

Abstract Submitted
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Enhanced ionic conductivity of polyurethane ionomers by self-solvating cations SHIH-WA WANG, RALPH COLBY, Pennsylvania State University — We study the effect of different cations on ionic conductivity and dielectric properties of polyurethane ionomeric single-ion conductors with para-phenyl diisocyanate and anionic diols (carboxylate or phosphonate) constituting the hard segments and poly(ethylene glycol) as the soft segment. Bulky cations such as tetra-alkyl ammonium can increase ionic conductivity compared to metallic cations like sodium because bulky cations have lower interaction energy with anions, allowing more dissociation from the anions. In order to increase the conductivity even more, ether oxygens, which are well-known to solvate cations, are incorporated in the alkyl tail of ammonium-type cations. By comparing polyurethane ionomers with sodium, tetramethyl ammonium, and ammonium with ether oxygens in the alkyl tail, we show that the presence of ether oxygen on the ammonium can significantly reduce T_g and increase ionic conductivity in our single-ion conductors.

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