Electrochemical Behaviors of Myoglobin on Ionic Liquid-Graphene-Cobalt Oxide Nanoflower Composite Modified Electrode and Its Electrocatalytic Activity

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A biocomposite was prepared by mixing myoglobin (Mb), ionic liquid (IL) 1-butyl-3-methylimidazolium tetrafluoroborate, graphene (GR) and cobalt oxide (Co_3O_4) nanoflower together. Then the mixture was applied on carbon ionic liquid electrode (CILE) to get a modified electrode with chitosan film. Ultraviolet-visible and FT-IR spectroscopic experiments showed that Mb in the composite remained its native structure. On cyclic voltammogram a pair of well-defined redox peaks was got in 0.1 mol L^{-1} pH 5.0 phosphate buffer solution, which was ascribed to the realization of direct electrochemistry of Mb with the underlying electrode. The synergistic effects of IL, GR and Co_3O_4 nanoflower provided a fast electron transfer path for the movement of electron from Mb active centers to the electrode. Electrochemical parameters of electrode reaction of Mb were calculated. The Mb modified electrode showed excellent electrocatalytic ability towards the reduction of trichloroacetic acid, which indicated that a new third-generation electrochemical biosensor was constructed successfully.

Keywords: Myoglobin; Ionic liquid; Graphene; Cobalt oxide nanoflower; Electrochemical biosensor

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