

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Photo-induced Reshuffling of Covalent Networks for Shape Actuators** MITCHELL ANTHAMATTEN, YUAN MENG, University of Rochester, DEPT. CHEMICAL ENG. TEAM — Photo-responsive allyl sulfide linkages within a polymer network can undergo addition fragmentation chain transfer (AFCT), in the presence of free radicals, to cause bond reshuffling. This phenomenon is employed to program a single-phase, two-way shape actuator that is thermal-responsive, even without an applied external load. Semicrystalline poly(caprolactone) networks containing allyl sulfide linkages are melted, strained to various elongations (hundreds of percent), and irradiated. Light causes a cascade of AFCT events, resulting in rupture of some network strands, configurational relaxation of dangling ends, and reformation of network bonds. After irradiation, the resulting double networks assume a mechanical state-of-ease and chains are under permanent configurational bias; when cooled, they crystallize in a preferred direction leading to fully reversible shape actuation. The mechanism of shape actuation is investigated using a combination of calorimetry and X-ray scattering.

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Date submitted: 14 Nov 2014

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