

Cross-linked poly(ether ether ketone) membranes with sulfonic acid groups on the backbone and pendant for fuel cell applications

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A series of cross-linkable sulfonated poly(ether ether ketone)s (CPEEKs) with sulfonic acid groups on the backbone and pendant were synthesized and used to prepare polymer electrolyte membranes for fuel cells. The direct synthesis of SPEEK provided the opportunity to control the Degree of Sulfonation (DS) by adjusting the molar ratio of sulfonated to non-sulfonated difluorodiphenylketone monomer. These transparent and flexible membranes are insoluble in common organic solvents and demonstrated little swelling in hot water. The conductivity of the cross-linked PEEK membrane with a 20% degree of cross-linking and a 50% DS is better than that of Nafion 117 at 40 OC (0.079 S cm^{-1}) and above 80 OC (0.133 cm^{-1}). This kind of membrane is expected to be a good alternative to Nafion 117 in polymer electrolyte fuel cell applications.