Response and Characterization 5: 3:55 - 4:30 p.m.

Origins of Anelasticity in Some Main-chain Liquid Crystalline Elastomers

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We have synthesized a series of SmC main-chain liquid crystalline elastomer films in a polydomain state. Uniaxial stretching of these films at room temperature produces a monodomain structure that can, upon removal of load, retain a significant level of strain. Although these films show ordinary elastic response at temperatures in the mesophase near the isotropization (clearing) temperature, at room temperature – far below the clearing temperature – the mechanical response is anelastic. Above a strain threshold, the films do not fully recover their original dimensions after unloading. We will present results showing strain retention as a function of time after removal of load; stress/strain behavior of the partially recovered films, and the temperature profile of the strain recovery process. Of particular interest is the origin of anelasticity in these films. Through examination of this phenomenon by chemical variation of the mesogen, the alkylene chain, and the linear dimethylsiloxane linking units we will attempt to offer a rationale for the origins of shape memory in these LCE's.