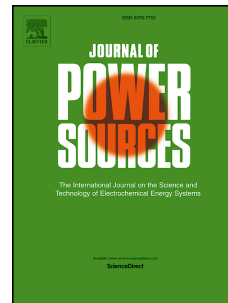


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Performance of vertically oriented graphene supported platinum-ruthenium bimetallic catalyst for methanol oxidation

Zheng Bo ^{*}, Dan Hu, Jing Kong, Jianhua Yan, and Kefa Cen

State Key Laboratory of Clean Energy Utilization, Department of Energy Engineering, Zhejiang University, Hangzhou, Zhejiang Province 310027, China

Keywords: direct methanol fuel cells; methanol oxidation; electrocatalysis; vertically oriented graphene; bimetallic catalyst

Abstract

This work reports the electrocatalytic performance of vertically oriented graphene (VG) supported Pt-Ru bimetallic catalysts toward methanol oxidation reaction (MOR). Dense networks of VG are directly synthesized on carbon paper (CP) *via* a microwave plasma-enhanced chemical vapor deposition (PECVD) method. A repeated pulse potentials approach is applied in a conventional three-electrode electrochemical system for the co-electrodeposition of Pt-Ru bimetallic nanoparticles. It is found that, the decoration of VG can simultaneously lead to a ~3.5 time higher catalyst mass loading and a ~50% smaller nanoparticle size than the pristine CP counterparts. An optimum Pt molar ratio of 83.4% in the deposits, achieved with a $[\text{H}_2\text{PtCl}_6] : [\text{RuCl}_3]$ of 1:1 in the

^{*} Corresponding author at: State Key Laboratory of Clean Energy Utilization, Institute for Thermal Power Engineering, Department of Energy Engineering, Zhejiang University, 38 Zheda Road, Zhejiang, 310027 China
Tel.: +86 571 87953290; fax: +86 571 87952438; email: bozh@zju.edu.cn.

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