

A preparation of PANi/Nafion composite membrane and its application for DMFCs

PANi/Nafion 복합막의 제조와 DMFCs에의 응용

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1. Introduction

Direct methanol fuel cells (DMFCs) have attracted considerable attention as an alternative to internal combustion engine technology, since they offer numerous benefits, such as high efficiency, high power density, low or zero emissions and reliability. However, the crossover of methanol through the electrolyte membrane in DMFCs still restricts their performance and applications. For the breakthrough of the DMFCs technology, suitable membranes with high proton conductivity and low water and methanol permeability are required.

2. Experimental

The in-situ polymerization of aniline monomer into Nafion membrane would be more effective to bind sulfone group and cationic center than blending two materials. Therein the polyaniline-impregnated Nafion(PANi/Nafion) composites were prepared by in-situ chemical oxidation of aniline monomer. Methanol permeation and ionic conductivity measurements were also implemented to explore the effects attributed to the presence of polyaniline on in-situ polymerization time.

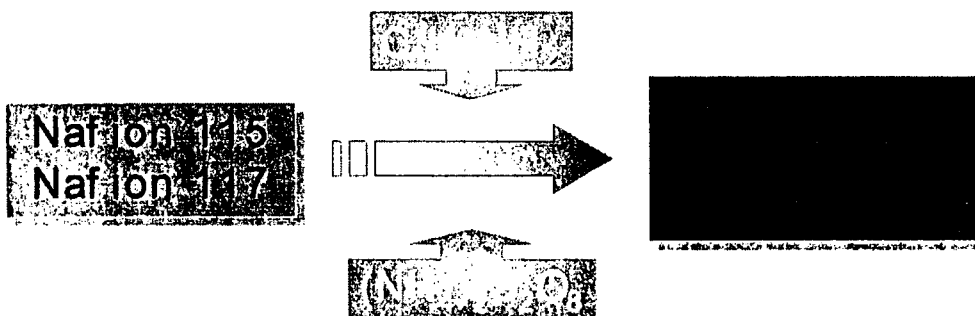


Figure 2. Fabrication of Nafion/PANi composite membrane

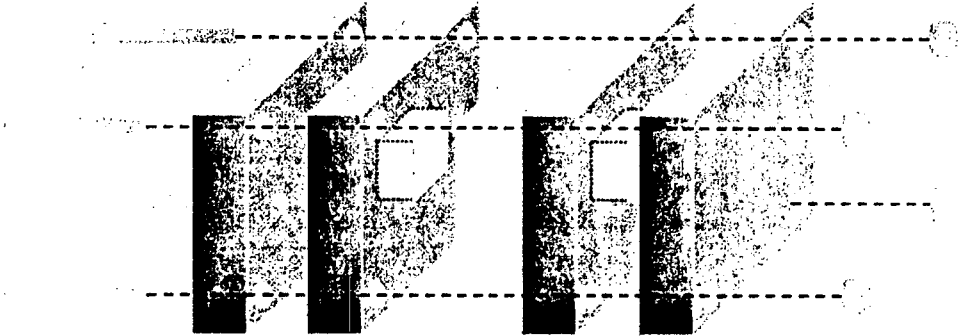


Figure 3. Acrylcell for Polymerization.

3. Result

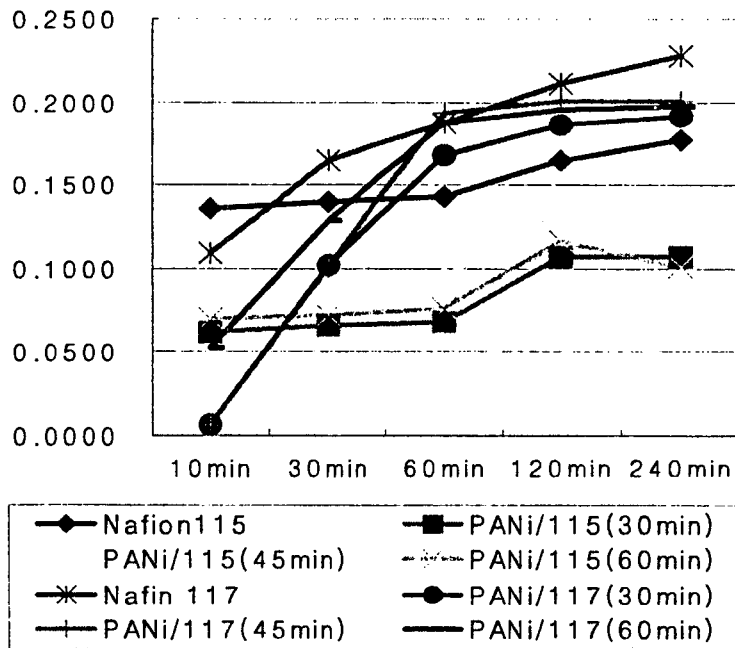


Figure 4. Nafion/PANi composite membrane uptake curve.

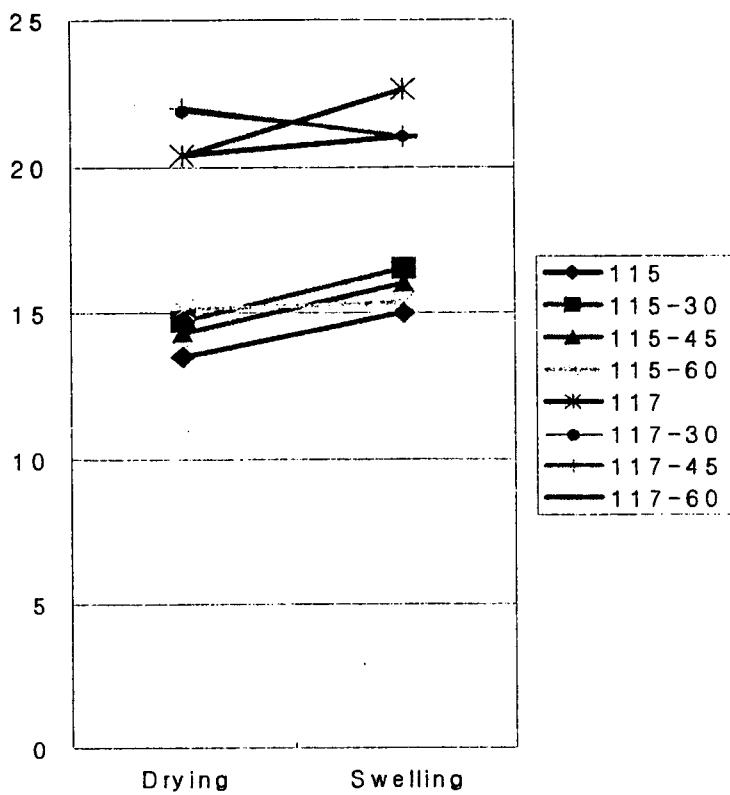


Figure 5. Nafion/PANi composite membrane thickness curve.

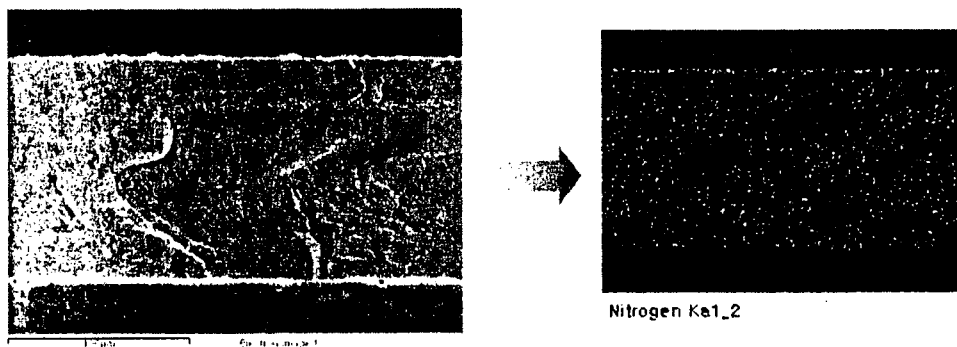


Figure 5. EDS-Mapping data of Nafion/PANi composite membrane.

4. Conclusion

In this study, we investigate the effect on the methanol cross-over and direct methanol fuel cell performance by modification of Nafion with polyaniline. For the purpose of enhancement in DMFCs performance, the PANi/Nafion composite membrane was prepared by in-situ polymerization in Nafion with aniline. And then, the electrochemical properties and the DMFCs performance of PANi/Nafion composite were investigated to elucidate application of conducting polymer in modification of electrolyte membrane. The experimental results of electrochemical properties and DMFCs performance were presented in this study. The methanol uptake was shown PANi/Nafion composite membrane and Nafion 115 in Figure 3. Figure 5 was shown nitrogen content of Nafion/PANi composite membrane.

ACKNOWLEDGMENTS

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