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X SBPMat

Gramado (RS), de 25 a 29 de setembro de 2011

Área: Nanostructured Functional Materials for Advanced Energy and Environmental Applications

Session SP1 - Sessão de Posters 1

Session: dia 26 of 16:00 to 18:00
Room name: RP – Posters room

4EJF
SP1–F23
16:00hs

Oxidation of Small Organics Molecules Mixtures on $PtCeO_2/C$ (Poster)

Authors: Rodrigo Fernando Brambila de Souza[1], Júlio César Martins da Silva, Melina D'villa-Silva, Fernando Carmona Simões, Almir Oliveira Neto, Mauro C Santos; [1]Universidade Federal do Abc

Oxidation of Small Organics Molecules Mixtures on PtCeO2/C

R.F.B De Souza1, J.C.M. Silva1, M. D'Villa-Silva1, F.C Simões1, A.O. Neto2, M.C. Santos1

1LEMN - Centro de Ciências Naturais e Humanas - UFABC, Santo André – S.P - Brasil;

2Instituto de Pesquisas Energéticas e Nucleares - IPEN, CNEN/SP, São Paulo - SP, Brasil.

Direct Liquid Fuel Cells are promising energy sources, however still are many parameterswould be optimized to commercial use, to obtain high power densities. For this reason, new electrocatalysts are necessary and the incorporation of metals such as Ce on Pt-based catalysts, to increase the catalytic activity has been shown in the literature [1]. Although Pt based materials leading to great advances in the increasing of power densities obtained, it has been studied alternative fuels besides methanol or ethanol [2]. There are no studies about oxidation of a fuel mixture using methanol + ethanol. This work describes the oxidation of a mixture containing methanol and ethanol on PtCeO2/C for utilization in fuel cell devices. The Pt3Ce1/C was prepared by polymeric precursors method [1] where the metal load used were 20 % on carbon. /The material prepared were characterized by X-ray diffraction (XRD), high resolution transmission electron microscopy (HRTEM), and the catalytic activity for the oxidation of a mixture (methanol + ethanol) on both PtCe/C and Pt/C ETEK was evaluated by cyclic voltammetry and chronoamperommetry. To gain some information about the intermediates and products of the reactions the electro oxidation of the fuel mixture was investigated by "in situ" FTIR spectroscopy. The XRD data shows that the Pt-CeO2/C catalysts are composed of nanosized polycrystalline non-alloyed deposits, from which reflections corresponding to the fcc (Pt) and fluorite (CeO2) structures were clearly observed. The mean crystallite sizes calculated from XRD data revealed that values close to 3 nm and 7 nm, respectively for CeO2 and Pt. These values were confirmed using TEM images. Chronoamperommetry experiments for methanol, ethanol and a solution of the both alcohols in acidic media (HClO4 0.5 molL-1 + alcohol 1 mol L-1) after 30 min at E = 0.5 V, obtained for ethanol 1.7 mA mgPt -1 on Pt/C and 3.4 mA mgPt -1on PtCeO2, while for methanol the currents densities were lower. When tested with the fuel mixture in a ratio of 1:1, the current densities increases were 25% on Pt and 60% on PtCeO2/C compared with current densities obtained for ethanol. FTIR data show that the observed behavior could be explained by the favoring of the production of carboxylic compounds in PtCeO2/C. These species are almost not existent in Pt/C material.

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Keywords: Direct Alcohol Fuel Cells, PtCeO2/C, PEMFC, ATR-FTIR *"in-situ"*

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souza.rfb@gmail.com