Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Auto-origami with liquid crystal elastomers: a simulation study[1]
ANDREW KONYA, ROBIN SELINGER, Kent State University — Liquid crystal elastomers (LCE) undergo shape transformations induced by stimuli such as heating/cooling or illumination. When a non-uniform director field is imposed on a sample during crosslinking, it encodes a complex actuation trajectory which may include a combination of bends, twists, and folds along with changes in Gaussian curvature. Taking a materials-by-design approach, we perform finite element simulations to explore director geometries which produce such auto-origami behavior. By cataloging and assembling a variety of basic motifs including those identified by Modes and Warner [1], we design director geometries that yield a variety of target structures. Assembling a sample with domains of two LCE materials with different isotropic-nematic transition temperatures provides a means for sequencing steps in the resulting actuation choreography on heating/cooling. [1] CD Modes and M Warner, Phys. Rev. E84, 021711 (2011)

[1]Supported by NSF-DMR-1106014.

Robin Selinger
Kent State University

Date submitted: 09 Nov 2012 Electronic form version 1.4