ORGANIC CHEMISTRY SEMINAR

Shining light on polymer brushes

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219 BRL

The covalent attachment of polymers has emerged as a powerful strategy for the preparation of multi-functional surfaces and interfaces. These surface-grafted polymer brushes provide improved durability, longevity, and functionality, e.g., by enabling coatings that can respond 'intelligently' to a variety of external stimuli. This presentation describes recent advances in our group in developing user-friendly chemical and engineering techniques to produce functional polymer brush coatings via surface-initiated (SI) photoinduced electron/energy transfer (PET) reversible addition–fragmentation chain transfer (RAFT) polymerization. Oxygen tolerance, mild reaction conditions, and the use of visible light make this approach robust and versatile for applications from anti-microbial surfaces to anti-fogging coatings and robust coatings that can self-heal incisions within seconds. Polymer brushes are also used as a new heterogeneous photocatalysis platform based on photocatalyst-functionalized polymers grafted to micron-scale glass beads. The resulting photocatalytic materials can be used for light-mediated organic transformations, controlled photopolymerizations, and wastewater remediation. Recyclability of the heterogeneous catalyst and re-use for multiple reactions is possible, while the covalent tether avoids cata-lyst contamination of the synthetic products.

Christian Pester received his Diploma in Polymer and Colloid Chemistry from the University of Bayreuth (Germany) and his doctorate from RWTH Aachen (Germany) working with Prof. Alexander Böker (DWI – Leibniz Institute for Interactive Materials, Germany). He graduated summa cum laude and was awarded the Borcher's Medal for his dissertation on "Block Copolymers in Electric Fields." He then was an Alexander-von-Humboldt Feodor-Lynen Postdoc with Profs. Edward Kramer and Craig Hawker at the University of California, Santa Barbara. His independent academic career began at Penn State, where he was named the Thomas K. Hepler Early Career Professor in Chemical Engineering and awarded tenure in 2023. Since 2024, Christian is an Associate Professor of Materials Science and Engineering at University of Delaware and a visiting researcher at the Leibniz Institute of Resilience Research (Mainz, Germany). He was awarded the NSF CAREER, ACS PMSE Young Investigator, and TO-SOH Excellence in Polymer Science award.

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