Preparation of High Catalytic Activity and Low Platinum Loading Catalyst for Methanol Oxidation

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In this paper, low platinum loading catalysts for methanol oxidation was fabricated by impregnation and reduction of inductively coupled plasma (ICP). The Pt-based supported on RGO catalysts (Pt/RGO-2) was finally obtained, which was of well dispersion, uniform sizes distribution, a stable adhesion of Pt nanoparticles with GO and suitable platinum crystal structure. Compared with commercial Pt/C catalysts, the catalysts Pt/RGO-2 was exhibited an improved and stable electrocatalytic activity and good tolerance towards CO poisoning for methanol oxidation via cyclic voltammetry (CV) and chronoamperometry in acid medium. The electrochemically active surface area (ESCA) of the achieved catalysts reached to $1026 \text{ cm}^2 \cdot \text{mg}^{-1}$, attributing to the large surface area of graphene for Pt nanoparticles anchoring. The forward peak anodic current density (I_f) and the backward peak anodic current density (I_b) of Pt/RGO-2 were measured to be $59 \text{ mA} \cdot \text{mg}^{-1}$ and $54 \text{ mA} \cdot \text{mg}^{-1}$, respectively. The ratio of the forward current to the backward current (I_f/I_b) was calculated to be 1.09.

Keywords: Pt-based catalyst; Graphene; Electrocatalyst; Methanol oxidation reaction

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