Synthesis and Characterization of Cu- and Co-Doped $Bi_4V_2O_{11}$ for Intermediate-Temperature Solid Oxide Fuel Cell Electrolytes by Carbonate Coprecipitation

이진구, 박명근, 이기천, 설용건*
연세대학교
(shulyg@yonsei.ac.kr*)

Bi2MexV1-xO5.5-3x/2 (Me = Cu: 0≤x≤0.2) powders were prepared by the ammonium carbonate coprecipitation method. The crystallite structure, surface morphology, and ionic conductivity of the prepared powders and pellets were examined using X-ray diffractometry, field emission scanning electron microscopy, and an impedance analyzer, respectively. The average particle sizes of the Bi2Cu0.1V0.9O5.35 and Bi2Co0.1V0.9O5.35 powders were 10–50 nm. The tetragonal structure (γ-phase) appeared at sintering temperatures higher than 700℃ and the peak intensity increased at higher sintering temperatures. The ionic conductivities of the Bi2Cu0.1V0.9O5.35 and Bi2Co0.1V0.9O5.35 pellets sintered at 800℃ showed the highest values of 6.8╳10-2Scm-1 at 700℃ and 9.1╳10-2Scm-1 at 700℃, respectively. The optimum concentration of the Cu and Co dopants in Bi2MexV1-xO5.5-3x/2 was determined to be 0.1. The results of this study demonstrated that the ammonium carbonate coprecipitation process could be used as an economical method for the preparation of Bi2MexV1-xO5.5-3x/2 electrolytes for intermediate-temperature solid oxide fuel cells.