Chemical & Biomolecular Seminar Series

Theresa Reineke

Distinguished McKnight University Professor

Department of Chemistry

Purdue University

Friday, October 13, 2017

10:00—11:00 a.m.

102 Colburn Lab

Theresa Reineke is a Distinguished McKnight University Professor in the Department of Chemistry at the University of Minnesota. She also holds graduate faculty appointments in the Department of Chemical Engineering & Materials Science and Pharmaceutics. She received a B.S. Degree from the University of Wisconsin-Eau Claire, a M.S. Degree from Arizona State University, a Ph.D. from the University of Michigan, and a National Institutes of Health Postdoctoral Fellowship at the California Institute of Technology. Currently, her research group is focused on enabling fundamental and applied technology advancements of polymers in the fields of gene therapy, oral drug delivery, and sustainability. She has published over 100 peer-reviewed manuscripts and received several awards. Reineke is also a founding Associate Editor of *ACS MacroLetters* and currently on the Editorial Advisory Boards of the ACS journals *Biomacromolecules* and *Bioconjugate Chemistry*.

Enabling Functional Biomaterials Through Controlled Polymer Synthesis

Multifunctional macromolecules have a tremendous impact on a multitude of applications. For example, the development of polymer excipients can improve the solubility and bioavailability of intractable drugs, nucleic acid delivery vehicles have promise to promote selective genome editing, and materials from sustainable monomers may lower the environmental impact of plastics. While the materials function is diverse across these fields, the polymer chemistry is similar and should be readily tunable for each specific application while remaining biologically and environmentally benign. Bio-based feedstocks such as carbohydrates and their derivatives offer great promise for tailoring materials development for a multitude of uses due to their rich functionality (high heteroatom content and stereochemistry), renewable production on an impressive scale, low toxicity, and the potential for triggered degradation. In addition, renewable feedstocks offer high glass transition temperatures, the ability to modulate solubility through chemical modification, and the utility to target delivery to selective tissue types. Indeed, the chemical, physical, mechanical, and morphological properties of polymers containing sustainable and biologically-friendly monomers can be tuned based on chemistry, sequence, and composition to yield diverse function and properties. Herein, the design and development of tailored polymers using a variety of synthetic pathways will be presented. Their application in the development of sustainable polymers, improvement of oral pharmaceutical bioavailability, and design of nucleic acid delivery vehicles for genome editing applications will be presented.