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New Polymer Structures for Anion Exchange Membranes[1]

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New cationic membranes for alkaline fuel cells and other ion transport applications continue to generate interest in the polymer materials community. A current barrier in the field is the lack of consensus on structure-property relationships of polymers with backbone-tethered cations. Our group has demonstrated a number of polymer structures based on commercially-available polymers and inexpensive modification reagents. We have focused on poly(phenylene oxide) as a backbone platform and employed ammonium cations that have good stability in light of their low cost and reasonable performance. In previous work, we employed alkyl chains to cause phase separation in random copolymers. This phase separation increased the conductivity and decreased the water uptake of the materials. We have since continued to investigate crosslinking and interpenetrating networks as further methods to optimize the conductive, mechanical, and swelling properties of anion exchange membranes. This talk will highlight our recent work on new polymer structures and demonstrate how stability and conductivity can be increased by iterating on quaternary ammonium poly(phenylene oxide)-based materials.

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