Effect of Properties of Gas Diffusion Layers on Electrode Flooding Level in a PEM Fuel Cell

Trung Van Nguyen and Guangyu Lin
Chemical and Petroleum Engineering Department
The University of Kansas
Lawrence, KS 66045, USA

ABSTRACT

Gas and water management are key to achieving good performance from a PEM fuel cell. Excessive liquid water saturation in the gas diffusion layers could lead to lower reactant (hydrogen and oxygen) gas transport rates to the catalyst layers in the fuel cell resulting in poorer performance.

An electrode flooding monitoring device designed for PEM fuel cells with interdigitated flow distributors [1-4] was used to study the effect of morphological and wetting properties on the electrode flooding level in the gas diffusion layers of a PEM fuel cell cathode. The electrode flooding level and its effects on the performance of a PEM fuel cell were investigated for two different types of gas diffusion materials, each with different wet-proofing properties.

The results show that the porosity, thickness and water proofing properties of the gas diffusion layers have a significant effect on the liquid water saturation levels in the gas diffusion layers which in turn have a significant effect on a PEM fuel cell performance. Lower saturation levels and better performance were observed with gas diffusion materials that have higher porosity, lower thickness, and higher water proofing content.

References

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