Title : Pd-Electrocatalysts on Modified Graphene Oxide to Enhance Efficiency of Oxidation Reaction in Direct Alcohol Fuel Cells (DAFCs)

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ABSTRACT

The development of palladium (Pd) electrocatalysts supported on graphene oxide (GO) modified with three aza-BODIPY compounds (DA, DM and DP) has been carried out to enhance efficiency of oxidation reaction in direct alcohol fuel cells (DAFCs). The synthesis of the catalysts involved ultrasonic dispersion and chemical reduction. The electrochemical activity and stability of the synthesized catalysts were investigated using cyclic voltammetry (CV) and chronoamperometry (CA), respectively. The results showed that the electrochemical surface area of the modified catalysts (GO-DA/Pd, GO-DM/Pd, and GO-DP/Pd) significantly increased compared to that of the unmodified catalyst (GO/Pd). Additionally, the GO-DM/Pd exhibited the highest current density with 0.328 $mA.cm^{-2}$ for methanol oxidation and 0.257 $mA.cm^{-2}$ for ethanol oxidation. For butanol oxidation, the GO-DA/Pd showed the highest current density of 0.177 $mA.cm^{-2}$. This improvement in catalytic efficiency resulted from the synergistic effect between palladium and the modified graphene oxide support. From the CA study, the GO-DM/Pd catalyst has greater stability than GO-DA/Pd, GO-DP/Pd and the unmodified catalysts (GO/Pd). Furthermore, the GO-DM/Pd catalyst demonstrated the highest electrocatalytic activity and stability for methanol and ethanol oxidation reactions.

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