燃料化学学报
JOURNAL OF FUEL CHEMISTRY AND TECHNOLOGY
ISSN 0253-2409
CN 14-1140/TQ

燃料化学学报 » 2014, Vol. 42 » Issue (06): 763-768 DOI:

新型碳纤维负载直接乙醇燃料电池Pt-SnO_2阳极催化剂的性能研究

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Performance of carbon fiber supported Pt-SnO_2 anode catalyst for direct ethanol fuel cell

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摘要 采用静电纺丝技术制备了碳纤维基纳米Pt-SnO_2阳极催化剂（Pt/Sn原子比为3）。通过X射线衍射（XRD）、红外光谱（FT-IR）、扫描电子显微镜（SEM）等技术对该催化剂进行了表征，并采用循环伏安法对其在乙醇燃料电池中的阳极催化活性进行了评价。结果表明，纳米Pt-SnO_2催化剂均匀地分散在碳纤维骨架上；随着烧结温度的升高，碳纤维载体的致密度越高、导电性能越好。电催化性能测试表明，烧结温度为800 ℃时催化剂的峰电流密度最大，达到0.11 A/cm^2，抗中毒能力也最强。单电池的发电性能表明，在一定的乙醇浓度下，1.0 mL/min进样流速具有最优的发电效率。

关键词： 直接乙醇燃料电池 静电纺丝 碳纤维 Pt-SnO_2 阳极催化剂

Abstract: Nano Pt-SnO_2 anode catalyst (with a Pt/Sn atomic ratio of 3) supported on carbon fiber was synthesized via electrospinning technology. The catalyst was characterized by X-ray diffraction (XRD), Fourier transform infrared (FT-IR) and scanning electron microscopy (SEM); its activity for ethanol oxidation as an anode in direct ethanol fuel cell was evaluated through cyclic voltammogram (CV). The results showed that nano Pt-SnO_2 catalyst is uniformly scattered around the skeleton of vesicular carbon fiber. The carbon fiber exhibits higher density, better conductive performance with the increase of sintering temperature. The electrocatalytic test results indicated that at a sintering temperature of 800 ℃, the catalyst exhibits the best peak current density (0.11 A/cm^2) and the strongest tolerance to CO. Single cell power performance test suggests that highest power generation efficiency can be achieved with an injection velocity of 1.0 mL/min with proper ethanol concentration.

Key words: direct ethanol fuel cell electrospinning carbon fiber Pt-SnO_2 anode catalyst

收稿日期: 2013-12-19;

基金资助:

江苏省自然科学基金（BK2007704）。

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王旭红,朱慧,黄金山等. 新型碳纤维负载直接乙醇燃料电池Pt-SnO_2阳极催化剂的性能研究[J]. 燃料化学学报, 2014, 42(06): 763-768.

WANG Xu-hong,ZHU Hui,Huang Jin-shan et al. Performance of carbon fiber supported Pt-SnO_2 anode catalyst for direct ethanol fuel cell[J]. J Fuel Chem Technol, 2014, 42(06): 763-768.

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