# Electrochemical biosensor for nitrite based on polyacrylic-graphene composite film with covalently immobilized hemoglobin

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**ABSTRACT**

A new biosensor for the analysis of nitrite in food was developed based on hemoglobin (Hb) covalently immobilized on the succinimide functionalized poly(n-butyl acrylate)-graphene [poly(nBA)-rGO] composite film deposited on a carbon-paste screen-printed electrode (SPE). The immobilized Hb on the poly(nBA)-rGO conducting matrix exhibited electrocatalytic ability for the reduction of nitrite with significant enhancement in the reduction peak at −0.6 V versus Ag/AgCl reference electrode. Thus, direct determination of nitrite can be achieved by monitoring the cathodic peak current signal of the proposed polyacrylic-graphene hybrid film-based voltammetric nitrite biosensor. The nitrite biosensor exhibited a reproducible dynamic linear response range from 0.05–5 mg $L^{-1}$ nitrite and a detection limit of 0.03 mg $L^{-1}$. No significant interference was observed by potential interfering ions such as $Ca^{2+}$, $Na^{+}$, $K^{+}$, $NH_4^{+}$, $Mg^{2+}$, and $NO_3^{-}$ ions. Analysis of nitrite in both raw and processed edible bird's nest (EBN) samples demonstrated recovery of close to 100%. The covalent immobilization of Hb on poly(nBA)-rGO composite film has improved the performance of the electrochemical nitrite biosensor in terms of broader detection range, lower detection limit, and prolonged biosensor stability.

**KEYWORDS:**

edible bird's nest, electrochemical biosensor, graphene, hemoglobin, nitrite