

고체산화물 연료전지 소재공정 요소기술 개발 현황

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Current Status of SOFC Materials and Processing Core Technology

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The solid oxide fuel cell (SOFC) has attracted great deal of attention due to its high electrical efficiency, high waste-heat utilization, fuel flexibility, and application versatility. However, SOFC technology is still not matured enough to fulfill the practical requirements for commercialization. Therefore, all the research and development activities are mainly focused on a development of practically viable SOFCs with higher performance and better reliability. We were successful in fabricating high-performance anode-supported unit cells by employing hierarchically controlled multi-layered electrodes for both structural reliability and high performance. In addition, a novel composite sealing gasket made it possible to achieve excellent sealing integrity even with considerable surface irregularities in a multi-cell planar arrayed stack.

Key words : SOFC(고체산화물 연료전지), cell(단전지), stack(스택), seal(밀봉재), multi-cell planar array stack(평면집합전지)

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기술자립형 5kW 연료전지 시스템 구축을 위한 고효율 연료변환기 개발

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The development of High efficiency fuel processor for technical independence 5kW class fuel cell system

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Fuel Cell cogeneration system is a promising technology for generating electricity and heat with high efficiency of low pollutant emission. We have been developed 5kW class fuel cell cogeneration system for commercial and residential application. The fuel processor is a crucial part of producing hydrogen from the fossil fuels such as LNG and LPG. The 5kW class high efficiency fuel processor consists of steam reformer, CO shift converter, CO preferential oxidation(PrOx) reactor, burner and heat exchanger. The one-stage CO shift converter process using a metal oxide catalyst was adopted. The efficiency of 5 kW class fuel processor shows 75% based on LHV. In addition, for the purpose of continuous operation with load fluctuations in the commercial system for residential use, load change of fuel processor was tested. Efficiency of 30%, 50%, 70% and 100% load shows 75%, 75%, 73% and 72%(LHV), respectively. Also, during the load change conditions, the product gas composition was stable and the outlet CO concentration was below 5 ppm. The Fuel processor operation was carried out in residential fuel cell cogeneration system with fuel cell stack under dynamic conditions. The 5kW class fuel processor have been evaluated for long-term durability and reliability test including with improvement in optimal operation logic.

Key words : 5kW class fuel cell system(5kW급 연료전지), 5kW class Fuel processor(5kW급 연료변환기), Load change(부하변동), LNG(액화천연가스)

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