

고온형 고분자 전해질막 연료전지(HT-PEMFC) 구동환경에 따른 탄소 담지체 부식 평가

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Effect of operating conditions on carbon corrosion in High temperature polymer electrolyte membrane fuel cells (HT-PEMFCs)

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The influence of potential and humidity on the electrochemical carbon corrosion in high temperature polymer electrolyte membrane fuel cells(HT-PEMFCs) is investigated by measuring CO₂ emission at different potentials for 30 min using on-line mass spectrometry. These results are compared with low temperature polymer electrolyte membrane fuel cells(LT-PEMFCs) operated at lower temperature and higher humidity condition. Although the HT-PEMFC is operated at non humidified condition, the emitted CO₂ in the condition of HT-PEMFC is more than LT-PEMFC at the same potential in carbon corrosion test. Thus, carbon corrosion shows a stronger positive correlation with the cell temperature. In addition, the presence of a little amount of water activate electrochemical carbon corrosion considerably in HT-PEMFC. With increased carbon corrosion, changes in fuel cell electrochemical characteristics become more noticeable and thereby indicate that such corrosion considerably affects fuel cell durability.

Key words : Carbon corrosion(탄소부식), Mass spectrometry(질량분석), Durability(내구성), High temperature polymer electrolyte membrane fuel cell(고온형 고분자 전해질막 연료전지)

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고분자 연료전지의 데드엔드 운전 시 기울임에 따른 성능 변화

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The Effects of the Inclination on the Performance of dead-end operating PEM Fuel Cell

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In automotive applications or water vehicles, the polymer electrolyte membrane fuel cell(PEMFC) stack is kept moving while their operation. Especially the inclination environment can take an effect to fuel cell stack performance, because this condition can cause a bad effect to water exhaust of fuel cell stack.

In this study, a large scale stack(over 100kW power) is inclined up to 30 degree in lengthwise and crosswise using stack lift equipment. And the stack is operated in 10~100% load.

No significant change has appeared in crosswise inclined condition and lengthwise low angle. But in lengthwise large angle tilting condition, the fuel cell performance has significantly decreased. And this performance decrease is aggravated in low load.

An active water exhaust device is applied to the stack to prevent the performance decrease. And in lengthwise large angle tilting condition, this device causes a good effect to fuel cell stack performance.

Key words : PEMFC(고분자연료전지), Fuel Cell(연료전지), Inclination(기울임), Dead-end operation(데드엔드 운전), Performance(성능)

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