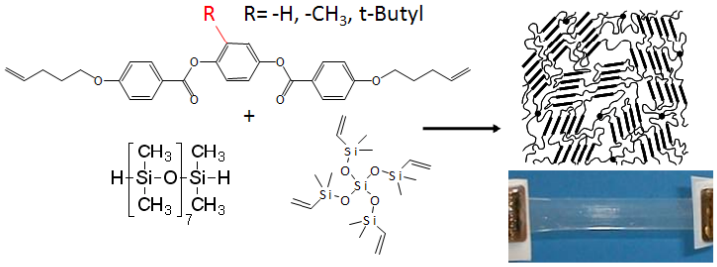
Response and Applications 11: 4:05 - 4:40 p.m.

Shape Memory Effects in Main-Chain Liquid Crystalline Elastomers

Patrick T Mather, Kelly A Burke, Angel Romo-Uribe

Liquid crystalline elastomers (LCEs) offer unique thermomechanical properties that can be exploited for a variety of applications. Our group has focused on main-chain LCEs that feature the smectic-C phase and tailored phase transition temperatures near room temperature. Uniquely, we have found that those compositions with constituent mesogens bearing a bulky side-group yield glass formation for the mesogenic layers and associated strain-fixing capability (Scheme 1). Consequently, we are able to “ix”macroscopic and microscopic temporary deformation, despite the material softness. This presentation will examine the viscoelastic properties of LCEs fixed in a uniaxially deformed state with varying tensile strain and using new methods for rheological characterization of anisotropic specimens. Further, we will correlate observed mechanical anisotropy with separate measurements of microstructure using wide-angle and small-angle x-ray scattering. .



Scheme 1. Main-chain LCEs featuring shape memory behavior.