البحث الرابع

Novel Ni-Cr-based alloys as hydrogen fuel sources through alkaline water electrolytes.

Abstract

The hydrogen evolution reaction (HER) from water splitting is particularly attractive for
green and clean power sources, but it remains a significant challenging issue. For the successful application of hydrogen-based renewable energy such as fuel cells, highly active
and cost-saving metallic electro-catalysts for H2 fuel production are vital. The goal of this
study is to look into the effects of alloyed molybdenum, chromium, and iron on the electrocatalytic activity of Ni-based alloys in an alkaline electrolyte for HER. SEM with an energy dispersive spectroscopy (EDX) unit was used to determine the chemical composition
of alloys. The electrocatalytic effectiveness of the explored cathodes on HER was evaluated
in alkaline solutions employing open circuit potential measurements, linear polarization
and electrochemical impedance spectroscopy (EIS). The impact of KOH concentrations on
HER rate was also investigated. Tafel curves were used to calculate the HER's kinetic parameters, and the mechanisms of the HER were discovered. EIS observations at HER's
cathodic potential have been explored and compared to a theoretical model. The Ni-Cr-Mo-Fe alloy has a low over-potential of 232 mV @ 10 mA cm2 and a Tafel slope of
57.7 mV dec1 in 1.0 M KOH media, resulting in an efficient HER. These findings indicate

that the addition of Mo and Fe to Ni-Cr improves the catalytic efficiency of HER significantly. The Ni-Cr-Mo-Fe cathode is an economical and practical material for alkaline HER production.

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