Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Confined Water in Ionic Membranes: Studied by NMR LILIN HE, Department of Chemistry, Clemson University, South Carolina, 29634-0973, CY FUJIMOTO, Chem.and Bio. Technologies, Sandia National Laboratories, Albuquerque, New Mexico 87185-0888, CHRISTOPHER CORNELIUS, Chem.and Bio. Technologies, Sandia National Laboratories, Albuquerque, New Mexico 87185-0888, DVORA PERAHIA, Department of Chemistry, Clemson University, South Carolina, 29634-0973 — Proton NMR studies have been carried out to identify the location and dynamics of water confined within highly rigid sulfonated ionomer membranes. Understanding the dynamics and location of water molecules within polymeric ionic membrane, is critical to their many potential uses from fuel cell application to water purifying membranes. The magnetic relaxation times are sensitive to the degree of confinement of the molecules and the chemical environment affects the resonance frequency (chemical shift) of the water. Three different environments have been identified, highly mobile, almost free water molecules, partially confined in hydrophilic environment and water molecule that penetrated into the hydrophobic regime. Where surprisingly no fast exchange between these sites was detected even at room temperature. The distribution between these sites strongly depend on the degree of ionization of the polymers.

Dvora Perahia
Chemistry Department Clemson University

Date submitted: 19 Jan 2006 Electronic form version 1.4