Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

A Quasi Elastic Neutron Scattering study of polymer dynamics in PEO based sulfonate ionomers: Effect of ion content and ion identity
KOKONAD SINHA, JANNA MARANAS, The Pennsylvania State University — We present Quasi Elastic Neutron Scattering (QENS) data for characterizing dynamics in ion containing polymers (ionomers) with varying ion content (cation to ether oxygen ratio) and ion identity. To remove electrode reverse polarization, the anion is immobilized by covalently bonding it to the PEO backbone through an 'ionizable' isophthalate co-monomer unit and only the cation contributes to the conductivity. We vary the ion content in two ways: changing the ratio of neutral to ionized co-monomer units, and changing the length of the PEO spacer separating the co-monomer units. In neutral ionomers, we observe two segmental processes; PEO segments in the spacer midpoint are one order of magnitude faster than those near the isophthalate groups. In ionized samples, cross-linking between ionic groups considerably slows the dynamics of PEO segments near the isophthalate group. The extent of cross linking depends on the ion content and spacer length. This effect is also ion dependent, which indicates that cations have different binding capacities and formation of this complex controls the availability of free cations for conduction.

Kokonad Sinha
The Pennsylvania State University

Date submitted: 01 Dec 2010 Electronic form version 1.4