In situ exsolved CoFe alloy nanoparticles socketed on the Ruddlesden-Popper support for SOFC anode

박성민, 한현수, 최준일, 윤원근, 김원배†
POSTECH
(kimwb@postech.ac.kr†)

We developed a new and efficient catalyst in which exsolved CoFe alloy nanoparticles socketed on the support of the Ruddlesden-Popper structure and conducted various physicochemical analyses to investigate its applicability as an anode material of the solid oxide fuel cells (SOFCs). The catalyst was prepared by in situ annealing of perovskite-derivatives in a reducing atmosphere with a 10% H_2/N_2 gas mixture at 800 °C, which is a less rigorous condition than the typical synthesis method of Ruddlesden-Popper materials. The single cell with anode catalyst developed in this study exhibited a good electrochemical performance with a maximum power density value of 729 mW/cm^2 at 800 °C. The presence of oxygen vacancies and low synthesis temperature might be responsible for its good catalytic activity. Moreover, in situ exsovled CoFe alloy nanoparticles could provide additional chemisorption and activation sites for the H_2 electrooxidation reaction, leading to the enhanced electrochemical performance. Therefore, this Ruddlesden-Popper material with exsolved CoFe alloy nanoparticles could be a promising anode for possible use as the SOFCs.