Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Thermotropic Liquid Crystalline Side Chain Elastomers DAVID THOMAS, MATTHEW CARDARELLI, PEGGY CEBE, BADEL MBANGA, TIMOTHY ATHERTON, Tufts University, ANTONI SANCHEZ-FERRER, ETH Zurich Institute of Food, Nutrition, and Health — Nematic Liquid Crystal Elastomers (NLCE) are lightly cross-linked polymeric materials that exhibit rubber elasticity and liquid-crystalline orientational order. We investigated the thermal response and microstructure of side-chain NLCEs using real-time synchrotron wide-angle X-ray scattering (WAXS) and optical ellipsometry. During thermal treatment, the material displayed a highly anisotropic fiber-like diffraction pattern comprising narrow equatorial reflections characteristic of the nematic state. A fully reversible nematic to isotropic transition was observed in WAXS upon heating and cooling. The transition temperature from WAXS was correlated with thermal properties, using differential scanning calorimetry, and with optical properties, using polarizing optical microscopy and transmission ellipsometry. By transmission ellipsometry, with the sample in the low temperature nematic phase, we were able to observe the effect of mechanical stimuli (tensile drawing) on the degree of orientational order.

David Thomas
Tufts University

Date submitted: 04 Oct 2013 Electronic form version 1.4