dynamics experiments at extreme pressures, up to 10 Mbar, and strain rates (1.e6 -1.e8 1/s) are being developed for the NIF laser. The experimental methods are being developed on the Omega laser facility. VISAR measurements establish the ramped, high-pressure conditions. Recovery experiments offer a look at the residual microstructure. Dynamic diffraction measurements allow phase, shear stress (strength), and possibly twin volume fraction and dislocation density to be inferred. Constitutive models for material strength at these conditions by comparing 2D simulations with experiments measuring the Rayleigh-Taylor instability evolution in solid-state samples of vanadium and tantalum. The material deformation likely falls into the phonon drag regime. We estimate of the (microscopic) phonon drag coefficient, by relating to the (macroscopic) effective lattice viscosity.

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