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Deformation behavior of a Ce-Al bulk metallic glass LAURA CHEN, DANIEL EAKINS, Imperial College London, NARESH THADHANI, Georgia Institute of Technology, DAMIAN SWIFT, MUKUL KUMAR, Lawrence Livermore National Laboratory — The mechanisms of stress relaxation in metallic glasses under high strain rates are an area of active study. The lack of extended structure forces strain accommodation through alternative modes to slip. For example, amorphous Ce_3Al has been shown to undergo a phase transition to the crystalline FCC Ce_3Al at 25 GPa under quasistatic loading. Whether this mechanism extends to high strain rates has yet to be determined. We present results of an initial study into the ultrafast deformation characteristics of a Ce-Al bulk metallic glass. Using the Janus laser at the Jupiter Laser Facility (LLNL), thin targets $\sim$30 μm in thickness were shocked over a range of pressures up to 50 GPa. The velocity of the target rear surface was measured using a line-imaging VISAR to reveal features in the wave profile attributed to stress relaxation. In addition, experiments were performed on crystalline forms of Ce-Al prepared through heat treatment of the amorphous material. Preliminary results reveal a distinct precursor wave in the amorphous material below 20 GPa, which gives way to a complex multiwave structure above 30 GPa. Results of analyses in terms of the contribution of elastic energy to Gibbs' free energy of the initial phase are also presented.

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