

Preparation and Characterization of sPEEK/ORMOSIL hybrid membrane for Fuel Cell

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In this study, novel polymer electrolyte membrane for Direct Methanol Fuel Cell was synthesized and its characteristics were investigated. PEEK(poly(ether ether)ketone) was used as a primary polymer matrix. Most sulfonated PEEK membranes had low methanol permeabilities. On the other hand they had low proton conductivities. In order to improve the proton conductivity sPEEK polymer was modified with organic silanes. We used the ORMOSIL solution including TEOS and Isocyanate for stable silica network and phosphotungstic acid for high acidity. These ingredients diffused into sPEEK polymer were hydrolyzed and condensed under acidic condition by sol-gel reaction. With the method, we have studied the effect of the ORMOSIL solution for proton conductivity and methanol permeability. The influence of temperature on methanol permeability was investigated as well. Our results show that proton conductance of the hybrid membrane could be enhanced near to that of Nafion. Although methanol permeability of the hybrid membrane increased to some degree according to operation temperature, it was less than that of Nafion. The characteristics of the hybrid membrane were analyzed by Scanning Electron Microscope(SEM), Energy Distribution Spectrometer(EDS) and A.C Impedance experiment.