Semi-IPN system electrolyte membranes composed of ketone sulfonated poly(arylene ether ketone) block copolymer and organosiloxane based hybrid network for fuel cell

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A semi-IPN system electrolyte membrane is prepared from the sulfonated poly(arylene ether ketone) block copolymer and organosiloxane based organic/inorganic hybrid network. The organosiloxane network is synthesized from 3-glycidyloxypropyltrimethoxysiane and 1-hydroxyethane-1,1-diphosphonic acid. The chemical structure of the hydrophobic and hydrophilic oligomers and the block copolymers and semi-IPN synthesized from them is identified using 1H-nuclear magnetic resonance (NMR) spectroscopy, attenuated total refection fourier transform infrared (ATR-FTIR) spectroscopy, and gel permeation chromatography (GPC). The proton conductivity and water uptake along with the thermal, mechanical, oxidative stabilities are measured to investigate the effect of the semi-IPN structure on the membrane properties.