Study on Pt(Sn)/TiO₂-C as Anodic Catalysts for Direct Ethanol Fuel Cell

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This research concentrated on the use of a modified Pt/C anodic catalyst with titania (TiO₂) and tin (Sn) to enhance the utilization and efficiency of a direct ethanol fuel cell. The TiO₂-doped active carbon support (TiO₂-C) was prepared by the impregnation method. Then, using platinum chloride (PtCl₄) and tin (II) chloride dihydrate (SnCl₂·2H₂O) as precursors, a Pt(Sn)/TiO₂-C anodic catalyst was fabricated by the formic acid reduction method. Further, a series of Pt(Sn)/TiO₂-C anodic catalysts were coated on carbon paper as working electrodes. Performance evaluations were executed by cyclic voltammetry (CV) and chronoamperometry for the ethanol electro-oxidation, and CO stripping voltammetry was performed in an acid solution at room temperature. Characterization of the series Pt(Sn)/TiO₂-C catalysts displayed that all catalysts revealed uniform dispersion of platinum with a diameter around 3 - 6 nm and a high electrochemically active surface area. Apparently, the doping of TiO₂ and Sn could disperse the active species, and lower the potential of the ethanol electro-oxidation to improve the ethanol oxidation reaction (EOR). In addition, the inclusion of TiO₂ and Sn could promote CO stripping by the surface active OH_{ad} sites and through the formation of a PtSn₂ alloy at a lower oxidizing potential.

Keywords: Pt(Sn)/TiO₂-C anodic catalyst; Electro-oxidation; Cyclic voltammetry.

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