

Cross-linkable sulfonated poly(ether ether ketone) membranes for fuel cell application

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Perfluorinated polymers, such as Nafion, are most widely used for high proton conductivity and excellent oxidative stability, but because of their high cost, efforts are focused on the development of alternatives. Among the various polymers, Sulfonated poly(ether ether ketone)(SPEEK) was shown to be of considerable promise. However, the mechanical properties of SPEEK tend to decrease progressively with sulfonation for extreme swelling. In this study, a series of cross-linkable sulfonated poly(ether ether ketone)s (CSPEEKs) were synthesized and used to prepare polymer electrolyte membranes for fuel cells. These transparent and flexible membranes are insoluble in common organic solvents and demonstrated little swelling in hot water. Thermal and mechanical stability of the membranes were evaluated using a thermogravimetric analyzer and strain-stress test, respectively. The high conductivity and low methanol permeability make CSPEEK membrane a good alternative to Nafion 117 in direct methanol fuel cells.