NSF NANOSCALE SCIENCE AND ENGINEERING GRANTEES CONFERENCE:
NANO AND AI CONVERGENCE
DECEMBER 9-10, 2024

"Electron Videography and Its Automation for Nanoparticles"

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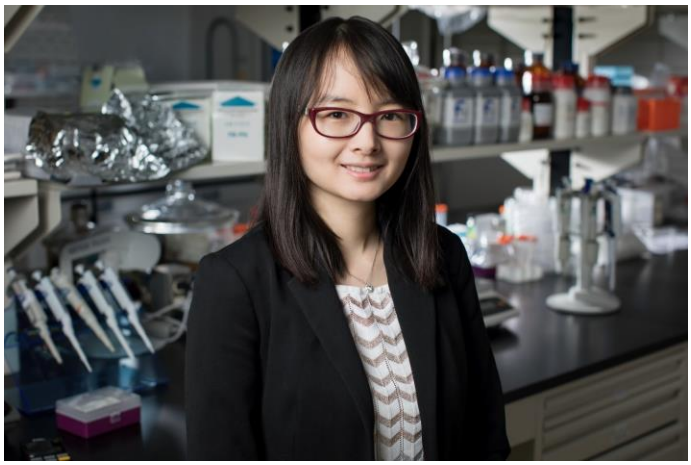

Bio: Prof. Qian Chen is currently a professor and Racheff Scholar in the Department of Materials Science and Engineering at the University of Illinois at Urbana-Champaign. She obtained her PhD degree from the same department with Prof. Steve Granick (2012) and completed her postdoctoral research with Prof. Paul Alivisatos at the University of California, Berkeley, under a Miller Fellowship. She became an assistant professor in 2015, promoted to associate professor in 2021, and then to full professor in 2024. She has received awards for the research in her group, such as the Forbes 30 under 30 Science List (2016), the AFOSR YIP (2017), the NSF CAREER award (2018), the Sloan Research Fellow in Chemistry (2018), the ACS Unilever Award (2018), the Hanwha-TotalEnergies IUPAC Young Scientist Award (2022), the Soft Matter Lectureship (2023), the Provost's Award for Excellence in Graduate Student Mentoring (2024), and the MRS Outstanding Early-Career Investigator Award (2024). Her group's research focuses on imaging, understanding, and engineering soft, biological, and energy materials at the nanoscale.

Abstract: I will present our group's recent progress on establishing and utilizing "electron videography" to image, understand, and engineer synthetic and natural nanoparticle systems, in space and time at a nanometer resolution. This involves systems that underpin the fundamentals of structure–functional relationship for a wide range of phenomena and applications. In this talk, we will discuss in detail two types of such systems. The first focuses on metallic nanoparticles assembling into various complex lattices such as Maxwell lattice, a chiral pinwheel lattice, a colloidal moiré pattern, and nanoparticle swarms as promising optical and mechanical metamaterials. The second is on the structural fluctuations and fingering dynamics of membrane protein lipid assemblies. We will show how we build electron videography upon liquid-phase transmission electron microscopy, electron tomography, and four-dimensional scanning transmission electron microscopy, while coupling them with machine learning, automation, and molecular dynamics simulations. I will end the talk by discussing the prospects of autonomous electron videography for understanding and discovery of dynamic multifunctional nanoparticle systems in liquid and at operation at the otherwise inaccessible spatiotemporal precision.