Preparation and electrochemical property of ionic liquid modified graphene supported Pt nanocomposites

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Direct methanol fuel cells (DMFCs) have been identified as promising energy converters for a variety of portable applications [1]. However, the crossover of methanol from the anode to the cathode leads to a “mixed potential” effect on the cathode side and decreases the fuel efficiency. To solve this problem, some other intermediates or modifications have to be introduced [2-4].

Ionic liquid (IL), an amphoteric ion commonly used as protecting agent to stabilize metal nanoparticles, can also the formation of building blocks in assembly [5]. The Pt nanocomposites were compared between pristine graphene oxide supported Pt nanocomposite and a modified graphene oxide supported Pt nanocomposite. The Pt nanocomposites were synthesized by NaBH4 reduction and a modified graphene oxide was prepared by Ionic liquid as modifier agent. The morphological properties of Pt nanocomposites were investigated by transmission electron microscopy (TEM) and X-ray diffraction (XRD), respectively. The electrochemical properties of Pt nanocomposites were confirmed by cyclic voltammetries (CVs). The fundamental electrochemical test results indicated that the electrocatalytic activities of a modified graphene supported Pt nanocomposites were better than pristine graphene oxide supported Pt nanocomposite, which was attributed to the surface area increase of the graphene supports by ionic liquid and the facile ion transfer. Simple approach was used to synthesize uniform Pt nanoparticles on Ionic liquid-assisted graphene for a methanol oxidation. All results indicated that the Pt/IL-reduced graphene oxide (RGO) is a more promising catalyst for fuel cell applications.

Fig. 1 Schematic representation for a preparation of Pt nanocomposites

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References