



CHEMISTRY

SPRING 2018 CHEMISTRY COLLOQUIA



March 2, 2018

3:15 Refreshments

3:30 Seminar

112 Hamilton Hall

Open to the public

Professor Shu Yang, University of Pennsylvania

“Foldable and Responsive Soft Metamaterials”

Reconfigurable soft metamaterials that can bend, fold, or transform the shape in response to external stimuli have attracted significant interests in design of actuators, sensors, and smart materials and devices. We fabricate a variety of microstructured polymer networks, including tilted and straight polymeric pillar arrays and porous membranes with different size, shape and arrangement from poly(dimethylsiloxane) (PDMS), poly(2-hydroxyethyl methacrylate) (PHEMA) based hydrogels, and epoxy based shape memory polymers (SMPs). By exploiting mechanical instabilities in these material systems, we investigate dynamic tuning of the microstructures in respond to environmental cues, such as pH, heat, light, and mechanical stretching, for potential applications such as tunable dry adhesion, water harvesting, and smart windows. To control the actuation and reversibility, we design and synthesize nematic liquid crystal elastomers (LCEs) with anisotropic strains, and precisely align the monomers within the patterned microchannels. Thus, we demonstrate to pre-program the folding of 2D sheets into 3D with various curvatures by embedding cues in surface patterns. Lastly, I will show our initial success in knitting functional polymer yarns into fabrics.

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