

研究论文

反胶束法制备直接甲醇燃料电池Pt-Sn/C催化剂及其表征

白玉霞, 吴建军, 邱新平\*, 王建设, 朱文涛, 陈立泉

(<sup>1</sup>清华大学化学系 有机光电子与分子工程教育部重点实验室 北京 100084)

(<sup>2</sup>石家庄学院化学系 石家庄 050801)

收稿日期 2005-3-3 修回日期 2005-11-28 网络版发布日期 接受日期

**摘要** 在水/AOT/环己烷反胶束体系中, 制备了Pt-Sn/C催化剂, 研究了不同 $\omega$  (反胶束溶液中水与表面活性剂的质量之比)值对Pt-Sn粒径的影响. 并采用TEM, XRD, XPS, 循环伏安等技术对其进行表征. TEM结果表明合成的Pt-Sn纳米颗粒为球形, 在碳载体表面均匀分布, 粒径分布窄, 平均粒径为2.7 nm. Pt-Sn颗粒尺寸随着 $\omega$ 的增加而增大.

XRD结果表明该催化剂中Pt具有面心立方结构且没有与Sn形成合金. XPS结果表明在该催化剂中, Pt主要以零价态存在. 在甲醇溶液中的循环伏安扫描结果表明, 甲醇氧化峰电位和峰电流随着 $\omega$ 的增加而减小, 说明反胶束方法可以通过控制颗粒尺寸, 从而影响催化剂的电氧化活性. 相对于商用Pt-Ru/Vulcan XC-72 (20 wt%, E-TEK公司), 该催化剂具有较低的峰电势以及较高的 $I_f/I_b$

(循环伏安曲线中正向扫描峰电流与反向扫描峰电流的比值), 这表明用此方法制备的Pt-Sn/C催化剂具有较好的抗中毒能力.

**关键词** [反胶束法](#) [催化剂](#) [Pt-Sn/C](#) [直接甲醇燃料电池](#) [甲醇电化学氧化](#)

分类号

**Preparation and Performance of Carbon Supported Platinum-Tin Catalyst for Direct Methanol Fuel Cell by Reverse Micelle Method**

BAI Yu-Xia, WU Jian-Jun, QIU Xin-Ping\*, WANG Jian-She, ZHU Wen-Tao, CHEN Li-Quan

(<sup>1</sup> Key Laboratory of Organic Optoelectronics and Molecular Engineering, Department of Chemistry, Tsinghua University, Beijing 100084)

(<sup>2</sup> Department of Chemistry, Shijiazhuang College, Shijiazhuang 050801)

**Abstract** Carbon supported catalyst Pt-Sn/C was synthesized in reverse micelle solution of water/AOT/ cyclohexane [AOT: bis-(2-ethylhexyl)sodium sulfosuccinate, (aerosol-OT)] and characterized by TEM, XRD, XPS and cyclic voltammetry (CV) techniques. TEM results showed that the Pt-Sn bimetallic particles were well dispersed on the carbon support with narrow size distribution and regular spherical shape. The average size of the particles prepared is about 2.7 nm, and the particle size was increased with the increase of  $\omega$  value (water-surfactant molar ratio). XRD results show that Pt has fcc crystalline structure and did not alloyed with Sn. XPS results showed that the surface of the catalyst prepared was mainly covered by metallic platinum, Sn(II) and/or Sn(IV) species. CV results show that the methanol electrooxidation activity was decreased with the increase of  $\omega$  value, and the catalyst prepared has lower peak current potential and higher  $I_f/I_b$  [the ratio of the forward anodic peak current density ( $I_f$ ) to the backward anodic peak current density ( $I_b$ ) obtained from CV] than commercial catalyst of Pt-Ru/Vulcan XC-72 (20 wt% Pt-Ru, E-TEK company).

**Key words** [reverse micelle method](#) [catalyst](#) [Pt-Sn/C](#) [direct methanol fuel cell](#) [methanol electrooxidation](#)

DOI:

通讯作者 邱新平 [qiuxp@mail.tsinghua.edu.cn](mailto:qiuxp@mail.tsinghua.edu.cn)

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(298KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“反胶束法” 的相关文章](#)

▶ 本文作者相关文章

- [白玉霞](#)
- [吴建军](#)
- [邱新平](#)
- [王建设](#)
- [朱文涛](#)
- [陈立泉](#)