Construction of Nafion/Hb/Au/ZIF-8/CILE and its application as electrochemical sensor for determination of bromate and nitrite

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In this paper zinc-based metal organic framework material (ZIF-8) modified carbon ionic liquid electrode (CILE) was prepared and electrodeposited with gold nanoparticles to get a composite modified electrode, which was used as the sensing interface for the immobilization of hemoglobin (Hb) with Nafion to prepare a modified electrode (Nafion/Hb/Au/ZIF-8/CILE). Electrochemical behaviors of Hb on the modified electrode were checked by cyclic voltammetry with a pair of well-defined redox peaks appeared. The effects of pH and scan rate on direct electrochemistry of Hb were studied with electrochemical parameters calculated. The prepared electrochemical enzyme sensor showed good catalytic activity to the electroreduction of bromate and nitrite with the linear ranges from 0.5 to 10.0 mmol/L and from 0.1 to 0.8 mmol/L, respectively. The detection limits were calculated as 0.83 mmol/L and 0.03 mmol/L, and the water samples were analyzed to prove the practical application.

Keywords: carbon ionic liquid electrode, zinc-based metal organic framework, gold nanoparticle, hemoglobin, electrochemistry, bromate

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