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Study the nickel concentration effect in electro deposition solution on performance of nano Pt-Ni/Ni electrodeposited electro catalyst for methanol oxidation reaction in alkaline media

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Nowadays, methanol fuel cell systems have been attracted research activities to investigate for facilitating methanol oxidation reaction. One of activities is concentrated on improving electro catalysts. Platinum is widely used as an electro catalyst. Nickel is also due to cost and availability, as well as good catalytic activity can be used as an electro catalyst. In the present study, the simultaneous presence of nickel and platinum as the electro catalyst for methanol oxidation reaction was investigated. First for fabricating of electrodes, nickel particles was deposited on carbon paper by cyclic voltammetry (potential range: -0.850 V to 0.3 V vs. Ag/AgCl, scan rate 50 mV s^{-1}, cycle number 30, room temperature) as the electrochemical deposition method in three electrode half-cell system. Then, platinum and nickel particles simultaneously was deposited on prepared nickel layer by cyclic voltammetry (potential range: -0.850 V to 0.650 V vs. Ag/AgCl, scan rate 50 mV s^{-1}, cycle number 30, room temperature). At electro deposition processes the nickel concentration was varied 10 up to 60 mM and platinum concentration was fixed at 1 mM. The fabricated electrode was investigated for methanol oxidation reaction in three electrode half-cell system by the electrochemical methods like as linear sweep voltammetry, cyclic voltammetry and impedance spectroscopy. Accordance SEM results, the electro catalysts are formed as nanostructure on carbon paper. The fabricated electrode has been shown good electro catalytic activity for methanol oxidation reaction in alkaline media. Based on electrochemical analysis of prepared electro catalysts, the optimum concentration of nickel in electro deposition solution was determined at 50 mM.

Biography

Rasol Abdullah Mirzaie received PhD degree in Physical Chemistry from Tarbiat Modares University in 2003. He joined Shahid Rajaee Teacher Training University and currently he is the Head of the Faculty of Science. He is the Head of the Fuel Cell Research Laboratory of Shahid Rajaee Teacher Training University (Tehran, Iran). His research interests include Electrochemistry, Gas Diffusion Electrodes, Fuel Cell and Batteries and Chemistry Education.

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