CENTER FOR RESEARCH IN SOFT MATTER & POLYMERS

CRiSP SEMINAR

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Monday, Oct. 14, 2019

10:00 a.m.

366 Colburn Lab

“Translocation of Soft Nanoparticles Through Confining Nanochannels“

Translocation – the movement of material from one fluid reservoir to another through a single nanochannel – is a common, if not universal, feature of many systems. For example, many plant viruses undergo translocation-like processes as they infect neighboring cells, and water filtration can be thought of as preventing translocation. Translocation is typically studied by observing pulses in ionic current as polymers or nanoparticles in salt solutions move through a nanochannel and block the transport of ions. A large challenge today is interpreting this current pulse to understand nanoparticle transport and to measure the physical characteristics of the nanoparticles. In the first part of this talk, I will discuss experimental neutron scattering measurements of the structure and dynamics of polymers that are grafted to spherical nanoparticles, and use a newly-developed self-consistent field theory (SCFT) + Poisson-Nernst-Planck framework to calculate the expected experimental signatures of translocation. In the second part of this talk, I will discuss the translocation of soft, bio-derived phytoglycogen nanoparticles and how translocation can be used to measure the “hardness” of the dendrimer-like nanoparticles. To interpret the experimental translocation signatures, we will combine Poisson-Nernst-Planck calculations with Monte Carlo simulations.

Michael J.A. Hore

Assistant Professor

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Dr. Hore is an assistant professor in the Macromolecular Science & Engineering department at Case Western Reserve University. He earned his BS degree in Physics/Mathematical Science at The University of Memphis, and later his MS degree in Physics at The University of Memphis in 2007. He earned his Ph.D. in Materials Science & Engineering from the University of Pennsylvania in 2012, and received a National Research Council (NRC) Postdoctoral Fellowship to perform neutron scattering measurements at the NIST Center for Neutron Research (NCNR) from 2012-2014. Recently, he has been recognized with several teaching awards, an NSF CAREER Award, the DPOLY/UKPPG Lecture Exchange Award from the American Physical Society (APS), and was named a 2018 PMSE Young Investigator by the American Chemical Society (ACS). His research group combines theory, computer simulations, and experiments to study grafted polymers, thermoresponsive materials, and nanoparticle transport.

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