

# Department of Chemistry Seminar

*Dr. Alexa Kuenstler*

*University of Colorado Boulder*



Thursday, January 27 at 3:30 PM (CT)

Virtual Event

Host: Prof. Tehshik Yoon

## **“Using Light to Make and Control Advanced Soft Materials”**

Compared to other stimuli, light provides a powerful means to control chemical processes because it can be patterned in both time and space with high specificity. In this talk, novel methods to both manipulate soft material behavior and to enable fabrication of polymeric materials with light will be presented. In the first part of the talk, a novel method to control reversible photoactuation of polymer sheets into shapes with specific curvature will be presented. We demonstrate that by controlling the spatial absorbance of gold nanoparticles within liquid crystal elastomer nanocomposites, arbitrary photothermal profiles can be prescribed. Upon illumination with visible light, these materials buckle out of plane into complex shapes. In combination with theory and finite-element models, we demonstrate the inverse design of these materials for full shape control. In the second part of the talk, novel photopolymerization platforms towards mechanically robust and responsive materials will be discussed. We show that by incorporating dynamic covalent bonds within semi-crystalline photopolymers, novel materials that can be reconfigured over their lifetime are realized. Finally, incorporation of these materials with digital light projection (DLP) 3D printing is shown to enable the fabrication of high-performance constructs that are amenable to full recycling and repolymerization.

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