Preparation and Characterization of Organic/Inorganic Hybrid Composite Membranes for Fuel Cells

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Abstract

The scope of the présent study is on the preparation and investigation of PVA/SiO_2 and PVA/SiO_2/PMA based membranes. A series of hybrid composite membranes were prepared by the incorporation of SiO_2 and PMA into PMA polymer matrix using sol gel method. Presence of inorganic fillers in polymer matrix is identified through XRD and FTIR investigations. The swelling behavior was reduced notably while increasing the SiO_2 and PMA content. The proton conductivity of both the hybrid composite membranes exposed in the order of 10^{-3} S/cm and depends on the inorganic concentration. The maximum conductivity of 0.36×10^{-3} S/cm is reached by the presence of PMA in PVA/SiO_2 membrane at 40 °C with constant relative humidity of 50%. It reveals that the occurrence of maximum conductivity depends strongly on the ability of water uptake as functions of inorganic addition. The excellent thermal stability was identified for PMA based hybrid composite membranes and thus it can be suitable for low temperature H_2/O_2 fuel cells.



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