

Fabrication of Pt/Ru-membrane using I-R Method and addition new material for methanol crossover

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A direct methanol fuel cells(DMFCs) based on a polymer electrolyte membrane(PEM) is attractive for transport and portable applications.

However, the crossover of methanol through the electrolyte membrane in DMFCs still restricts their performances and applications. The methanol crossover the cathode not only reduces fuel efficiency but also increases the overpotential of the cathode, thus resulting in lower cell performance.

A material which can protect methanol crossover was added to Nafion membrane. Using I-R method, Membrane surface was coated with Pt and Ru. In the Impregnation-Reduction method(IR method), the cation-exchange membrane with a preexchange cationic metal species($[\text{Pt}(\text{NH}_3)_4]\text{Cl}_2$ and $[\text{RuCl}(\text{NH}_3)_5]\text{Cl}_2$) is subsequently immersed in the reduction solution, which reduces and displaces the metal towards the outer surface of the membrane. Changing Pt/Ru loading($2\sim 4\text{mg}/\text{cm}^2$) measured best performance condition and found out material which protect methanol crossover efficiently.