Development of 500W-class Advanced Anode-supported Flat-Tube Solid Oxide Fuel Cell Stack in KIER

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KIER has been developing the anode supported flat-tube solid oxide fuel cell for the intermediate temperature(700 ~ 800 °C) operation. Anode supported flat-tube cells have Ni/YSZ cermet anode supported tube, 8 mol.%Y_2O_3 stabilized ZrO_2(YSZ) thin electrolyte, and cathode multi-layer composed of Sr-doped $LaSrMnO_3$ (LSM), LSM-YSZ composite, and $LaSrCoFeO_3$(LSCF). The prepared anode-supported flat tubular cell was joined with ferritic stainless steel by induction brazing furnace process. Current collection for the cathode was achieved by winding Ag wire, while current collection for the anode was achieved by using Ni wire and felt. For making stack, the prepared anode-supported flat-tube cells with effective electrode area of 90 cm^2 connected in series with 12 modules, in which one module consists of two cells connected in parallel. The performance of unit cell in 3 % humidified H_2 and air at 800 °C shows maximum power density of 0.6W/cm^2. Through these experiments, we obtained basic technology of the modified anode-supported flat-tube cell and established the proprietary concept of the anode-supported flat-tube cell stack in KIER.