

**Phase Separation and Miscibility
Behavior of Model Polyurethanes.**

Han Sup Lee* and Shaw Ling Hsu

**Polymer Science and Engineering Department
University of Massachusetts**

Segmented polyurethanes exist mainly as phase separated systems due to incompatibility between the two structural components such as hard segment and soft segment. Thus, the degree of phase separation as reflected in the size and perfection of the domains is the most important criterion for the determination of overall sample mechanical properties. Although phase separation kinetics of polymer mixtures have been active areas of study, few investigations have been carried out to characterize the phase separation kinetics of polyurethane block copolymer. During the first half of this talk, the spectroscopic and thermal results for phase separation kinetics of model polyurethanes will be presented.

The miscibility behavior of two polyurethanes have been studied also. Even though two model polyurethanes have exactly same chemical structures for soft segment as well as hard segment, two polymers appear to phase separate due to the difference in the hard segment length. The conformation of the hard segments inside the hard domain is also studied by the SAXS method. Since the polymers have monodisperse hard segment length distribution, the extended nature of the hard segments inside hard domain could be inferred from the difference in the domain spacing between two polymers. The extended conformation, in contrast with the chain folded conformation reported previously, appears to be mainly due to the narrow distribution of the hard segment length.

*** Present address : Department of Textile Engineering
Inha University**