

Synthesis of poly(arylene ether sulfone) with new functional group for PEMFC applications

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Polymer electrolyte membrane fuel cells (PEMFCs) made several revolutionary advances in power generation system because of their environmentally friendly feature. In the PEMFC system, proton exchange membrane (PEM) is one of the most important elements which have a great effect on the performance of fuel cell. Nafion, produced by Du Pont, is the most widely used membrane in fuel cell industry due to its great proton conductivity and durability. However, high cost of production and complex fabrication procedure became one of the problems of Nafion which could delay the commercialization of fuel cell. In this manner, when sulfonation degree is well-controlled, poly(arylene ether sulfone)s (PES), hydrocarbon-based polymer, can be an alternative of Nafion. Because proton conductivity and mechanical strength of PES cannot coexist, it is important to overcome this drawback by introducing some pendant groups other than sulfonic acid groups. In this report, the synthetic procedure of PES with new functional group would be described. Characterization of membrane by ¹H-NMR, FT-IR, and the results of proton conductivity and single cell test would also be stated.