



~~~~ Polymer Physics Seminar ~~~~

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301 Steidle Bldg.

Molecular mobility and cation conduction in sulfonated polyester copolymer ionomers

Poly(ethylene oxide) ionomers are candidate materials for electrolytes in energy storage devices due to the ability of ether oxygen to solvate cations. Copolyester ionomers are synthesized via condensation of sulfonated phthalates with mixtures of PEO and PTMO to make random copolymer ionomers with identical ion content. Variation of the PEO/PTMO composition changes T_g , dielectric constant and ionic aggregation; each with consequences for ion transport. Dielectric spectroscopy is used to determine number density of conducting ions, their mobility and extent of aggregation. Conductivity and mobility show Vogel temperature dependence and increase with PEG content; even though PTMO ionomers have lower T_g . Conducting ion densities show Arrhenius temperature dependence and are nearly identical for polymers containing PEO. SAXS confirms the extent of aggregation and temperature response from dielectric results, and exposes phase separation as PTMO content is increased. The tradeoff between ion-solvation and low T_g in this study provides fundamental understanding of ionic aggregation and ion transport in polymer electrolytes.