

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

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A semi-interpenetrating polymer network (semi-IPN) proton exchange 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-glycidyloxypropyltrimethoxysilane and 1-hydroxyethane-1,1-diphosphonic acid. The methanol permeability is illustrated in Fig.1. and it is much lower than Nafion® 117 under addition of the organosiloxane network. The proton conductivity is illustrated in Fig.2. the proton conductivity increases with an increase the organosiloxane network content; the membrane containing the 20-24 wt% organosiloxane network shows higher conductivity than Nafion® 117 . Chemical synthesis of the semi-IPN membranes is identified using FTIR and thermal stability was analyzed by the thermal gravimetric (TGA) method. And its ionic cluster dimension of the membrane was analyzed by the small angle X-ray scattering (SAXS) technique. The water uptake, ion exchange capacity (IEC), oxidative stability and mechanical properties of the semi-IPN membrane were investigated for their applications in proton exchange membrane fuel cells.