

Meeting Abstracts

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Effect of Pd/C, Au/C and PdAu/C Synthesized Using Ionic Liquids in the Electro-Oxidation of Crude Glycerol in Alkaline Media

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Abstract

Crude glycerol as waste from the synthesis of biodiesel has been used in fuel cells to obtain electrical energy using mainly Pt-based electrocatalysts. In the present work, nanoparticles of Pd/C, Au/C and PdAu/C were synthesized and tested in the electro-oxidation reaction of crude glycerol. The synthesized materials were characterized by X-ray diffraction (XRD), X-ray fluorescence (XRF), thermogravimetric analysis (TGA), high-resolution transmission electron microscopy (HR-TEM) and cyclic voltammetry. On the other hand, crude glycerol was prepared by transesterification reaction in alkaline medium and temperature with edible vegetable oil, KOH and methanol. In addition, Pd, Au and PdAu were synthesized and supported on Vulcan® carbon via green chemistry using the 2-hydroxyethylammonium formate ionic liquid. The micrographs obtained by HR-TEM revealed the presence of hemispherical particles with sizes between 8 and 30 nm. The electrocatalytic evaluation performed by cyclic voltammetry at 0.1, 0.5, 1, 1.5 and 2 M in alkaline medium of glycerol and crude glycerol. Raman spectrum of crude glycerol showed bands of methanol, soaps and glycerol, and the Raman spectrum of purified glycerol exhibited the characteristic signals of analytical glycerol. The maximum current density peak (55 mA mg^{-1}) was obtained employing PdAu/C at 2 M glycerol. On the other hand, for 2 M crude glycerol, PdAu/C showed two maximum current densities peaks at 0.18 and 0.44 V vs NHE, associated to the oxidation of methanol and glycerol from crude glycerol. In summary, PdAu/C can be used as an alternative to Pt-based electrocatalysts for the efficient usage of crude glycerol as fuel for energy conversion applications.

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May be of interest

The Effect of Ni in the Pt-Ni Electrocatalyst for the Glycerol Electro-Oxidation Reaction

Isaac Velázquez-Hernández et al., ECS Meeting Abstracts

Selective electrocatalysts developed to boost direct methanol fuel cell performance

Chinese Academy of Sciences Headquarters, ScienceDaily

First insights of the PdPt/C and PdPtRu/C Electrocatalysts Towards Glycerol Electro-Oxidation in Alkaline Medium

Amanda Cristina Garcia et al., ECS Meeting Abstracts

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Nan Jia et al., Nano Research

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Hongsheng Fan et al., Nano Research

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Jose Antonio Maya-Cornejo et al.,
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