

Synthesis and Characterization of SiO₂/PVA/ SPEEK Composite Membrane for Proton Exchange Membrane Fuel Cell

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Abstract : Proton exchange membrane (PEM) fuel cell is a very efficient and promising energy conversion device. Although Nafion® is considered as benchmark materials for membrane used in PEM fuel cell, it has limitations that restrict its uses. Alternative materials for the membrane is always a challenging field for researchers. Sulfonated poly(ether ether ketone) (SPEEK) is one of the promising material for membrane due to its chemical and mechanical stability and lower cost. In this work, SPEEK is synthesized, and property booster such as silica nanoparticles and polyvinyl alcohol (PVA) are also added to analyse changes in properties such as water uptake, IEC, and conductivity. It has been found that adding PVA support high water uptake and proton conductivity but at large amount of PVA reduces the proton conductivity due to very high water uptake. Adding silica enhances water uptake and proton conductivity.

Keywords : PEM Membrane, sulfonated poly (ether ether ketone) (SPEEK), silica fumes (SiO₂), polyvinyl alcohol (PVA)

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