

## Introduction of high amount of fumed silica into sulfonated poly(arylen ether sulfone) membranes for the application to proton exchange membrane

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Perfluorinated sulfonic acid membranes are representative proton exchange membranes (PEMs). However, their high price and low thermal stability at high temperature have hindered the early commercialization of proton exchange fuel cell (PEMFC). Accordingly, sulfonated hydrocarbon membranes with low cost and high thermal stability have been widely studied as alternatives. Although these extensive efforts, there remains some critical problems to solve such as an excessive dimensional change in dry and wet conditions and a relatively low proton conductivity to perfluorinated sulfonic acid membranes with the same ion exchange (IEC) value. Introduction of inorganic functional particles into sulfonated hydrocarbon membranes has been suggested as a possible solution to improve the membrane properties including dimensional stability and proton conductivity. In this study, hydrophobic and hydrophilic fumed silicas were introduced into sulfonated poly (arylene ether sulfone) (SPAES) membranes. High amount (5wt%) fumed silica affected water uptake, dimensional stability and proton conductivity, in which a dispersant was used to enhance the compatibility of fumed silica with SPAES.