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SYNTHESIS AND EVALUATION OF NANOSTRUCTURES ELECTROCATALYST FOR FUEL CELLS

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In recent years, Direct methanol fuel cells (DMFCs) have received a lot of attention as the promising power sources for portable electric devices due to high energy density, simple and easily handled structure, easy transportation and storage of cheap liquid fuel as well as low temperature operation.

The electrochemical reduction of oxygen and methanol oxidation are very important reactions in electrochemistry due to central role in fuel cells. The activity improvement of the oxygen reduction reaction (ORR) represents one of the important issues in fuel cell development. Efforts to this fact have involved the utilization of bimetallic catalysts to increase the catalytic activity and to reduce cost. On other hand, the methanol oxidation reaction involves higher catalytic activity and selectivity for avoid side reactions.

This work shows the synthesis of composites of metallic nanoparticles based on platinum on multiwall carbon nanotubes (MWCNTs) by the reverse microemulsion method for application as electrocatalysts in Direct methanol fuel cells.

Figure 1 shows the linear voltammograms of the catalytic activity for ORR of the metal electrocatalyst Pt/MWCNT and bimetallic electrocatalysts Pt-Au, Pt-Pd, Pt-Ru and Pt-Ir on MWCNTs. The results in this figure show the current density for Pt-Pd/MWCNTs, Pt-Ru/MWCNTs and Pt-Ir/MWCNTs are much higher value than Pt/MWCNT and Pt-Au/MWCNTs, which suggests a high ORR activities, for hence these materials can be a good cathode electrocatalysts. The selection of the best electrocatalysts at anode and cathode leads to a better performance on methanol fuel cells.

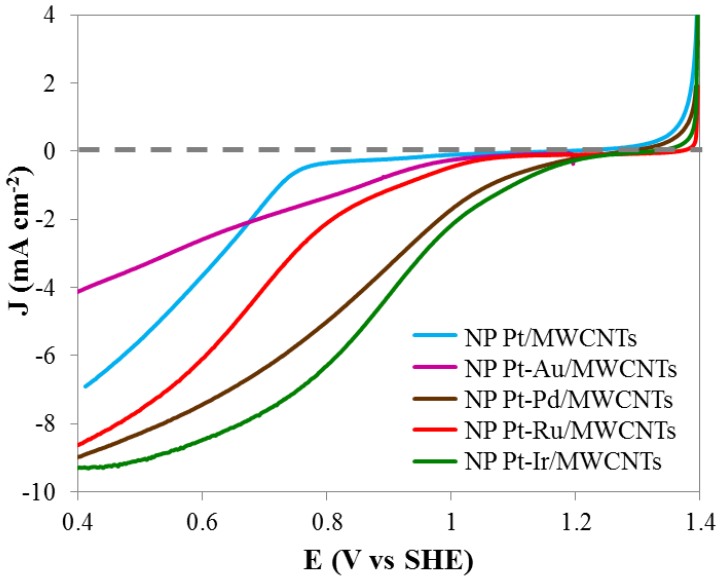

Figure 1. Linear voltammograms in 0.5 M H_2SO_4 at 5 mV s^{-1} and 750 rpm.

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