

Covalently cross-linked sulfonated poly(ether ether ketone)/heteropoly acid composite membrane for high temperature polymer electrolyte membrane fuel cells

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Covalently cross-linked sulfonated poly(ether ether ketone)(SPEEK) polymer was prepared from sulfonation-sulfochlorination, partial reduction and lithiation reactions. The polymer was cross-linked by reaction with 1,4-diiodobutane and then blended with tughstophosphoric acid (TPA). The membrane was prepared via a casting method and subsequent hydrosis of the sulfochloride groups by aqueous post-treatment. Cross-linking and blending with TPA decided the distinctive properties of membrane, and it can reduce the membrane swelling, which leads to a better mechanical and thermal stability of the membrane. The membrane shows good ion exchange capacity and proton conductivity. The PEMFC single cell test of cross-linked SPEEK/TPA composite membrane exhibits stable performance at high temperature above 100°C.