

# Lecture Series on Surface Forces 5

Organized by Institute of Multidisciplinary Research for  
Advanced Materials (IMRAM) Tohoku University, CREST-JST



**Time & Date:** June 5, 2009 (Friday) , 14:00-15:00

**Venue:** Meeting Room (306), No1 Buiding of Advanced Materials  
Processing, IMRAM, Tohoku University

## STIMULI RESPONSIVE COPOLYMERS FROM IONIC LIQUID REACTIVE SURFACTANTS

**Professor John Texter**

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Reactive imidazolium-based surfactants that also are ionic liquids have been used to create a new class of hydrogel/solvogel copolymers by microemulsion polymerization, a new class of fast ionic conducting copolymers by bulk and solution polymerization suitable for fuel cells, batteries, and various printable electronics applications, and examples of polymeric ionic liquids that are liquids after polymerization. The hydrogel/solvogel copolymers can be driven by ion exchange to undergo spinodal decomposition into open-cell microporous to nanoporous materials, depending upon the cross-linking density. Nanoparticle latexes produced by microemulsion polymerization of other reactive ionic liquid surfactant copolymers are super-stabilized in high salt when bromide is the imidazolium counter ion. This observation suggests a new approach to providing steric stabilization with grafted ionic liquid oligomeric surfactants, where the stability can be tuned by choosing alternative counter ions. Reactive ionic liquid surfactants are also used to fabricate very high charge density membranes (< 250 g/charge equivalent), and we obtain proton conductivities competitive with Nafion performance. Finally, creation of diblock copolymers of our homopolymer PIL with thermoreversible blocks has led to the first examples of aqueous core-shell particle dispersions wherein the core and shell can be reversibly interchanged!

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