

Preparation and Characterization of sulfonated Poly(phthalazionone ether sulfone ketone) (PPESK) membrane for DMFC application

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A direct methanol fuel cells (DMFCs) using polymer electrolyte membranes has gained much interest over the last decade. Most DMFC research has concentrated on polymer electrolyte membrane fuel cells (PEMFC) fed directly with methanol. In this study, the proton exchange membranes were prepared using PPESK as the base materials. The introduction of sulfonic acid group into polymer matrix was achieved by the sulfonation with concentrated sulfuric acid under a variety of conditions. Here, we might expect that the introduction of sulfonic group might lead to both high proton conductivity. Their water swelling, ion exchange capacity, proton conductivity and methanol permeability were investigated in an attempt to characterize membranes for DMFC application. The prepared proton exchange membranes at each preparation condition possessed the IEC in the range of 0.3 ~ 1.1 meq./g-dry membrane. The proton conductivity of sulfonated PPESK membranes are in the range from 10^{-3} ~ 10^{-2} S/cm. It was found that proton conductivity was dependent on the sulfonation degree due to hydrophilic group (SO_3H).