

Preparation of poly(vinylphosphate-*b*-styrene) and its blend membranes

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Poly(vinyl alcohol) (PVA) membranes have been used in ethanol dehydration to break the ethanol-water azeotrope. Therefore PVA membrane is expected to decrease methanol permeability in DMFC. However, the highest reported proton conductivity is only 3.65×10^{-5} S/cm. To improve the proton conductivity of the PVA membranes, a number of research groups have investigated several combinations of PVA with acid or salts, such as phosphoric acid (H_3PO_4), etc. PVA membranes doped with H_3PO_4 shows higher proton conductivity, but PVA- H_3PO_4 blend is very soft, water soluble, and H_3PO_4 leaches out of the membrane easily and the proton conductivity drops rapidly. In order to overcome these drawbacks, we synthesized poly(Vinylphosphate-*b*-styrene) copolymer (Poly(VPP-*b*-St)) via consecutive telomerization of vinyl acetate (VAc), ATRP with styrene, saponification, and phosphorylation with phosphorous oxychloride. Then, the blend membranes of PPO with poly(VPP-*b*-St) were prepared by solution casting method.