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ABSTRACT BOOK

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ORAL ABSTRACTS

[Abstract:0044]

Preparation of MoPd Deposited Carbon Felt Electrodes and Investigation of their Electrochemical Activity for Hydrogen Production

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Surface of carbon felt (C) electrode was activated by electrochemical deposition of Mo (C/Mo). Then, a small amount of Pd was electrochemically deposited over this modified surface (C/Mo-Pd). The prepared electrodes were characterized using scanning electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDX). The electrodes were tested as cathode in 1 M KOH solution and their hydrogen evolution activity was evaluated. Fort his aim, cathodic current-potential curves and electrochemical impedance spectroscopy techniques were used. SEM studies showed that Mo-Pd modified electrodes have large surface area. Enhancement of surface area increases the rate of hydrogen evolution reaction. EDX analysis indicated that Pd and Mo metals almost homogenously distribute over the surface. This is a very important advantage since the hydrogen evolution reaction takes place homogenously over the catalyst surface. Electrochemical data showed that the modification of C surface with a thin Mo film increase its electrochemical activity. However, the deposition of Pd over the surface of C/Mo enhances the rate of this reaction more and more. The enhanced activity of the PdMo-modified electrocatalyst was related to a possible synergistic effect between the metals and enhanced real surface area of the electrode.

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Keywords: Carbon felt, palladium, molybdenum, electrolysis, hydrogen production

[Abstract:0045]

Electrochemical Preparation and Characterization of NiPd Deposited Ni-modified Carbon Felt Electrodes and Their Application for Hydrogen Evolution Reaction in Alkaline Solution

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Electrocatalysis is a surface process. Therefore, the supporting materials with high surface area are essential to prepare modified electrocatalysts. Because carbon felt (C) has low cost, good electrical conductivity and high surface area, it could be used as supporting material for preparation of catalytic electrodes. The use of such electrodes provides important advantages. However, pure C has low electrochemical activity. To overcome this disadvantage, surface of the C electrode was electrochemically modified with a thin Ni film (1 g Ni/1 g C). It is well-known that Ni has relatively high activity for the hydrogen evolution reaction. But, literature survey showed that pure Ni losses its activity with time during the electrolysis. In order to overcome this disadvantage, low amounts of Ni and Pd metals with various metal rations were co-deposited over the previously thin Ni film-modified C surface (C/Ni-NiPd). High price and low abundance of Pd limit its wider usage for industrial applications. Co-deposition of these two metals at various metal ratios provides great advantages and enhances electrochemical activity of the C/Ni-NiPd electrodes. The surface structure of the electrodes was investigated by scanning electron microscopy (SEM). Their surface composition and the distribution of the elements over the catalyst surface were analyzed using energy dispersive X-ray spectroscopy (EDX). The prepared electrodes were tested as cathode in 1 M KOH solution and their electrochemical activities for hydrogen evolution reaction was investigated with the help of various electrochemical techniques. SEM and EDX analysis showed that Ni and Pd metals almost homogenously distributed over the surface and the surface has large surface area. Electrochemical data indicated that co-deposition of Ni and Pd over the Ni-modified C surface enhances hydrogen evolution reaction. The rate of this reaction depends on metallic ratios of deposited Ni and Pd.

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Keywords: Electrochemical metal deposition, electrolysis, electrochemical hydrogen production NiPd-modified electrode.