Effects of MEA properties on the current distribution in a direct methanol fuel cell

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The properties of membrane-electrode assembly (MEA) affect the performance of direct methanol fuel cell. During DMFC operation, two-phase flows such as the liquid methanol solution and CO2 gas at the anode side or the air and the water at the cathode side affect the cell performance. The methanol crossover is an important factor that affects the mass transfer in a DMFC. The properties of the components constructing the MEA such as thickness of the membrane or gas diffusion layer, permeability of the electrode, or catalyst loading can affect the mass transfer phenomena inside the DMFC. In this study, therefore, current density distribution was measured to investigate the effect of MEA properties on the spatial difference along the surface of a membrane electrode assembly (MEA) during the operation of a direct methanol fuel cells. The current distribution profiles were examined with various MEA properties such as catalyst loading, thickness of membrane, and the properties of gas diffusion layer with different thickness and air permeability.