

Abstract Submitted
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Increasing the Mechanical Strength of Block Polymer Ion Gels Through the Stepwise Self-Assembly of a Thermoresponsive ABC Triblock Terpolymer CECILIA HALL, CAN ZHOU, SCOTT DANIELSEN, TIMOTHY LODGE, Univ of Minnesota - Twin Cities — Blends of network-forming block polymers and ionic liquids have remarkable potential for solid electrolytes, as they allow the combination of desirable mechanical and electrical properties. While ABA triblock copolymers have successfully been implemented as the network component of ion gels, these networks contain looped defects, where the endblocks of the polymer loop back into the same spherical core instead of forming a bridge between two cores. We demonstrate that the ABC triblock terpolymer poly(ethylene-*alt*-propylene)-*block*-poly(ethylene oxide)-*block*-poly(*N*-isopropylacrylamide) (PEP-*b*-PEO-*b*-PNIPAm) in the ionic liquid 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide forms a thermoreversible gel network with negligible looping defects. PEP-core micelles exist at all temperatures, while cooling causes association of the PNIPAm micelle corona to form a bridging network. Small-angle x-ray scattering and dynamic light scattering were used to characterize the high-temperature micelles. These gels show enhanced mechanical properties and the ability to form gels at lower concentrations than the corresponding thermoresponsive ABA triblock copolymers.

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