



~~~~ Polymer Physics Seminar ~~~~

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301 Steidle Bldg.

Structure and Dynamics of Microphase Separated Polymers Containing Strong Associations

Polymers with strong interactions (i.e. ionic associations and hydrogen bonding), such as ionomers, polyurethanes, and polyureas, are used in a number of applications including performance coatings, adhesives, packaging, biomaterials, and shock absorbing materials. The strongly interacting moieties in these materials tend to self assemble into domains which effectively crosslink the polymer, improving properties such as toughness. Understanding the connections between the association chemistry, morphology and molecular dynamics is critical in the development and application of these materials. The dynamics of sulfonated polystyrene (SPS) ionomers neutralized with Na, Cs, and Zn were investigated using dielectric relaxation spectroscopy (DRS). Dynamic results will be correlated with key structural findings from x-ray scattering and scanning transmission electron microscopy. The focus will be on the segmental dynamics results from DRS which are highly sensitive to the neutralizing ion, in particular, the character of the segmental relaxation, i.e. relaxation time, breadth and number of relaxations. A Maxwell-Wagner-Sillars interfacial polarization process was also revealed at high temperatures with relaxation times that were in good agreement with predictions from a simple model. In addition, planned research on polyurea elastomers will be presented.