

Synthesis and characterization of poly(arylene ether sulfone) ionomers with pendant quaternary ammonium groups for anion exchange membranes

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Proton exchange membrane fuel cells have been demonstrated to have high power density and reasonable energy density. Their commercialization, however, has been hampered by the high cost and low durability of their electrocatalysts. By switching from an acidic medium to a basic one, Alkaline anion exchange membrane fuel cells have the potential to solve the problems.

Poly(arylene ether sulfone) has been widely used in the manufacture of synthetic polymer membranes due to its excellent mechanical, thermal, and chemical stability. With the monomer containing four tertiary amine groups, PAES was prepared. Anion exchange membranes were made by the reaction of the tertiary amine groups with iodomethane to form quaternary ammonium groups which acted as the counter ion for hydroxide ion. The advantage of this method is avoiding the use of toxic chloromethylation reagents. Furthermore, the amount of quaternary ammonium groups and their location along the polymer backbone could be controlled precisely by adjusting the composition of comonomers.