**310c Structure and Dynamics of Salt-Responsive Polyelectrolyte Solutions**

*Jun Sato and Victor Breedveld*

By integrating microfluidics and particle tracking microrheology, we have constructed a dialysis cell for microrheology, which provides unique opportunities for studying the dynamics of microstructural changes induced by controlled rapid changes of solvent composition. Such experiments are virtually impossible with standard mechanical rheometers. Data will be presented on the response of polyelectrolyte solutions to changes in ionic strength.

Sulphonated polystyrene is a water-soluble polymer and its molecular conformation in solution strongly depends on ionic strength of the solution. It will be shown that quantitative measurements of transient solution viscosity during solvent exchange can be performed with the new dialysis cell.

A second set of experiments was performed on amphiphilic block copolypeptide (BCP) hydrogels that self-assemble into fibrillar structures due to a subtle balance between attractive and repulsive intermolecular forces. One of the key repulsive forces is the electrostatic repulsion between the hydrophilic L-lysine blocks. Changes in ionic strength of the solution therefore have a significant effect on the self-assembled local structure and mechanical properties of the BCP gels, as we previously observed in rheometer experiments. Microrheology in the dialysis cell provided a much more complete picture, revealing the occurrence of microscopic phase separation upon the addition of salt. For a K160L40 lysine-leucine block copolypeptide, the motion of tracer particles in the hydrogel was homogeneous in DI water. After the addition of salt, microrheology revealed the co-existence of a population of freely moving particles and a population of immobilized particles. It was also observed that the changes in local microstructure are reversible when the ionic strength of the solution is lowered. Data will be presented on the structure and dynamics of these morphological changes.