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Effect of palladium on gold in core-shell catalyst for electrooxidation of ethanol in alkaline medium

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Abstract

Author keywords

Funding details

Abstract

In this paper the effect of small amounts of palladium deposited on gold nanoparticles supported on Vulcan XC-72 carbon (core-shell structure denoted Au@Pd/C) is studied. Different nominal atomic compositional ratios of Au@Pd_x maintaining fixed gold nuclei and varying the amount of palladium (x = 0.10; 0.80 and 1.60) were synthesized via seed growth method for the ethanol oxidation reaction in alkaline medium. UV-Vis spectrometric, X-ray powder diffraction, X-ray energy dispersive spectroscopy, transmission electron microscopy and electrochemical measurements were performed for the characterization of these catalysts. Electrocatalytic activity toward ethanol oxidation on Au@Pd/C catalysts were investigated by cyclic voltammetry and chronoamperometry showed that Au@Pd_{0.10}/C electrocatalyst has the highest current density and low onset potential for ethanol oxidation reaction in alkaline medium. In-situ Fourier transform infrared spectroscopy measurements demonstrated that acetate is the main product of ethanol oxidation and CO₂ can be slightest observed, the latter could be visualized in greater quantity on catalyst Au@Pd_{0.80}/C catalyst. © 2021 Hydrogen Energy Publications LLC

Author keywords

Core-shell nanoparticles; Electrocatalysis; Ethanol oxidation reaction (EOR); Gold; In-situ FTIR; Palladium

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