DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING

CBE.UDEL.EDU

SEMINAR SERIES 2021

10:00 - 11:00 AM | COLBURN LAB | ROOM 102

NANOPARTICLE TRANSPORT IN CROWDED, CONFINED MEDIA

12/03

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ABSTRACT

Transport of nanoscale particles through crowded, confined media affects applications ranging from targeted delivery of drugs and diagnostics to environmental remediation to processing of nanocomposite materials. In each of these applications, nanoparticles must be transported through a complex fluid to reach the desired target, whether the extracellular matrix, the saturated soils, or a polymer melt. Because nanoparticles are comparable in size to heterogeneities within these matrices, however, their transport properties may not be directly related to the bulk fluid properties and may be further altered by nearby confining surfaces. Here, I will discuss recent work using microscopy and scattering experiments and molecular simulation examining the effects of crowding and confinement on nanoparticle transport in three prototypical settings: polymer solutions, which model viscoelastic liquids; supercooled and glassy colloidal liquids, which model crowded suspensions; and ordered and disordered porous media. In each setting, we probe how the dynamics of nanoparticles are coupled to relaxations within the surrounding liquid and to geometric confinement. The physics elucidated in these studies will grant better control over the transport and dispersion of nanoparticles through complex, heterogeneous materials.

BIOGRAPHY

Jacinta Conrad is a physical scientist studying transport and dynamics within soft, complex materials and matrices. Using a broad range of microscopy, rheology, scattering, and computational methods, her group seeks to understand how microscale particles, including colloids, nanoparticles, bacteria, viruses, and proteins, explore and/or transport through confined and crowded environments containing polymers, macromolecules, or other dispersed species. Insights gained from fundamental studies of these non-equilibrium processes inform the design of new materials for preventing fouling and corrosion, for remediating environmental damage, and for sensitively diagnosing disease. She earned an SB in Mathematics from the University of Chicago and MA and PhD degrees in Physics from Harvard. She worked as a postdoctoral associate in MatSe at Illinois before starting her faculty position at the University of Houston (UH). Currently, she is Frank M. Tiller Professor of Chemical Engineering at UH, the Chair-Elect of the American Physical Society Division of Soft Matter (DSOFT), and an Associate Editor for ACS Applied Nano Materials, and was named a Fellow of the Society of Rheology in 2021