

Electrochemical characteristics of durable polymer electrolyte pore-filling membranes for solid alkaline fuel cells

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Novel hydroxide ion conducting polymer electrolyte pore-filling membranes were prepared for the application to solid alkaline fuel cells(SAFCs). The anion conducting polymer electrolytes consisting of the whole hydrocarbon materials without an amination process were employed in this work. The highly quarternary-aminated electrolyte was introduced into porous hydrocarbon substrates and crosslink-polymerized by UV irradiation. The prepared pore-filling membranes are able to drastically decrease fuel crossover from anode to cathode because the porous substrate suppresses a swelling factor of highly quarternary-aminated helectrolytes in water media such as highly relative humidified operation conditions. The physico-chemical properties of the prepared membranes such as swelling behavior, ion exchange capacity, and ionic conductivity were also investigated in correlation with the electrolyte composition. And electrochemical characteristics using I-V property, Impedance, and Cyclic Voltammetry were examined at the membrane-electrode-assembly (MEA) conditions for SAFC. The cell performance was also conducted at 50°C with H₂ / pure air.