Electrochemical Biosensor Based on Hemoglobin and Titanate Nanotubes Modified Electrode and its Application

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An electrochemical biosensor based on hemoglobin (Hb) and titanate nanotubes (TNTs) modified carbon ionic liquid electrode (CILE) was prepared with direct electrochemistry and electrocatalysis of Hb investigated. The morphology and structure of TNTs was analyzed by field emission scanning electron microscopy and transmission electron microscopy. UV-Vis and FT-IR spectra confirmed that Hb maintained the natural conformation with TNTs. A pair of enhanced reversible redox peak could be observed on Nafion/Hb/TNTs/CILE, indicating that the positive effects of TNTs to the electron transfer. The electrochemical parameters of Hb on the modified electrode were calculated with the number of electron transfer (n), the charge transfer coefficient (α) and the electrode reaction rate constant (k_s) obtained as 1.18, 0.478 and 0.85 s^{-1} , respectively. The electrochemical sensor was applied to investigate the electrocatalytic performance to trichloroacetic acid (TCA) and nitrite with excellent ability.

Keywords: hemoglobin; titanate nanotubes; direct electrochemistry; electrocatalysis.

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