작동 압력과 연료 공급 유량 변화가 고분자 전해질 연료전지 성능에 미치는 영향

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Effects of Operating Pressure and H_2/Air Mass Flow Rate on Performance of a Proton Exchange Membrane Fuel cell

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Key Words: PEM Fuel cell(고분자 전해질 연료전지), Operating Pressure(작동압력), Mass Flow Rate(유량), Serpentine Type Flow Path(사행유로), Power Density(출력밀도)

Abstract : Operating pressure and mass flow rate of H_2/air are the dominant parameters affecting the performance of PEMFC. To investigate effects of operating pressure and mass flow rate of reactants on the performance of fuel cell, the performance measurements were executed for a unit cell of PEMFC. The activate area is 100cm^2 and each separator made of graphite has a serpentine flow path. The operating pressure ranges from atmospheric pressure to 2kgf/cm^2, while mass flow rate of reactants from 0.3 and 3.5 times ideal value. As a result of this study, the operating pressure of 1kg·f/cm^2 has 27% higher performance of PEMFC than atmospheric pressure case. However, the performance for the operating pressure of 2kg·f/cm^2 is almost similar to that of 1kg·f/cm^2. The performance is improved by increasing mass flow rate of air, while increasing mass flow rate of H_2 hardly affects the performance of fuel cell.

TROI 실험에서 반응용기 구조가 증기폭발에 미치는 영향

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The Effect of the Interaction Vessel Geometry on Steam Explosions in the TROI Experiment

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Key Words: Steam Explosion(증기폭발), TROI Experiments(TROI 실험), Corium(코륨), Triggering(기폭), Void Fraction(기포율)

Abstract : The effect of the interaction vessel geometry has been studied on the occurrence of a steam explosion with a narrow interaction vessel of 30cm in diameter in the TROI experiment. Two types of corium composition such as 80 : 20 corium (UO_2 : ZrO_2) and 70 : 30 eutectic corium were used as melt. Although two tests were carried out for each composition of corium, none of the tests did not lead to steam explosions even with external triggering. Since eutectic corium led to spontaneous or triggered steam explosions in the previous test using a 60cm wide interaction vessel, it is quite probable that a geometry effect of the interaction vessel should be existing. The reason for no steam explosions in the narrow interaction vessel is probably relatively high void fraction in the vessel compared with the wide vessel.