Amgen Seminar Series in Chemical Engineering

in

Cherry Auditorium, Kirk Hall, 12:45 PM

Presents on November 15, 2018

Diffusion and Stability of Magnetic Nanoparticles in Complex and Biological Fluids

By

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Magnetic nanoparticles are of interest in a variety of applications that take advantage of their manipulation using externally applied magnetic fields. In this talk I will summarize our recent work on characterizing the diffusion and stability of magnetic nanoparticles in complex and biological fluids through their response to time-varying magnetic fields. I will discuss the physical principles of this measurement technique and then demonstrate how quantitative measurements can be made accurately in simple fluids. Then I will show results for nanoparticles suspended in complex fluids, such as gelling solutions, polymer solutions, and polymer melts. Finally, I will present results for measurements of magnetic nanoparticle rotational dynamics in biological fluids, as a means of studying protein adsorption, concentrated protein solutions, and nanoparticle behavior in tissues and blood.

Bio: Carlos Rinaldi is the Chair and Dean's Leadership Professor in the Department of Chemical Engineering at the University of Florida. He is also a Professor in the J. Crayton Pruitt Family Department of Biomedical Engineering. He received his bachelor's degree in Chemical Engineering at the University of Puerto Rico, Mayagüez, and completed degrees in Master of Science in Chemical Engineering, Master of Science in Chemical Engineering Practice, and Doctor of Philosophy in Chemical Engineering at the Massachusetts Institute of Technology. Prior to the University of Florida, Prof. Rinaldi was an Assistant Station Director of the MIT David H. Koch School of Chemical Engineering Practice and a Professor in the Department of Chemical Engineering at the University of Puerto Rico, Mayagüez. Prof. Rinaldi's research interests are in biomedical applications of magnetic nanoparticles, including applications where the particles respond to magnetic fields by rotating, exerting forces/torques on biological structures, or dissipating the energy of the magnetic field in the form of heat.

This series at the University of Rhode Island is made possible through the generosity of Amgen, West Greenwich, R.I.

Refreshments provided by the Joseph Estrin Endowment.