

Chemical Engineering Seminar Series

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Chemical Engineering and
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102 Chemistry

10:50-11:50 am

Directed Deposition of Functional Polymers onto Structured Materials and Liquid Surfaces

Abstract

This talk will present the mechanism, kinetics, and potential applications associated with the vapor phase deposition of functional polymers onto structured materials and liquid surfaces. Vapor phase deposition eliminates the need for organic solvents and thereby offers a safer and cleaner alternative to liquid phase polymer processing. We will demonstrate our ability to pattern functional polymers onto structured materials such as microfluidic devices and pillar arrays. We will also present our recent work demonstrating deposition onto liquids with negligible vapor pressures such as ionic liquids (ILs) and silicone oils. We will demonstrate that the polymer morphology at the liquid/vapor interface is controlled by surface tension interactions. The ability to controllably tailor polymer morphology at the interface allows for the design of ultrathin free-standing polymer films, micron-scaled particles, and core-shell particles. We will also demonstrate that polymerization can occur within the liquid layer allowing for the fabrication of polymer/IL composite films.

Biosketch

Malancha Gupta is an associate professor in the Mork Family Department of Chemical Engineering and Materials Science at the University of Southern California. She received her BS in chemical engineering from the Cooper Union in 2002. She received her PhD in chemical engineering from the Massachusetts Institute of Technology in 2007 under the guidance of Professor Karen Gleason. From 2007--2009, she was a postdoctoral fellow in the department of chemistry and chemical biology at Harvard University working under the guidance of Professor George Whitesides. Her current research interests include polymer coatings and thin films, and chemical vapor deposition, ionic liquids, and microfluidics. She has co-authored 51 manuscripts and 3 patents in these topic areas. She has received several awards including an ACS PRF Doctoral New Investigator Award in 2012, the Jack Munushian Early Career Chair, and a NSF CAREER Award in 2013.