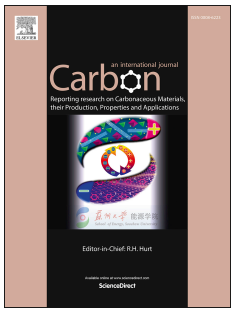
Accepted Manuscript



Nitrogen-doped carbon nanotubes for high-performance platinum-based catalysts in Methanol oxidation reaction

Li-Mei Zhang, Xu-Lei Sui, Lei Zhao, Jing-Jia Zhang, Da-Ming Gu, Zhen-Bo Wang

PII: S0008-6223(16)30632-7

DOI: 10.1016/j.carbon.2016.07.059

Reference: CARBON 11186

To appear in: *Carbon*

Received Date: 7 April 2016

Revised Date: 29 June 2016

Accepted Date: 28 July 2016

Please cite this article as: L.-M. Zhang, X.-L. Sui, L. Zhao, J.-J. Zhang, D.-M. Gu, Z.-B. Wang, Nitrogen-doped carbon nanotubes for high-performance platinum-based catalysts in Methanol oxidation reaction, *Carbon* (2016), doi: 10.1016/j.carbon.2016.07.059.

Nitrogen-doped Carbon Nanotubes for High-performance Platinum-based Catalysts in Methanol Oxidation Reaction

Li-Mei Zhang,[1] Xu-Lei Sui,[1] Lei Zhao,[1] Jing-Jia Zhang,[1] Da-Ming Gu,[1] Zhen-Bo Wang, [1,*]

[1] MIIT Key Laboratory of Critical Materials Technology for New Energy Conversion and Storage, School of Chemistry and Chemical Engineering, Harbin Institute of Technology, No.92 West-Da Zhi Street, Harbin, 150001 China

Abstract:

Nitrogen-doped carbon nanotubes (CN_x-NTs), platinum (Pt)-based catalysts supports, were prepared by pyrolysis of polypyrrole nanotubes (PPy-NTs), which were synthesized using a self-degraded template method. The morphology, structure and physicochemical properties of CN_x-NTs supports and Pt/CN_x-NTs catalysts were investigated by scanning electron microscope, Brunauer-Emmett-Teller surface area, transmission electron microscopy, X-ray diffraction, and X-Ray photoelectron spectroscopy. Fine Pt nanoparticles are uniformly deposited onto the CN_x-NTs supports, which possess well-defined nanotube morphology. The Pt/CN_x-NTs catalysts, especially Pt/CN_x-NTs-800 catalyst (CN_x-NTs prepared at pyrolysis temperature of 800 ^oC), exhibit outstanding electrochemical performance toward methanol oxidation reaction (MOR), compared with commercial Pt/C catalyst, which is attributed to high nitrogen content and nanotube morphology of the support. High nitrogen content can better disperse and anchor Pt nanoparticles, and nanotube structure may provide an open network around the active catalysts for facilitating the mass transfer. Under the same

* Corresponding author. Tel.: +86-451-86417853; Fax: +86-451-86418616.

Email: wangzhb@hit.edu.cn (Z.B. Wang)