

Dynamics of Electrocatalytic Oxidation of Ethylene Glycol, Methanol and Formic Acid at MWCNT Platform Electrochemically Modified with Pt/Ru Nanoparticles

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ABSTRACT

Comparative electrocatalytic behavior of functionalized multiwalled carbon nanotubes (fMWCNTs) electrodeposited with Pt/Ru nanoparticles towards the oxidation of methanol (MeOH), ethylene glycol (EG) and formic acid (FA) has been investigated. The catalytic current density decreased approximately as MeOH > EG > FA. Result revealed that BPPGE-fMWCNT-Pt/Ru tolerates CO poisoning for FA electrooxidation than when used for the oxidation of the EG or MeOH. Electrochemical impedance spectra are dependent on the oxidation potentials, with equivalent circuit models characteristic of adsorption-controlled charge transfer kinetics. The results provide important insights into the electrochemical response of these small organic molecules useful in fuel cell technology.

Keywords: MWCNT-Pt/Ru nanoparticles, Electrocatalytic oxidation, Small organic molecules, Cyclic voltammetry, Impedance spectroscopy, Adsorption-controlled kinetics, Nanoparticles