

W. A. Badawy, H. Nady, G.M.A. El-Hafez, Electrodeposited Zn-Ni alloys as promising catalysts for hydrogen production-Preparation, characterization and electro-catalytic activity, Journal of Alloys and Compounds 699 (2017) 1146–1156.

الملخص الانجيزى للبحث:

Nano-crystalline Zn, Ni and Zn-Ni alloys were prepared as electrodeposited layers on copper substrates. The obtained materials were characterized morphologically and chemically by XRD and scanning electron microscopy, SEM, coupled with EDAX analysis. The electrochemical properties were investigated in KOH solutions by polarization measurements, cyclic voltammetry and EIS techniques. Special emphases were subjected to the hydrogen evolution reaction, HER, on the electrodeposited materials. It was found that the electrodeposited Zn-Ni alloy cathodes possess high catalytic activity for hydrogen evolution in alkaline solutions, which was found to depend on the microstructure and surface morphology of the deposited layer. The high electro-catalytic activity was attributed to the increased surface area of the deposited layers and the number of active sites therein. The increase of the Ni content up to ≈ 50 at% in the deposited cathode leads to a decrease in the hydrogen evolution overpotential. The highest rate of hydrogen evolution was recorded on Zn-Ni deposits with ≈ 50 at% Ni. The electrochemical polarization measurements were confirmed by impedance experiments, and the experimental impedance data were fitted to theoretical data according to a proposed model for the electrode/electrolyte interface.