Abstract Submitted
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Shock-processing of astrophysical dust grains[1] J.F. HANSEN, G.A. GRAHAM, E.M. BRINGA, B.A. REMINGTON, LLNL, A.T. KEARSLEY, Natural History Museum, London, W. VAN BREUGEL, UC Merced, A.G.G.M. TIELENS, NASA Ames, E.A. TAYLOR, Open University, UK — We are developing a new capability to carry out experiments on the shock processing of astrophysical dust grains and cratering of space hardware due to hypervelocity interplanetary dust particle (IDP) impacts. A 527 nm, 200 J laser launches a shock through a target consisting of a 25 μm plastic ablator followed by a 200 μm, 100 mg/cm^3 foam. Dust grains embedded near the rear surface of the foam experience pressures of $\sim$200 kbar in a $<$50 ps spike, simulating astrophysical pressure conditions in grain-grain collisions. A first experiment shows acceleration of 5 μm diameter Al_2O_3 dust grains to several km/s as measured by particle image velocimetry using a double-pulsed probe laser that is Mie-scattered off the grains. The grains were allowed to impact high-purity Cu foils where they caused abundant cratering, similar to what is seen on recovered space hardware after exposure to IDPs. The cratering is currently being studied in scanning electron microscopes and a preliminary analysis will be presented.

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