he Relation of PEMFC Performance with Mass Transfer through its Cathode

蕭樺瑋、鄭錕燦

E-mail: 365406@mail.dyu.edu.tw

ABSTRACT

The mass transfer in PEM fuel cells is the main factor affecting the performance of fuel cells. Especially in the cathode side, the effects of oxygen mass transfer through the gas diffusion layer are the most decisive ones. In this study, numerical simulations using the COMSOL software were conducted to investigate the cathode mass transfer in PEM fuel cell, with an aim to understand its impact on the performance of the fuel cell. The results of this study show that at the cathode flow channel in the fuel cell, the oxygen concentration decreases gradually along the direction of air flow. The situation of the catalyst layer and gas diffusion layer are the same at the interface. It leads to the fact that the current density decreases monotonically from the channel inlet to the outlet, but the range of the decline is determined by the amount of supplied air. If sufficient air is supplied, the current density would not change substantially. Otherwise, at the outlet of the flow channel, the current density of the fuel cell would be much lower than that at the entrance. This results in the decline of the overall performance of the fuel cell.

Keywords : Fuel cell、Mass transfer、Gas diffusion layer

Table of Contents

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