Development of Ring-Opening Metathesis Polymerization Methods Enabling Self-Assembly Studies on Bioinspired Bottlebrush Polymer Amphiphiles

Speaker

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Our lab aims to understand and apply the process of self-assembly at a range of length scales from small amphiphiles to large bottlebrush block copolymers. In particular, we are interested in tapered (i.e., cone-shaped) bottlebrush block copolymers with a mixture of hydrophobic and hydrophilic side chains. Critical to these synthetic efforts are our studies on optimizing livingness in ring-opening metathesis polymerization (ROMP). Our synthetic methods have enabled synthesis of bottlebrush pentablock copolymers with varying side chain lengths and identities, allowing for the construction of a library of tapered bottlebrush polymers with tunable shapes and cone directionality, i.e., hydrophilic or hydrophobic tips. We then study the self-assembly tendencies of these amphiphilic copolymers in water using cryogenic transmission electron microscopy, small-angle neutron scattering, and related techniques to establish structure–self-assembly relationships in these unusual amphiphiles.

John Matson *studied Chemistry and German at Washington University in St. Louis (with Karen Wooley, 2004), followed by a Ph.D. in polymer synthesis at Caltech (with Bob Grubbs, 2009) and an NIH-funded postdoc on peptide-based biomaterials at Northwestern University (with Sam Stupp). In 2012 he began his career at Virginia Tech, where he became Professor in 2021. His research focuses on macromolecular and supramolecular chemistry with applications in biology, medicine, and sustainability. He is a member of the IUPAC Polymer Division and serves as secretary of its Subcommittee for Polymer Terminology. https://matsonlab.com/*

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