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Trivalent anions in polymerized ionic liquids enhance both ion conductivity and viscosity[1] JOSHUA BARTELS, MATTHEW HELGESON, RACHEL SEGALMAN, University of California, Santa Barbara — The conductive and mechanical properties of polymerized ionic liquids (PILs) are strongly affected by the pendant ion and counter-ion. By including a mixture of two counter-ions, each ion may uniquely interact with the PIL and each give rise to a separate property. By including both a conductive ion (chloride) and a coordinating ion (phosphate) into a PIL, the mechanical and conductive properties may be decoupled. The incorporation of trivalent ions to an imidazolium-containing PIL results in stronger inter-polymer associations observed in rheological measurements as an increase in the polymer viscosity with increasing phosphate content. Phosphate ions bind more strongly with imidazoliums and allow chloride ions to more readily conduct. The ionic conductivity was determined by AC impedance and was found to increase with increasing phosphate content. At sufficiently high phosphate concentrations, the conductivity of the PIL with trivalent ions is superior to that of the neat PIL. The effect of incorporating trivalent anions is nontrivial as it also affects the organization and aggregation of ions, observed as a shift in the ion correlation peak observed in small angle x-ray scattering to shorter correlation distances.

[1]IRG Super Seed

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