

Electrochemical properties and OER performance enhancement by Cu substitution in NiCo₂O₄ spinel structure grown on Graphite Felt손남규, 강미숙[†]

영남대학교

(mskang@ynu.ac.kr[†])

In order to improve the electrochemical performance of the NiCo₂O₄ material, Ni ions were partially substituted with Cu²⁺ ions having excellent reducing ability. All of electrodes were fabricated by growing the Ni_{1-x}Cu_xCo₂O₄ electrode spinel-structural active materials onto the graphite felt (GF). Five types of electrodes, NiCo₂O₄/GF, Ni_{0.875}Cu_{0.125}Co₂O₄/GF, Ni_{0.75}Cu_{0.25}Co₂O₄/GF, Ni_{0.625}Cu_{0.375}Co₂O₄/GF, and Ni_{0.5}Cu_{0.5}Co₂O₄/GF, were prepared for application to the oxygen evolution reaction (OER). As Cu²⁺ ions were substituted, the electrochemical performances of the NiCo₂O₄-based structures were improved. Ni_{0.75}Cu_{0.25}Co₂O₄/GF electrode exhibited the best OER activity in a 1.0 M KOH alkaline electrolyte: the cell voltage required to reach a current density of 10 mA cm⁻² was only 1.74 V ($\eta = 509$ mV), and a low Tafel slope of 119 mV dec⁻¹ was obtained. The stability of Ni_{0.75}Cu_{0.25}Co₂O₄/GF electrode was demonstrated through 1000th repeated OER acceleration stability tests with a high faradaic efficiency of 94.3%.