Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

High-Pressure Shock Response and Phase Transition of Soda-Lime Glass JOSHUA E. GORFAIN, Applied Physical Sciences (United States), C. SCOTT ALEXANDER, Sandia National Laboratories (United States), CHRISTOPHER T. KEY, Applied Physical Sciences (United States) — The phase transition of crystalline and amorphous silica materials to a stishovite-like high-pressure phase has received considerable interest. While most work has focused on pure SiO_2 glass (fused silica), studies identifying a similar high-pressure phase transformation in soda-lime glass have not been performed. Marked differences in the network structure and compressibility of soda-lime as compared to fused silica raise questions as to how a stishovite transition manifests in these glasses. In this work, plate impact experiments on soda-lime glass have been performed to ˜110 GPa to measure the Hugoniot response at previously un-accessed pressures. Results of these tests supply evidence of a transition to a high-pressure polymorph under shock loading. A glass constitutive model is proposed to capture this newly found high-pressure response. Good agreement between time resolved measurements and simulation results from the CTH hydrocode with this model implemented are shown, along with additional insights into the apparent glass behavior. SNL is managed and operated by NTESS under DOE NNSA contract DE-NA0003525.

Joshua Gorfain
Applied Physical Sciences (United States)

Date submitted: 26 Feb 2019 Electronic form version 1.4