Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Proton Transport in Nanostructured Block Copolymer/Ionic Liquid Membranes MEGAN HOARFROST, University of California, Berkeley, MADHU TYAGI, NIST Center for Neutron Research, JEFFREY REIMER, RACHEL SEGALMAN, University of California, Berkeley — Nanostructured block copolymer/ionic liquid mixtures are of interest for creating membranes having high proton conductivity coupled with high thermal stability. In these mixtures, it is anticipated that nanoconfinement to block copolymer domains will affect ionic liquid proton transport properties. Using pulsed-field gradient NMR and quasi-elastic neutron scattering, this relationship has been investigated for mixtures of poly(styrene-b- 2-vinylpyridine) (S2VP) with ionic liquids composed of imidazole and bis(trifluoromethane)sulfonimide (HTFSI), where the ionic liquids selectively reside in the P2VP domains of the block copolymer. Proton mobility is highest in the neat ionic liquids when there is an excess of imidazole compared to HTFSI due to proton hopping between hydrogen-bonded imidazoles. As predicted, the amount of proton hopping can be tuned by nanoconfinement, as evidenced by the finding that a lamellar mixture of an imidazole- excess ionic liquid with S2VP has greater proton mobility than a corresponding disordered mixture of the ionic liquid with P2VP homopolymer.

Megan Hoarfrost
University of California, Berkeley

Date submitted: 18 Nov 2010 Electronic form version 1.4