

Evaluation of Pt /CeO₂ and Pt/Al₂O₃ as Electrocatalysts for the Ethanol Oxidation Reaction

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ABSTRACT

Fuel cells have attracted as a promising power-generation technology that converts chemical energy directly and with high efficiency into electricity. It has been categorized on the basis of electrolytes used, cell operating temperature, etc. Among the various types of fuel cells, direct alcohol fuel cell (DAFC) is a promising technology for portable electronic devices and electric vehicles. Platinum (Pt) is used as the most active electrocatalyst to achieve faster kinetics of the anodic reaction during electro-oxidation of alcohols (methanol, ethanol). Carbon supported platinum is commonly used as anode catalyst in low temperature fuel cells. Various metal oxides like TiO₂, CeO₂, etc. in combination with Vulcan XC-72 have been exploited for optimized dispersion of Pt and electro-oxidation of ethanol and exhibit enhanced tolerance to CO poisoning. In the present work a one-step microwave synthesis has been applied for obtaining CeO₂ and Al₂O₃ nanopowders. The samples were characterized by X-ray diffraction, differential thermal analysis/thermogravimetric analysis, transmission electron microscopy, Cyclic voltammetry. The electrocatalytic activity of Pt/CeO₂ and Pt/Al₂O₃, catalyst was investigated for the ethanol electro-oxidation at different concentrations in alkaline media. The results obtained were compared with those of Pt/C.

