

Title : Enhanced Methanol Oxidation Catalysis Using Platinum Supported on Carbon Black with Polypyrrole Mixed with Copper and Nickel

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ABSTRACT

This study investigates the preparation of catalysts for the methanol oxidation reaction (MOR) by synthesizing polypyrrole (Ppy) mixed with copper (Cu), nickel (Ni), and a combination of both copper and nickel (Cu-Ni). Carbon black (CB) was used as a support material to enhance the catalyst's ability to support platinum (Pt) deposition. The catalysts were prepared as follows: platinum on carbon black with polypyrrole mixed with copper (CB/Cu-Ppy/Pt), platinum on carbon black with polypyrrole mixed with nickel (CB/Ni-Ppy/Pt), and platinum on carbon black with polypyrrole mixed with copper and nickel (CB/Cu-Ppy-Ni/Pt). Electrochemical analysis using cyclic voltammetry (CV) and chronoamperometry (CA) revealed that the CB/Cu-Ppy/Pt catalyst exhibited the highest current density for methanol oxidation ($2.01 \text{ mA}\cdot\text{cm}^{-2}$) and a forward-to-backward current ratio (I_f/I_b) of 3.85. These results suggest that the CB/Cu-Ppy/Pt catalyst is effective in promoting methanol oxidation and facilitating the oxidation of poisoning intermediates. However, it does not significantly enhance the stability of the MOR.

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