

## Perfluorocyclobutane(PFCB) ring containing sulfonated poly(aryl ether) membrane for direct methanol fuel cells

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PFCB-containing aryl ether polymers were synthesized and sulfonated using chlorosulfonic acid and then cast into membranes for fuel cell applications. Sulfonation reaction was carried out by changing the molar ratio of chlorosulfonic acid and the PFCB-containing aryl ether polymer under fixed time and temperature. The resulting sulfonated polymers showed different sulfonation degree (SD), ion exchange capacity (IEC), and water uptake. All the synthesized compounds were characterized by FT-IR, <sup>1</sup>H-NMR, <sup>19</sup>F-NMR, and mass spectroscopy. With the increment of the content of chlorosulfonic acid, the SD, IEC, water uptake of the sulfonated polymer membranes increased. The sulfonated polymer membranes showed a high ion conductivity (0.102 S/cm, 80°C) comparable to that of Nafion-115 membrane (0.1070 S/cm, 80°C). The methanol permeability values of the sulfonated polymer membranes were lower than those of Nafion-115 membranes. These results indicate that the sulfonated fluoropolymer membranes can be promising electrolyte membrane for direct methanol fuel cells.