

Synthesis and Characterization of Pd Based Electro-catalysts Adding with Second Metal for Direct Formic Acid Fuel Cells

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Abstract

In the formic acid fuel cell, in order to improve the performance of the anode palladium catalyst, it is often carried out by adding metals, metal oxides and other modifications. This study mainly adds a second metal to the palladium-based electrocatalyst to explore the structure and electrocatalytic characteristics of the catalyst. In the study, acid-oxidized multi-walled carbon nanotubes were used as carriers, and metals (Pd-Fe, Pd-Cu, Pd-Pt) were deposited on the carbon tubes using X-ray photosynthesis or sodium borohydride reduction. The nano-mixed catalyst materials were synthesized to form a binary metal solid solution phase to improve the electrocatalytic efficiency. Raman, XRD, ICP-OES, and SEM, were conducted to characterize the structure, composition and surface morphology. The electrocatalytical performance of the prepared Pd based catalysts were measured by cyclic voltammetry.

In the study, the synthesized Pd and the second metal component M(Fe, Cu, Pt) have a molar ratio of 1:1 and 20% of the total metal weight. From the research results, it was shown that the synthesized catalysts were successfully deposited on the multi-walled carbon nanotubes, with a solid solution phase structure, and the nano metal particle size was less than 15nm. It can be seen from the cyclic voltammetry in formic acid sulfuric acid solution that Pd-Pt/AO-MWCNT (8 mins) with x-ray synthesis method for 8 minutes has the most stable and good current density and catalytic reaction voltage, and its performance is better than commercial palladium catalyst.

Keywords: *formic acid fuel cell, palladium.*