

Synthesis and characterization of sulfonated poly(arylene ether sulfone) copolymers containing carboxylic acid groups for polymer electrolyte membrane

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Sulfonated poly(arylene ether sulfone) copolymers containing carboxyl groups were synthesized via nucleophilic step polymerization of phenolphthalin (PP), sulfonated 4,4'-dichlorodiphenyl sulfone (S-DCDPS) and 4,4'-dichlorodiphenyl sulfone (DCDPS) as electrolyte membrane for PEMFCs. The composition and incorporations of the sulfonated repeat unit into the copolymers were confirmed by ^1H NMR and Fourier transform infrared spectroscopy. Thin, ductile films were fabricated by solution casting method and the thickness was about 50 μm . The membranes were measured by water uptake and proton conductivity as functions of degree of sulfonation. In general the water uptake and proton conductivity increased as the degree of sulfonation increased from 20 to 60 mol%. Solubility tests on the sulfonated copolymers confirmed that some crosslinking and probably branching occurred during the copolymerizations. These copolymers are promising candidates for high temperature proton exchange membranes in fuel cells.