A Study on the Methanol Crossover of a Direct Methanol Fuel Cell

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ABSTRACT

Fuel cell is an effective and clean energy conversion device that converts the chemical energy of fuel directly into electricity by electrochemical reaction. Due to some breakthrough of the fuel cell technique, the fuel cell becomes more energy-efficient and can be produced less costly so the future of fuel cell is promising. It is appropriate to call it “ the shining star of energy in the 21st century. ” Direct methanol fuel cell utilizes methanol as fuel directly dispensing with a reformer. With the merits of simple construction, high energy density, its fuel being easy to carry and store, DMFC is suitable to power vehicles and 3C products and it goes without saying that DMFC will become very popular in the near future. However, DMFC has two drawbacks, one is the high anodic overpotential and the other is the methanol crossover. The direct methanol fuel cell is the focus of this research. First of all, several direct methanol fuel cell single cells designed and fabricated with off-the-shelf MEA ’ s. The results show that decreasing methanol concentration and thickness of proton exchange membrane can all suppress methanol crossover. However, under operating condition of high current density, thick proton exchange membrane and low methanol concentration will cause large ohmic and concentration overpotential, respectively.

Keywords : Direct methanol fuel cells, Methanol crossover, Mass transfer

Table of Contents

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