Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Shockwave Absorption using Network-forming Ionic glass[1] JAEJUN LEE, KE YANG, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, JEFFREY MOORE, Department of Chemistry, University of Illinois at Urbana-Champaign, NANCY SOTTOS, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, MURI SWED COLLABORATION — Network-forming ionic glasses composed of di-ammonium cations and citrate anions exhibit significant potential for dissipation of shock wave energy. The long alkyl side chains in the di-ammonium cation form a soft matrix, while the negatively charged heads of anions segregate into hard nanophase domains. Similar to polyurea, which has microphase separation of soft and hard domains, we hypothesize that shock wave dissipation of the ionic glass occurs by bond breaking in the hard domains and/or pressure-induced phase transition. By employing size-tunable alkyl side chains in the cations, we examine the effect of the relative soft domain size on energy dissipation. A series of thin film (ca. 50 μm) ionic glass specimens are subjected to laser-induced compressive stress waves and the transmitted response measured interferometrically. Structural changes of the ionic glass due to shock wave impact are characterized by x-ray diffraction. When compared directly to polyurea films of identical thickness and geometry, the ionic glass showed superior shock-wave mitigating performance.

[1]ONR MURI program

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Date submitted: 30 Jan 2015 Electronic form version 1.4