

UCSD NANOENGINEERING/CHEMICAL ENGINEERING
Virtual **SEMINAR SERIES**
Wednesday, January 27, 2021
Seminar Presentation: 11:00am - 12:00pm PT
Zoom Seminar

“Conformational dynamics in supramolecular nanostructures”



Julia Ortony, PhD

Professor

*Department of Materials Science and Engineering
Massachusetts Institute of Technology*

Abstract: Small molecule self-assembly is an established route for producing high surface area nanostructures with readily customizable chemistries and precise molecular organization. However, these structures are fragile, exhibiting molecular exchange, migration, and rearrangement (among other dynamic instabilities), and ultimately disassociate upon drying. These dynamic instabilities can be controlled, but first the internal conformational dynamics must be understood. In this seminar, I will discuss experimental strategies used and developed in our group to measure dynamics within molecular self-assemblies with sub-nanometer resolution. Then I will discuss a new self-assembly platform designed in my group, the aramid amphiphile (AA), that forms nanoribbons with suppressed internal dynamics. I will describe how we exploit their extraordinary stability to extend small molecule self-assembly to hierarchically ordered macroscopic materials outside of water. I will conclude by discussing future research and applications afforded by suppressing dynamics in supramolecular nanostructures.

Educational Development: In this talk, I will highlight the interplay between fundamental principles and materials design, and I will offer my perspective on the value of setbacks in the discovery process.

Biosketch: Prof. Ortony received her B.S. in Chemistry from the University of Minnesota in 2005, and her Ph.D. in Materials Chemistry from UC Santa Barbara in 2011. Her graduate work, carried out in Songi Han's group, involved developing instrumentation based on electron paramagnetic resonance (EPR) spectroscopy for measuring the motion of water on molecular length scales in soft matter. Following her Ph.D., Prof. Ortony conducted postdoctoral research under Samuel Stupp at Northwestern University. There, she used EPR to probe dynamics of biomaterials. Prof. Ortony joined the faculty of the Department of Materials Science and Engineering at MIT in 2016, where she holds the Finmeccanica Chair. Her group specializes in molecular design and dynamics characterization, engineering supramolecular nanomaterials to address health and environmental challenges. Prof. Ortony is a recipient of the National Science Foundation Early Career Award and her department's 2020 Best Graduate Advisor Award.

Register to receive a zoom link the day of the seminar:

https://docs.google.com/forms/d/1ZGKR_X5K_jKXNeHhB77AFCWRRc-ucbDXKSrtxDsMpAA/