

UNIVERSITY OF CALIFORNIA, IRVINE

THE DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

Is Proud to Host a Seminar by:

**ASSISTANT PROFESSOR  
YUE JESSICA WANG**

Department of Materials Science  
and Engineering  
University of California, Merced



***ADAPTIVE MATERIALS THROUGH BIOINSPIRED  
DESIGN AND ADDITIVE MANUFACTURING***

DATE:

Thursday, May 23, 2024

TIME:

2:00 - 3:20 PM

LOCATION:

McDonnell Douglas Engineering Auditorium

**Abstract:** Synthetic materials typically have static properties that gradually deteriorate with increasing usage. In contrast, biological materials such as trees, bones, and muscles adapt to environmental stressors such as mechanical load. They evolve over time to reshape or strengthen the heavily stressed or strained locations to enhance their load-accommodation capabilities. In this talk, I will discuss our group's efforts on adopting this concept of adaptability to synthetic materials and structures, with a particular focus on conjugated polymers and their composites. First, I will highlight a new class of conducting polymers and composites with elongation-at-break and toughness that dynamically scale with the rate of deformation. The key to such unorthodox properties is to create a microstructure comprised of interconnected core-shell micelles with disparate chemical interactions within the cores and shells. Subsequently, we imbue conducting polymers with rate-independent properties via architected structuring. We have developed a variety of 3D printing techniques to realize this goal. Finally, we move beyond mimicking biological materials and instead, employ a biological organism, *Physarum polycephalum*, commonly known as slime mold, to design efficient load-bearing structures. Our aim is to directly harness the intelligence of biology for synthetic material development.

**Bio:** Yue Jessica Wang is an Assistant Professor of Materials Science and Engineering at the University of California, Merced, with affiliated faculty appointments in the Departments of Bioengineering and Chemistry & Biochemistry. She received her B.S. in Chemistry from the University of California, Los Angeles (UCLA) in 2008. After working in industry for a year, she returned to UCLA for graduate studies and received her Ph.D. in Inorganic Chemistry in 2014. She subsequently carried out postdoctoral research at Stanford University between 2014-2017. Currently, her research group focuses on developing bio-inspired and bio-designed soft materials with mechanical adaptability. Chemical design and 3D printing are tools her group uses. Wang lab's work has been recognized by a number of early career awards, including the NSF-CAREER, Beckman Young Investigator, and Army Research Office Early Career awards.

