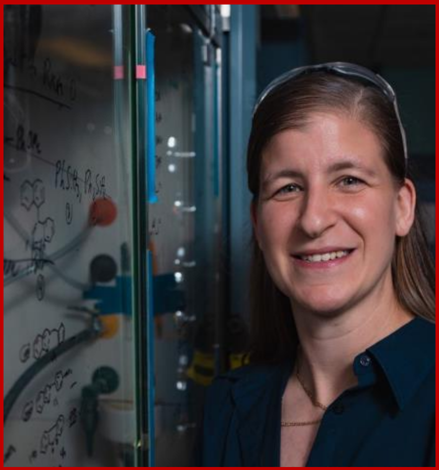
SPRING 2021 CHEMISTRY SEMINAR SERIES



DR. ELIZABETH ELACQUA

Department of Chemistry,
The Pennsylvania State University
University Park, PA

HOST:
DR. JAEKLE

ALL THOSE INTERESTED ARE WELCOME TO ATTEND

Merging Organic Synthetic and Polymer Chemistry: Toward Accelerated Catalysis and Architecturally-Diverse Sp3-Enriched Polymers

January 29th, 2020 ~ 11:30AM
Seminar Via Zoom

Abstract: Efforts to develop synthetic methods that achieve robust materials (e.g., sequenced organic electronics, polymerizable renewable feedstocks, and/or sustainable cooperative catalysis) have generated a need to engineer strategies that merge organic synthesis and polymer chemistry to address grand challenges. Our group's research is inspired by Nature and founded on using polymer chemistry to address shortcomings in organic synthesis and using organic chemistry to confront challenges in polymer synthesis. This talk will detail our group's recent efforts at this interdisciplinary interface. We will first discuss our homogeneous polymer catalysts that are visible-light activated and feature significant rate acceleration in cooperative organic photoredox catalysis, ascribed to more efficient single-electron transfer.[1] Our approach deviates from conventional methods, and tackles diffusion-limited cooperative catalysis, while enabling enhanced reactivity under polymer confinement. Second, we will disclose the synthesis of sp3-hybridized 1D carbon-based polymers from simple petroleum-based or biomass-derived sp2 feedstocks under pressure.[2-3] In these studies, we have uncovered new robust materials from abundant aromatics (e.g., furan, phenol, pentafluorophenol) that are theorized to possess high tensile strength and chemical versatility.

[1] J. J. Piane, L. E. Chamberlain, S. Huss, L. T. Alameda, A. C. Hoover, and E. Elacqua, ACS Catalysis, 2020, 10, 13251-13256.

[2] M. C. Gerthoffer, S. Wu, B. Chen, T. Wang, S. Huss, V. H. Crespi, J. V. Badding, and E. Elacqua, Chemical Science, 2020, 11, 11419-11424.

[3] S. Huss, S. Wu, B. Chen, T. Wang, M. C. Gerthoffer, D. J. Ryan, S. E. Smith, V. H. Crespi, J. V. Badding, and E. Elacqua, ACS Nano, 2021, DOI: 10.1021/acsnano.0c10400.

Biography: Beth was born and raised in upstate New York, and received her B.S. Degree in Chemistry and Biology from LeMoyne College (Syracuse, NY). There, she worked on the total synthesis of polyphenolic stilbenoid natural products. After spending a year at SUNY College of Environmental Science and Forestry working in the lab of Dr. Israel Cabasso at the Michael Szwarc Polymer Research Institute, she ventured to the University of Iowa for graduate school. At Iowa, Beth worked at the interface of solid-state organic chemistry, supramolecular chemistry, and organic synthesis in the research group of Leonard R. MacGillivray, and received her Ph.D. After graduation, Beth headed back to the great state of New York where she started as a Postdoctoral Research Associate at New York University working alongside Marcus Weck. At NYU, Beth synthesized β-sheet-mimicking telechelic polymers for self-assembly, as well as designing reversibly-assembling colloidal matter. In August of 2017, Beth began her independent career at Penn State, where she has been awarded an ACS Doctoral New Investigator Award and an NSF CAREER award, and is the experimental lead-PI of their NSF Phase I CCI on carbon nanothread polymers.

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