

Synthesis and Characterization of Sulfonated Poly(Phenylene Sulfide Sulfone Nitrile) for Direct Methanol Fuel Cell Applications

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High molecular weight sulfonated poly(phenylene sulfide sulfone nitrile) (SPSSN) with various degrees of sulfonation (DS) were prepared by polycondensation of monomers in N-methyl-2-pyrrolidone. The chemical structures of SPSSNs were confirmed by FT-IR and ¹H NMR spectroscopy. SPSSN membranes with DS lower than 50% show relatively higher oxidative stability than any other sulfonated poly(arylene ether)s. Furthermore, SPSSN membranes exhibit improved methanol barrier property and proton conductivity as compared with Nafion membrane. Consequently, the membrane-electrode assemblies based on SPSSN membranes show excellent electrochemical DMFC performances at high temperature of 90 °C.