



Rensselaer

The HOWARD P. ISERMANN
DEPARTMENT OF CHEMICAL AND
BIOLOGICAL ENGINEERING

CBE Seminar Series – Spring 2025

Dr. Brad H. Jones

Principal Member of the Technical Staff
Department of Organic Materials Science
Sandia National Laboratories

Seminar: Wednesday, February 26, 2025

9:30 a.m. (Ricketts 211)

“Designing Polymer Chemistry In Situ for Enhanced Physical Properties and Recyclability”

Abstract: Polymeric materials are ubiquitous in modern society, ranging from cheap plastic packaging to high-performance structural composites. There has been persistent demand for new polymer technologies with continually improving and tailorable performance, while considerations around environmental persistence and recyclability are more critical than ever before in light of the plastics waste crisis. This seminar will illustrate our group’s efforts to design in situ chemical and physical processes within polymeric materials in the search for both high-performance and recyclable plastics. In one example, we have developed an approach to fine-tune polymerization-induced phase separation in epoxy thermosets, enabling us to systematically vary the physical properties of these materials in unprecedented ways. Through subtle changes in the epoxy formulation, glass transitions, modulus profiles, residual stresses, and even the dynamic response to mechanical shock can be manipulated and optimized. In another example, we have developed a range of materials that can be fabricated, broken down, and reprocessed by the application of various stimuli. These materials are based on the microencapsulation of organometallic catalysts, such as ruthenium carbenes for olefin metathesis, within stimuli-responsive particles. The particles are then formulated directly into monomers and other precursors to polymer systems, after which the catalyst can be triggered to release and induce a desired chemical transformation in situ initiated by a growing number of different stimuli.



Biography: Dr. Jones received his B.S. in Materials Science and Engineering from Pennsylvania State University and Ph.D. in Materials Science and Engineering from the University of Minnesota in 2011 under the mentorship of Prof. Tim Lodge. During his graduate study, Dr. Jones studied the use of polymeric bicontinuous microemulsions as templates for the synthesis of nanostructured materials. After his Ph.D., Dr. Jones spent two years in DuPont’s Central Research and Development organization working on agricultural products. In 2014, Dr. Jones joined Sandia National Laboratories in Albuquerque, New Mexico, initially as a postdoctoral researcher studying peptide synthesis and self-assembly. In 2015, he was promoted to a staff scientist in the Organic Materials Science Department, where he has been affiliated since. Dr. Jones’s research at Sandia has ranged from fiber optic sensors to stimuli-responsive materials, as well as the fundamental chemistry and physics of polymers and even radiation chemistry. He enjoys time spent with his 8-year-old son and takes advantage of the numerous outdoor activities New Mexico offers, particularly skiing and mountain biking.

Refreshments will be available at 9:00 a.m. in the Ricketts Coonley Lounge.