Title	Nanocrystalline nickel–cobalt electrocatalysts to generate hydrogen using alkaline solutions as storage fuel for the renewable energy
Author	**Mosaad Negem**, H.Nady M.M.El-Rabiei
Journal Information	**International Journal of Hydrogen Energy**
ISSN	0360-3199
Impact factor	**٤.٩٣٩ (2019)**

Abstract

Generation of hydrogen using an electrocatalyst is valuable research field for the energy conversion and storage of the renewable energies. Electroplating of nanocrystalline metals and their alloys thin film is auspicious for the conversion and storage of the energy in the form of hydrogen fuel during water electrolysis. In this work, we electroplated the nanocrystalline Ni-Co alloys of different Co% using natural compounds such as gluconate and cysteine via the galvanostatic-ultrasonication conditions. The electroplated Ni-Co alloys have been characterized using energy dispersive X-ray, X-ray diffraction and scanning electron microscopy, to determine their elemental composition, crystal lattice system and surface morphology, respectively. The morphological structure of the electroplated Ni-Co alloys varies from dense and lustrous to granular. The electroplated Ni-Co alloys arranged in the face centred cubic or hexagonal closed packaged depending on the Co%. The electroplated Ni-Co alloys arranged in the small unit cell which enhances electron transfer and boosts the rate of hydrogen reduction. The electrocatalytic activity of the electroplated Ni-Co cathodes towards hydrogen reduction reaction was investigated using cathodic polarization and electrochemical impedance spectroscopy, EIS, dipped in 1.0 M KOH solution. The electroplated Ni-50Co cathode displays the superior electrocatalytic activity and the lowest overpotential for the hydrogen evolution reaction than bulk Ni.