Abstract Submitted
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Shock compression of glow discharge polymer (GDP): density functional theory (DFT) simulations and experiments on Sandia's Z machine[1] KYLE R. COCHRANE, T. AO, R.W. LEMKE, Sandia National Laboratories, S. HAMEL, Lawrence Livermore National Laboratory, M.E. SCHOFF, B.E. BLUE, General Atomics, M.C. HERRMANN, T.R. MATTSSON, Sandia National Laboratories — Glow discharge polymer (GDP) is used extensively as capsule/ablation material in inertial confinement fusion (ICF) capsules. Accurate knowledge of the equation of state (EOS) under shock and release is particularly important for high-fidelity design, analysis, and optimization of ICF experiments since the capsule material is subject to several converging shocks as well as release towards the cryogenic fuel. We performed Density Functional Theory (DFT) based quantum molecular dynamics (QMD) simulations, to gain knowledge of the behavior of GDP - for example regarding the role of chemical dissociation during shock compression, we find that the dissociation regime along the Hugoniot extends from 50 GPa to 250 GPa. The shock pressures calculated from DFT are compared experimental data taken at Sandia's Z-machine. The GDP samples were grown in a planar geometry to improve the sample quality and maintained in a nitrogen atmosphere following manufacturing, thus allowing for a direct comparison to the DFT/QMD simulations.

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Thomas R. Mattsson
Sandia National Laboratories

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