Title

Direct nanoscopic imaging: from crystallization of nanoparticles to fluctuation of membrane proteins

Speaker

Qian Chen, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign

Abstract

I will discuss emergent opportunities at the intersection of soft materials and advanced electron microscopy. Our systems include suspensions of nanoparticles that crystallize into superlattices, polymer membrane that develop nanomorphology following “morphogenesis”, and the ever-fluctuating proteins molecules, which are all imaged directly for the first time at nanometer resolution in a function-relevant environment. A series of electron microscopy (e.g., liquid-phase TEM, electron tomography, STEM) and image analysis methods are optimized for the highly-sensitive and low contrast soft materials. The materialized opportunities cover a wide range of fundamental questions and applications: the elusive phase transition pathways of nanoscale objects complicated by generic discreteness and coupling unique to their sizes, the synthesis–morphology–performance relationship of functional polymeric materials, and the operating mechanism of machines of life.

Bio

Prof. Qian Chen is currently an Assistant Professor in the Materials Science and Engineering Department at University of Illinois at Urbana-Champaign (UIUC). She obtained her PhD from the same department with Prof. Steve Granick (2012) and did her postdoc with Prof. Paul Alivisatos at UC Berkeley under Miller Fellowship. She joined the faculty of UIUC in 2015 and since then has received awards for the research in her group such as the Victor LaMer award in ACS (2015), Forbes 30 under 30 Science List (2016), Air Force Office of Scientific Research YIP award (2017), National Science Foundation CAREER award (2018), Sloan Research Fellow in Chemistry (2018), and the Unilever award in ACS (2018). The research in her group focuses on the broad scheme of imaging, understanding and engineering active soft matter, including systems such as nanoparticle and colloidal self-assembly, protein aggregation, advanced battery devices, and energy-efficient water filtration.