

## Improved PEMFC Properties of csPAEK Membranes with mesoporous material at Low Humidity

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In polymer electrolyte membrane (PEM) fuel cell operation, the reduced proton conductivity of the PEM was the main reason of poor cell performance at low humidity condition. To enhance the properties of the membrane at high temperature and low humidity, sulfonated mesoporous benzene silica (sMBS) materials were embedded in crosslinked sulfonated poly(arylene ether ketone) (csPAEK) membranes. The sMBS was highly sulfonated on both organic and inorganic moieties. The proton conductivity of composite membranes was much higher than that of the pristine polymer, and it reached that of Nafion at a high humidity, 95%. Crosslinked membranes provided enhanced mechanical stability as well as ion conductivity. The water evaporation rate of the membrane at 100°C was changed with ratio of sMBS which provides the capillary condensation effect with the 2D hexagonal cylindrical nano pores. The composite membranes showed enhanced property like conductivity, tensile strength and etc. at high temperature.