Study of the Carbon Infiltration into Ni-based anode for high-temperature Fuel Cell under methane

김용민*, 남석우, 윤창원
KIST
(yongminkim@kist.re.kr*)

MCFC or SOFC can generate electricity from carbon-containing fuels, composed of hydrocarbon and carbon monoxide. However, carbon deposition and the consequent infiltration easily deactivate commonly used Ni-based anodes and finally destroy the catalyst. We reported previously that electrical conductivity of the Ni-based catalyst decreases when the specimen is exposed to the atmosphere where carbon formation is thermodynamically favorable. The aforementioned phenomenon, the decrease of the conductivity was explained by the breakage of the electron conducting network composed of Ni particles by carbon infiltration. Also, the decrease rate was affected by mole fraction of methane and addition of steam. In this paper, as a succession of the previous study, the effects of mole fraction of methane and steam addition on the change of electrical conductivity of Ni-based anode as well as weight increase and microstructure are studied. Electrical conductivity of the specimen exposed to dry methane decreases with the isotropic expansion and this phenomenon was explained by the infiltration of the deposited carbon and the consequent destruction of electron-conducting network formed by contacts between nickel particles.