Designing organic solids with multi-reaction capability

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Chemistry Seminar on Organic Solid-state Chemistry

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Abstract: Chemical transformations conducted in the crystalline phase are significantly less common than solution-based reactions, primarily due to reduced motion, flexibility, and overall reactivity. In crystalline-state transformations, reactants are frequently designed to self-assemble into specific spatial arrangements, often leading to high control over product regio- and/or stereochemistry. In such crystalline transformations, typically only one type of reaction occurs, and a sacrificial template molecule is frequently used to direct the self-assembly process. In this presentation, we will describe the first system designed to undergo two chemically unique, orthogonal, and high yielding cycloaddition reactions simultaneously within a crystalline solid. We will also discuss the application of dually-reactive systems toward (supra)molecular solar thermal storage. Recent efforts toward programmable reactivity of dienes via solid-state structural control and wavelength-selective photocycloadditions will also be discussed.

About the speaker: Kristin received her B.S. in Chemistry from the University of Iowa in 2010. She stayed at the University of Iowa for graduate school and worked with Prof. Leonard MacGillivray in the areas of supramolecular chemistry, crystal engineering, and solid-state reactivity and received her Ph.D. in 2015. Kristin went to the University of Illinois at Urbana-Champaign to conduct postdoctoral work with Prof. Jeffrey Moore on polymer colloids for self-healing applications. In fall 2017, she started as an Assistant Professor at Texas Tech University. Her research group investigates stimuli-responsive organic solids, improving properties of pharmaceuticals, and design of polymers that capture rare-earth elements. Kristin was promoted to Associate Professor with tenure in September 2022. In September 2023, Kristin moved her group to the University of Missouri, and she is currently an Associate Professor in the Department of Chemistry and a core faculty member of the Materials Science & Engineering Institute. She is an editorial advisory board member for the journals *CrystEngComm* and *Structural Dynamics*, and she is a member of the advisory board for the Women in Supramolecular Chemistry Network.