Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Localizing linear and nonlinear elastic responses in liquid crystal elastomers ANESIA D. AUGUSTE, Air Force Rsch Lab - WPAFB, BENJAMIN A. KOWALSKI, Azimuth Corporation, TIMOTHY J. WHITE, Air Force Rsch Lab - WPAFB — Liquid crystal elastomers (LCE) contain rod-like rigid units (mesogens) which exhibit and maintain orientational or positional order. Under a stimulus, LCEs exhibit dramatic shape and/or optical changes that can be utilized in aerospace applications, optics, or medicine. Here, we prepared patterned elastomers with distinct local elastic properties by controlling the alignment of the mesogens through ink-jet printing. The mechanical response of LCEs is sensitive to the direction of the applied force with respect to director which is the preferred orientation direction of the mesogens. The material exhibits 'soft' elasticity when the mesogens realign to the stretching direction leading to deformation occuring at nearly constant stress. The orientation of the mesogens in homeotropically aligned LCEs, where the mesogens are aligned normal to the substrate, enables and allows for 'omnidirectional' soft elasticity in which the LCE exhibits nonlinear elasticity in any and all deformation directions compare to the anisotropic behavior of a planar aligned LCE. The ability to control the local elastic response allows us to create designer functional monoliths with various Poisson's ratios which may find use in flexible hybrid devices.

Anesia Auguste
Air Force Rsch Lab - WPAFB

Date submitted: 10 Nov 2016 Electronic form version 1.4