

## Hydrogen Peroxide Biosensor Based on Graphene-Toluidine Blue/HRP-Poly (Toluidine Blue)

Shaoming Yang\*, Shaoqing Ding, Lingling Li, Qing Sun, Jie Yang, Qiang Cao

School of Materials Science and Engineering, East China Jiaotong University, Nanchang 330013, Jiangxi, China

\*E-mail address: [yangsm79@163.com](mailto:yangsm79@163.com), [yangsm@aliyun.com](mailto:yangsm@aliyun.com)

doi: 10.20964/2017.11.57

Received: 1 August 2017 / Accepted: 12 September 2017 / Published: 12 October 2017

---

A novel hydrogen peroxide biosensor was prepared by entrapping horseradish peroxidase (HRP) by electropolymerization of toluidine blue onto a graphene-toluidine blue nanocomposite-modified base electrode. Graphene and the graphene-toluidine blue nanocomposites were characterized by SEM and UV-Vis spectroscopy. The preparation of the biosensor was monitored using electrochemical impedance spectroscopy. The catalytic performances of the biosensor were investigated using cyclic voltammetry and chronoamperometry. The performance of the biosensor was evaluated, and the results indicated that the biosensor exhibited excellent catalytic performance for the detection of hydrogen peroxide. The linear response range of the biosensor for hydrogen peroxide was  $5.0 \times 10^{-7} \sim 1.35 \times 10^{-5} \text{ mol} \cdot \text{L}^{-1}$  with a sensitivity of  $4.32 \mu\text{A} \cdot \text{L} \cdot \mu\text{mol}^{-1}$ , a correlation coefficient of 0.999 and a detection limit of  $3.5 \times 10^{-7} \text{ mol} \cdot \text{L}^{-1}$  (S/N=3).

---

**Keywords:** enzyme electrode, hydrogen peroxide, horseradish peroxidase, toluidine blue, biosensor

[FULL TEXT](#)

© 2017 The Authors. Published by ESG ([www.electrochemsci.org](http://www.electrochemsci.org)). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).