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Anion Exchange Membranes Based on Reactive Block Copolymers RICK BEYER, SAMUEL PRICE, AARON JACKSON, XIAOMING REN, DERYN CHU, Army Research Laboratory, YUESHENG YE, YOSSEF ELABD, Drexel University — The unmet needs for polymeric AEMs include high hydroxide conductivity, chemical stability under strongly basic conditions, and sufficient mechanical properties to withstand the temperature and humidity fluctuations in a fuel cell. This presentation will include our most recent findings from an effort to develop cation-containing polymers based on phosphonium and ammonium derivatives of styrene using co-polymerization of reactive, ion-containing block copolymers with a small molecule "matrix" monomer. By creating polymer membranes with co-continuous cation-containing domains in a cross-linked matrix, we hope to demonstrate high conductivity simultaneously with the robust mechanical properties required in the fuel cell environment. Morphological data from SAXS and TEM, mechanical property measurements, in- and through-plane charge transport measurements, and the results of fuel cell testing will be presented. It was found that the surface transport characteristics of these materials differ from the through-plane properties, that chemical crosslinks may not produce membranes with the required toughness, and that a polymerization technique that is highly sensitive to reaction kinetics is not ideal for the production of AEMs.

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