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**Methanol electro-oxidation by nanostructured Pt/Cu bimetallic on Poly 3,4
ethylenedioxythiophene (PEDOT)**

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Abstract

Herein, we report the preparation, characterisation and electrocatalysis of Pt/Cu bimetallic nanostructure formed on Poly 3,4 ethylenedioxythiophene (PEDOT) modified glassy carbon electrode, Pt-Cu-PEDOT/GC. A three-step procedure was adopted for the fabrication of the catalyst. Initially the glassy carbon electrode (GC) was modified by a uniform coating of PEDOT by potential cycling. Copper NPs were then deposited on the PEDOT film by deposition from a 2 mM solution of CuSO₄ in 0.1 M NaClO₄ at a constant potential of -0.477 V vs. SCE. Pt/Cu-PEDOT/GC catalyst was prepared by substitution of copper by galvanic displacement with various concentrations of H₂PtCl₆. The electrode thus prepared displayed very good electrocatalytic effect for methanol oxidation characterized by cyclic voltammetry. It was found that the catalyst prepared with 2 mM H₂PtCl₆ exhibited the highest catalytic activity, with I_f/I_b values of 1.80 and 1.38 for methanol concentrations of 1 M and 5 M, respectively. At a relatively low Pt loading of 5.48×10^{-6} /cm², the Pt/Cu-PEDOT/GC should be a cost-effective alternative anode catalyst for DMFC.

Keywords: Methanol oxidation; electrocatalysis; direct methanol fuel cells; platinum catalyst; galvanic displacement

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