Preparation of Pt-Pd/PANI/Graphene Nanosheets Composites as Electrocatalysts for Direct Methanol Fuel Cell

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The synthesis of noble metal nanoparticle with controlled shapes is an attractive goal in developing highly active catalysts. However, constructing high-quality noble metallic nanocatalysts with good electrocatalytic activity remains a huge challenge to date. In this research work, the high-quality polyaniline functionalized graphene nanosheets (PANI/GNS) were prepared by an interfacial polymerization method. The abundant -NH₂ groups onto the surface of resulted PANI/GNS nanocomposites, and can be used as active site for growing high load rate of Pd nanoparticles (NPs). Subsequently, Pt NPs were successfully deposited on the Pd surface formed Pt-Pd/PANI/graphene nanosheets (Pt-Pd/PANI/GNS) composites. Interestingly, the shape of Pt-Pd bimetallic can be effectively controlled by simply changing the reaction parameters. The shape and structure of nanocatalysts were characterized by X-ray diffraction (XRD) and transmission electron microscopy (TEM). The electrocatalytic properties of nanocomposites were characterized by cyclic voltammetry (CV). The TEM images show that the Pt-Pd nanoflowers were successfully decorated onto the surface of PANI/GNS nanocomposites. The electrocatalytic properties for dioxygen and methanol of prepared Pt-Pd/PANI/GNS nanocatalyst were investigated. The electrochemical results show that the nanocatalysts exhibit higher electrocatalytic activity for methanol oxidation and dioxygen reduction.

Keywords: Graphene; Polyaniline; Pd-Pt Bimetallic; Direct Methanol Fuel Cell

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