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Dispersing Functionalized Nanoparticles in PEO-based Single Ion Conductors MICHAEL O'REILLY, KAREN WINEY, University of Pennsylvania — Lithium single-ion conductors have the potential to reach high lithium transference numbers and high viscosities, but demonstrate poor ion transport properties. Ion mobility is inversely related to structural rigidity, so the highest ionic conductivity is usually achieved by ionomers with the most liquid-like properties. Solid nanofillers designed to enhance ion dynamics at the particle-polymer interface may improve the viscosity of an ionomer without arresting ion mobility. We demonstrate how silica nanoparticles are functionalized for favorable and unfavorable interactions with a sulfonated PEO-based ionomer matrix. We find that nanoparticle surface chemistry and loading fraction have implications on thermal properties, nanoparticle dispersion, viscosity, and lithium conduction. For functional groups designed for favorable ionomer interactions but poor nanoparticle dispersion, the viscosity of the nanocomposite may be altered significantly while negligibly affecting ionic conductivity even at high volume fractions of non-ionic filler.

Michael O'Reilly
University of Pennsylvania

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