

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Polarization Controlled Photomechanical Behaviors of Polydomain Azobenzene Liquid Crystalline Polymer Networks¹ TIMOTHY WHITE, KYUNG MIN LEE, VINCENT TONDIGLIA, HILMAR KOERNER, RICHARD VAIA, TIMOTHY BUNNING, Air Force Research Laboratory — We report the polarization controlled photomechanical behaviors of azobenzene liquid crystalline polymer networks (azo-LCNs) as a function of crosslink density and temperature. High modulus, glassy polydomain azo-LCNs were synthesized by copolymerizing RM257 and 2-azo, initiated by 1 wt% of the inorganic photoinitiator Ir-gacure 784. Crosslinking density of azo-LCNs increases from 2.09 mol/dm³ to 7.24 mol/dm³ with curing time from 1-120 min. Storage modulus and loss tangent of azo-LCNs also increase with crosslinking density. All azo-LCNs are glassy at room temperature. To increasing temperature, E' begins to decrease through T_g to a level dependent on the crosslinking density, and eventually reaching a rubbery plateau region. Interestingly, the bidirectional (forward and reverse) bending angles of the polydomain azo-LCN cantilevers at equilibrium decrease with increasing temperature and crosslinking density. Absorption and bending behaviors of the azo-LCNs with various thicknesses, concentrations and molecular structure of azobenzene monomer will be discussed.

¹Authors acknowledge support from AFRL/RX and AFOSR

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Date submitted: 19 Nov 2010

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