

Synthesis and Characterization of Multiblock Copoly(ether sulfone) Containing Pendant Sulfonic Acid Groups for Fuel Cell Application

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Nafion is one of widely used polymer electrolyte membrane (PEM) due to its high proton conductivity and good mechanical properties. However, Nafion suffers from high cost and low conductivity at high temperature. As an effort to overcome these drawbacks, studies have been conducted on hydrocarbon-based PEM. To obtain distinct phase separation, multiblock copolymer composed of hydrophilic and hydrophobic blocks were proposed and result showed that less dependence of humidity and temperature on proton conductivity compared with random copolymer. In this study, we present synthesis and characterization of multiblock copoly(ether sulfone) containing pendant sulfonic acid groups. Our approach to achieve well developed phase separation with high proton conductivity is multiblock copolymer with highly sulfonated unit. Highly sulfonated unit is achieved with conversing tetramethoxy groups into tetra hydroxyl group and followed by sulfobutylation. The polymers were characterized by ¹H NMR, thermogravimetric analysis (TGA), water uptake and proton conductivity. We believe that these polymer membranes are reasonably adaptable for PEM in fuel cell.