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研究论文

单壁碳纳米管负载Pt基二元金属催化剂对甲醇和乙醇氧化的电催化性能研究

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摘要: 用单壁碳纳米管(SWCNT)作为载体制备得到Pt, Pt--Fe, Pt--Co和Pt--Ni催化剂, 并用循环伏安法和电化学阻抗谱法研究各催化剂对甲醇和乙醇氧化的电催化性能。对于甲醇和乙醇的氧化, Pt--Fe/SWCNT, Pt--Co/SWCNT和Pt--Ni/SWCNT电催化活性依次增强, 抗中毒性能依次减弱。与Pt/SWCNT催化剂相比, Pt--Ni/SWCNT对甲醇氧化的电催化性能更强, 是很好的直接甲醇燃料电池催化剂材料; 而对于乙醇的氧化, Pt/SWCNT具有更高的电催化性能。

关键词: 无机非金属材料 燃料电池 甲醇 乙醇 电催化性能 单壁碳纳米管 Pt基催化剂

Research on Electrocatalytic Activity of Carbon Nanotube-Supported Pt-bimetallic Nanoparticles for Methanol and Ethanol Oxidations

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Abstract: Pt, Pt-Fe, Pt-Co, and Pt-Ni nanoparticles were synthesized on single-walled carbon nanotubes (SWCNT), and their effects on electrocatalytic activity for methanol and ethanol oxidations were investigated using cyclic voltammetry and electrochemical impedance spectroscopy. Followed by the order of Pt-Fe/SWCNT, Pt-Co/SWCNT and Pt-Ni/SWCNT, the catalysts demonstrate better electrocatalytic activities for both methanol and ethanol oxidations, but less tolerance to CO poisoning. In comparison to Pt/SWCNT, Pt-Ni/SWCNT exhibits better catalytic characteristics for methanol oxidation, and Pt-Ni/SWCNT could be a desirable catalyst candidate for direct methanol fuel cells. However, for ethanol oxidation, Pt/SWCNT has better catalytic characteristics than Pt-Ni/SWCNT.

Keywords: inorganic non-metallic materials fuel cell methanol ethanol electrocatalytic activity single-walled carbon nanotube Pt-based catalyst

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