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Water Diffusion in Ultrathin Ionomer Thin Films: Neutron Reflectivity Study LILIN HE, Department of Chemistry, Clemson University, Clemson, SC 29634, ERIK B. WATKINS, JAROSLAW MAJEWSKI, LNSC, Los Alamos National Laboratory, Los Alamos, NM 87545, CY H. FUJIMOTO, CHRISTOPHER J. CORNELIUS, Sandia National Laboratories, Albuquerque, New Mexico 87185 , DVORA PERAHIA, Department of Chemistry, Clemson University, Clemson, SC 29634 — The mechanism of penetration of solvents into ionic random co-polymers is a key to formation of polymeric membranes with selective transport. The pathways of diffusion depend on molecular parameters including the chemical structure, ionic strength and conformation of the polymer. The penetration of water into thin (on the order of magnitude of several R_g's) highly rigid sulfonated polyphenlylene films, supported on SiOx substrate as a function of time was investigated by neutron reflectometry. The ionomer films were exposed to saturated vapor and to liquid water and reflectometry patterns were recorded until equilibrium was reached. Increase thickness due to swelling was observed in both cases whereas exposure to vapors results in reversible changes and contact with bulk water, transform the film permanently. The onset of the diffusion is Fickian, however the distribution of the solvent within in the film is not uniform. Clear interfacial segregation is denoted.

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