

Palladium Nanoparticles - Poly(3,4-Ethylenedioxythiophene)-Carbon Nanotube Composite as Oxygen Reduction Catalyst for Direct Methanol Fuel Cells

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Abstract

Palladium, multi walled carbon nanotube (CNT) and poly(3,4-ethylenedioxythiophene) (PEDOT) composite, (Pd/CNT/PEDOT), is prepared as an electrocatalyst towards Oxygen Reduction Reaction (ORR). This composite is characterized using X-Ray diffraction, Fourier Transform Infrared, X-ray Photoelectron spectroscopy, X-Ray Fluorescence and Scanning Electron Microscopy to understand its properties and morphological characteristics. AC impedance analysis and the electrochemical analysis are also carried out to study its catalytic properties. Pd/CNT/PEDOT, which has 10% palladium content out of total mass, shows competitive performance in catalytic activity in both acidic and basic media and is better than that of commercially available Pt/C (20% Pt loading). Durability and methanol tolerance are extremely high for this catalyst. Therefore, this material can be used as the cathode material in Direct Methanol Fuel Cell applications.