

디젤 개질 가스로 운전되는 금속지지체형 고체산화물 연료전지의 운전 안정성에 관한 연구

*정 지훈, 백 승욱, **배 중면

Stability of Metal-supported SOFC using Diesel Reformate

*Jihoon Jeong, Seung-Wook Baek, **Joongmyeon Bae

The metal-supported solid oxide fuel cell (SOFC) was studied. Hydrocarbon fueled operation is necessary to make SOFC system. Different operating characteristics for metal-supported SOFC are used than for conventional ones as hydrocarbon fueled operation. Metal-supported SOFC was successfully fabricated by a high temperature sinter-joining method and the cathode was in-situ sintered. Synthetic gas, which is compounded as the diesel reformate gas composition and low hydrocarbons was completely removed by the diesel reformer. Metal-supported SOFC with synthetic gas was operated and evaluated and its characteristics analyzed. Button cell and $5 \times 5 \text{cm}^2$ single stack were mainly operated and analyzed. Long-term operation using diesel reformate shows degradation, and degradation analysis was completed in the view of metal oxidation. Solution to increase stability of long-term operation was tried in the way of materials and operating conditions. Finally, $5 \times 5 \text{cm}^2$ metal-supported single stack using synthetic gas was operated for 1000 hours under the modified condition.

Key words : SOFC(고체산화물 연료전지), Metal support(금속지지체), Diesel reformate(디젤 개질 가스), Stability(안정성)

E-mail : *jihoonj@kaist.ac.kr, **jmbae@kaist.ac.kr

입구 온도에 따른 나피온 막 가습기 성능의 비선형적 변화

*황 준영, 강 경태, 강 희석, 김 종훈

Nonlinear variation of performance for a NAFION membrane humidifier with inlet temperature elevation

*J. Y. Hwang, K. Kang, H. S. Kang, J. H. Kim

Effect of temperature elevation of inlet air on performance of a membrane humidifier for PEMFC vehicle application was investigated both experimentally and numerically. A shell-and-tube typed gas-to-gas humidifier with Nafion membrane was tested. The experimental result showed that water transfer varies nonlinearly with the temperature elevation. Numerical analysis based on detailed modeling is also conducted on a single tube geometry to explain this nonlinear behavior. The simulation revealed that the local water flux varies nonlinearly and dramatically along the tube. Analysis is based on competing role of temperature increase and relative humidity decrease, both of which seriously affect water conductivity of the membrane.

Key words : Membrane humidifier(막 가습기), PEMFC(고분자연료전지), Nafion tubes(나피온 튜브), Local water mass flux(국소물질량유속)

E-mail : *jyhwang@kitech.re.kr