

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

A Deuterium NMR Study of Water in a Blend of Soy and Polyether Polyols YUE ZHAO, XIA TONG, SHAW L. HSU, University of Massachusetts Amherst — The reaction of water with diisocyanate is crucial in formation of polyurethane foams. It yields polyurea hard segments whose lengths and segregation from the polyether soft segments depends, among other things, on the reaction kinetics largely determined by the miscibility of water in the polyether. For soy polyol-based polyurethane formulations, the miscibility issue is further complicated by the use of hydrophobic soy polyols. The question of where water molecules are located in the multicomponent blend is of importance; the answer is key to understanding how the morphology and phase separation evolve and are correlated with foam performance. With water content typically around 5%, it has long been challenging to find a technique that can provide this critical information. We developed an NMR method based on the use of deuterium oxide and found that the signal of resonance of deuterium is sensitive to the chemical environment, which allows water molecules to be quantitatively traced in the phase-separated blend of soy and polyether polyols. Moreover, the resonance signal could serve as a probe to monitor the evolution of phase separation upon composition and temperature change.

Shaw L. Hsu
University of Massachusetts Amherst

Date submitted: 16 Dec 2007

Electronic form version 1.4