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Stimuli Responses of Topology-Controlled Polymer Networks and Liquid Crystalline Gels

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In this talk I will present and discuss the stimulus-response relationships of topology-controlled polymer networks and liquid crystalline gels. I will assess several modern entanglement theories of rubber elasticity on the basis of the multi-axial stress-strain data of end-linked polydimethylsiloxane (PDMS) networks with well-characterized structures. The dynamics of guest linear PDMS in host PDMS networks will also been discussed as a function of mesh size and molecular mass of guest chains. I will also demonstrate the highly extensible or damping elastomers of PDMS by simply controlling the topological characteristics such as the conformation of network chains, the amount of trapped entanglement and pendant chain. Furthermore, I will present the volume transition accompanying the shape variation induced by nematic-isotropic transition in liquid crystalline gels. I will also reveal the electrically-driven deformation coupled to director rotation in nematic gels.