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Highly robust and increasing and robust adaptation level for the forecasting process. This work is part of a major project for developing a photovoltaic systems manager.

Keywords: Photovoltaic systems, solar energy, energy efficiency, battery, forecast system.



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Pt-RARE EARTH ELECTROCATALYSTS FOR PROTON EXCHANGE MEMBRANE FUEL CELL



E.G. Franco<sup>1, 2</sup>  
T.A.B. Santoro  
S.R. Brandão  
A.O. Neto → OLIVEIRA NETO, A.  
E.V. Spinacé  
E. Aricó → ARICÓ, E. M.  
M. Linardi

<sup>1</sup>Instituto de Pesquisa Energéticas e Nucleares IPEN/CNEN  
CCTM - Laboratório de Células a Combustível PEM  
Av. Prof. Lineu Prestes 2242, Cidade Universitária, São Paulo - SP, Brasil.  
Phone: (5511) 3816-9192/Fax (5511) 3816-9370  
egfranco@ipen.br; mlinardi@net.ipen.br  
<sup>2</sup>UNIBAN - Universidade Bandeirante de São Paulo

Electrocatalysts containing PtSm, PtTb and PtDy nanoparticles supported on high surface area carbon were synthesized by the colloid method developed by Bönemann and were characterized by Energy Dispersive Analysis (EDS), Transmission Electron Microscopy (TEM) and Cyclic Voltammetry (CV). The electrocatalysts were tested for methanol and ethanol electro-oxidation using the thin porous coating electrode technique. The results for methanol and ethanol electro-oxidation show that all the binary electrocatalysts investigated increase the oxidation current values when compared to pure Pt and the best results were obtained using a PtDy electrocatalyst.

Keywords: electrocatalytic, fuel cell, ethanol, methanol, rare earth elements

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OPTIMIZATION STUDIES ON PEM FUEL CELL USING RESPONSE SURFACE METHODOLOGY

T.A.B. Santoro  
A.M. Saliba-Silva  
E.G. Franco  
S.R. Brandão  
S.A.A. Bueno  
M. Linardi

Instituto de Pesquisa Energéticas e Nucleares IPEN/CNEN  
CCTM - Laboratório de Células a Combustível PEM  
Av. Prof. Lineu Prestes 2242, Cidade Universitária, São Paulo - SP, Brasil.  
Phone: (5511) 3816-9192/Fax (5511) 3816-9370  
tsantoro@ipen.br; mlinardi@net.ipen.br; egfranco@baitaca.ipen.br

Optimization of fuel cells operation is very desirable from economical point of view, since the energy production by fuel cells should be maximized. To obtain an optimized fuel cell performance under various experimental conditions, electrochemical impedance spectroscopy (EIS) was used under dynamic load in order to evaluate the resistance of Proton Exchange Membrane Fuel Cell (PEMFC) under practical operation conditions. The experiments were carried out using a PEMFC unit assembled with a commercial E-TEK MEA (Membrane Electrode Assembly). The results were analyzed by the statistical methodology of response surface (star central composite) optimizing the process operational parameters at PEMFC. The chosen operational parameters to evaluate the PEMFC process were: working temperature at the cell unit, inlet gas flow and humidifying temperature, keeping the working current in the range of 2.5 A. An important dependent variable, measured during the trials, was fuel cell voltage, collected at steady state, after achieving the EIS spectrum. The voltage result, following Ohm's Law, is an indirect measure of total PEMFC resistance against the occurring electrochemical reactions developed inside the fuel cell, since the current was kept constant during the experiments. The low frequency impedance module, at Bode Diagram, is an indicative of PEMFC total resistance. To get some representation of chemical kinetics at PEMFC, the inflection frequency and inflection angle at Bode diagram phase angle curve were also taken as dependent variables. The data were treated electronically by statistical software and the response surfaces were obtained, showing optimized results for an specific MEA.