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Make, Use, and Recycling Toward Sustainable Plastics

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Date: Monday November 13th 2023, 2pm-3pm

Location: SEEC Building S228 Sievers Room
Snacks and beverages will be served at 1:45pm

Or connect by Zoom https://cuboulder.zoom.us/j/97004369138

Abstract: This presentation will share three short stories focused on the make, use, and recycling of polymers with a focus on sustainability. In the first story, the development and application of organocatalyzed atom transfer radical polymerization using organic photoredox catalysts driven by visible light as well as their evolution and application toward challenging reductions including Birch reductions and PFAS remediation. In the second story, the synthesis and self-assembly of molecular bottlebrush block copolymers to photonic crystal coatings for greener structural coatings will be shared. In the third story an approach toward chemically recyclable polyolefin-like multiblock polymers with diverse mechanical properties through the construction of multiblock polymers from hard and soft oligomeric building blocks will be discussed. The multiblock polymers exhibit broad mechanical properties, spanning elastomers to plastomers to thermoplastics, while integrating a high melting transition temperature (T_m) and low glass transition temperature (T_g) making them suitable for use across diverse applications (T_m as high as 128 °C and T_g as low as -60 °C). After use, the different plastics can be combined and efficiently deconstructed back to the fundamental hard and soft building blocks for separation and repolymerization to realize a closed-loop recycling process.

Bio: Garret M. Miyake is the Dr. Robert Williams Professor of Organic Chemistry at Colorado State University. He earned his B.S. in Chemistry from Pacific University. He completed his Ph.D. studies with Eugene Chen at Colorado State University before conducting postdoctoral research with Robert Grubbs at the California Institute of Technology. He has been recently recognized with the 2021 ACS Division of Polymeric Materials: Science and Engineering Journal of Polymer Science Innovation Award and was a finalist for the 2023 Blavatnik Young Scientist Award. The Miyake group has research interests focusing on photoredox catalysis, sustainable polymers, as well as the synthesis of block copolymers that self-assemble to photonic crystals.

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