Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Solvation Effects on Counterion Transport in Single-Ion Conducting Ionomers JING-HAN HELEN WANG, Chemical Engineering, The Pennsylvania State University, University Park PA 16802, RALPH COLBY, Chemical Engineering and Materials Science and Engineering, The Pennsylvania State University, University Park PA 16802 — Ionomers with short ethylene oxide side chains are synthesized by free radical polymerization, to systematically test effects of solvating anion and cation, including directly substituting the ion attached to the polymer with its counterion. Dielectric relaxation spectroscopy is used to measure the conductivity, dielectric constant and segmental relaxations in these ionomers and the electrode polarization at very low frequencies is used to assess the number density of simultaneously conducting ions and their mobility. Conductivity and conducting ion content are larger for polyanions than their corresponding polycation because the counterion can be more effectively solvated by the ether oxygens. Changing ester linkages to amide linkages in polycations boosts conductivity and conducting ion content by solvating the anionic counterion. Such findings point a clear path toward design of superior single-ion conductors.

Jing-Han Wang
Chemical Engineering, The Pennsylvania State University

Date submitted: 31 Oct 2011 Electronic form version 1.4