Abstract Submitted
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Conductivity Scaling Relationships in Nanostructured Membranes based on Protic Polymerized Ionic Liquids[1] GABRIEL SANOJA, University of California, Berkeley, NATHANIEL LYND, University of Texas, Austin, RACHEL SEGALMAN, University of California, Santa Barbara — Nanostructured membranes based on protic polymerized ionic liquids are of great interest for a variety of electrochemical applications. Understanding the relationship between composition, structure, and ionic conductivity for these materials is essential for designing novel membranes with improved properties. In this work, we explore the effect of volume fraction of ionic liquid on conductivity, σ using a model system composed of poly[isoprene-*block*-(ethylene oxide-*stat*-histamine glycidyl ether) diblock copolymers [PI-*b*−P(EO-*stat*-HGE)] and the resulting [PI-*b*−P(EO-*stat*-IL)] obtained after treatment with trifluoroacetic acid. These materials self-assemble into lamellar structures with volume fractions of ionic liquid ranging from 0.50 to 0.90 as demonstrated by SAXS. PI-*b*−P(EO-*stat*-IL) membranes exhibit conductivities up to 4 x 10^{-3} S/cm at room temperature. In addition, PI-*b*−P(EO-*stat*-IL) based membranes have lower water uptake (λ = 8-10) in comparison with most proton conducting membranes reported elsewhere. The low λ in these membranes might translate into a stronger effect of morphology on transport properties.

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