PERFORMANCE MODELING OF A DIRECT METHANOL FUEL CELL

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ABSTRACT

The direct methanol fuel cell (DMFC) is the focus of this thesis. Modeling and simulations are carried out with an aim to understand the influence of operational and geometrical parameters on the performance of a direct methanol fuel cell. In addition, the influence of aforementioned parameters on methanol corssover in a direct methanol fuel cell is also investigated. The results show that increasing temperature and pressure can enhance the performance of a direct methanol fuel cell, and concentration of methanol in the feed flow plays an important role in its performance. The optimal concentration of methanol for a direct methanol fuel cell is about 2 M. Decreasing methanol concentration, increasing cathodic pressure and thickness of polymer electrolyte membrane (PEM) can all suppress methanol crossover. However, under operating condition of high current density, thick PEM and low methanol concentration will cause large ohmic and concentration overpotential, respectively.

Keywords : Direct Methanol Fuel Cell ; Fuel Cell ; Performance Modeling

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