Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Morphology and Ionic Associations in Polyphosphazene Ionomers

JOSHUA BARTELS, ANDREW HESS, HARRY ALLCOCK, RALPH COLBY, JAMES RUNT, Penn State University

— Polyphosphazene ionomers with short chain poly(ethylene oxide) (PEO) moieties, bound ammonium cations, and free iodide anions were previously synthesized and their conductivity was studied through dielectric relaxation spectroscopy (DRS). Polyphosphazenes provide interesting conductive materials to study because of their low glass transition temperature and unique inorganic backbone. Non-ionic (poly[bis(methoxyethoxy)phosphazene] (MEEP) and two high ion content phosphazene ionomers were studied by multiple angle X-ray scattering (MAXS). Room temperature scattering shows the polymers are completely amorphous. Two peaks are observed in non-ionic MEEP and correspond to the phosphazene backbone-backbone spacing and to the amorphous halo of PEO. When longer ion-containing pendants are incorporated, an increase in the spacing is observed. A third peak is observed in the ionic systems and is interpreted as the average spacing between ions. The average ion separation closely matches the spacing of monomers and suggests the ions are not aggregated but stay in isolated pairs even at high ion content. Although there is no observable ionic aggregation, the conducting ion concentration remains low due to strong cation-anion associations.

Joshua Bartels
Penn State University

Date submitted: 15 Nov 2013

Electronic form version 1.4