

论文

## SnO<sub>2</sub>-TiO<sub>2</sub>薄膜载体对Au-Pt纳米颗粒电化学性能的影响

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摘要:

采用真空镀膜法在玻碳(GC)电极表面修饰SnO<sub>2</sub>-TiO<sub>2</sub>薄膜, 在SnO<sub>2</sub>-TiO<sub>2</sub>/GC复合电极表面组装Au-Pt双金属纳米颗粒, 制得Au-Pt/SnO<sub>2</sub>-TiO<sub>2</sub>/GC复合电极. 通过循环伏安法(CV)研究了SnO<sub>2</sub>-TiO<sub>2</sub>薄膜载体对Au-Pt双金属纳米颗粒电化学性能的影响; 采用扫描电镜(SEM)及X射线光电子能谱(XPS)对Au-Pt在SnO<sub>2</sub>-TiO<sub>2</sub>薄膜沉积的形貌及结构进行了表征. 研究表明, 10 nm的Au-Pt双金属纳米颗粒均匀地组装于SnO<sub>2</sub>-TiO<sub>2</sub>薄膜表面; SnO<sub>2</sub>-TiO<sub>2</sub>薄膜载体改善了复合电极抗CO中毒能力; Au-Pt双金属合金的形成提高了Pt对甲醇氧化的电催化能力, SnO<sub>2</sub>-TiO<sub>2</sub>薄膜载体又使Pt纳米粒子d空轨道增多, 提高了Au-Pt双金属纳米颗粒的稳定性和催化性能.

关键词: Au-Pt纳米颗粒 SnO<sub>2</sub>-TiO<sub>2</sub>薄膜 抗CO中毒 甲醇氧化

## Effect of SnO<sub>2</sub>-TiO<sub>2</sub> Film Support on Electrocatalytic Properties of Au-Pt Nanoparticles

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Abstract:

SnO<sub>2</sub>-TiO<sub>2</sub> thin films were deposited on the activated glassy carbon electrodes by vacuum coating method. Au-Pt/SnO<sub>2</sub>-TiO<sub>2</sub>/GC composite electrode was prepared by reducing H<sub>2</sub>AuCl<sub>4</sub> and H<sub>2</sub>PtCl<sub>6</sub> mixture solution and sediment Au-Pt bimetallic nanoparticles successively on the SnO<sub>2</sub>-TiO<sub>2</sub>/GC. The effect of SnO<sub>2</sub>-TiO<sub>2</sub> film support on the electrocatalytic properties of Au-Pt nanoparticles was characterized *via* cyclic voltogramme method. The morphological and structural properties of Au-Pt nanoparticles self-assembled on SnO<sub>2</sub>-TiO<sub>2</sub> film were characterized *via* Scanning Electron Microscope and X-ray Photoelectron Spectroscopy. The results show that the compact and uniformed 10 nm Au-Pt nanoparticles were self-assembled on SnO<sub>2</sub>-TiO<sub>2</sub> film. The ability of anti-CO poisoning was enhanced with the function of SnO<sub>2</sub>-TiO<sub>2</sub> support. The form of Au-Pt alloy enhanced the electrocatalytic oxidation of methanol in acidic system. Furthermore, the increase of d vacancy with the function of SnO<sub>2</sub>-TiO<sub>2</sub> support improved the stability and catalytic property of Au-Pt bimetallic nanoparticles.

Keywords: Au-Pt nanoparticles SnO<sub>2</sub>-TiO<sub>2</sub> film Anti-CO poisoning Oxidation of methanol

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