

عنوان مقاله:

Effect of temperature on kinetics of the hydrogen evolution reaction on Ni-P-C cathodes in alkaline solution

محل انتشار:

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خلاصه مقاله:

The kinetics of hydrogen evolution reaction (HER) was studied in 1M NaOH solution at various temperatures (298 to 358 K) on Ni-P-C (composite electrodes). The electrochemical efficiency of the electrodes has been evaluated on the basis of electrochemical data obtained from the steady-state polarization Tafel curves, electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV) in 1M NaOH solution at 298, 323, 348 and 358 K. The HER rate constants were estimated using Tafel-impedance data assuming the Volmer-Heyrovský path at various temperatures. The k_2 values were smaller than those obtained for hydrogen adsorption rate constants (k_1) at all temperatures. The average values of k_2 , which characterize the apparent activity of the electrodes for the HER on the Ni-P-C cathodes, are increased by factors of 4.0, 3.7 and 3.5 from temperatures of 298 to 323 K, 323 to 348 K and 348 to 358 K, respectively. Microstructure and composition of the investigated electrodes were studied using scanning electron microscopy (SEM) and X-ray diffraction (XRD). The kinetic parameters showed that the temperature plays an important role on increase of the activities of Ni-P-C composite cathodes toward the HER

کلمات کلیدی:

Hydrogen evolution reaction (HER), Ni-P-C, Electrochemical impedance spectroscopy, Electrocatalytic activity, Composite electrodes

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