

Accepted Manuscript

Copper Nanoparticles/Polyaniline/Graphene Composite as a Highly Sensitive Electrochemical Glucose Sensor

Weiran Zheng, Liangsheng Hu, Lawrence Yoon Suk Lee, Kwok-Yin Wong

PII: S1572-6657(16)30401-5
DOI: doi: [10.1016/j.jelechem.2016.08.004](https://doi.org/10.1016/j.jelechem.2016.08.004)
Reference: JEAC 2778

To appear in: *Journal of Electroanalytical Chemistry*

Received date: 29 April 2016
Revised date: 29 July 2016
Accepted date: 2 August 2016

Please cite this article as: Weiran Zheng, Liangsheng Hu, Lawrence Yoon Suk Lee, Kwok-Yin Wong, Copper Nanoparticles/Polyaniline/Graphene Composite as a Highly Sensitive Electrochemical Glucose Sensor, *Journal of Electroanalytical Chemistry* (2016), doi: [10.1016/j.jelechem.2016.08.004](https://doi.org/10.1016/j.jelechem.2016.08.004)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Copper Nanoparticles/Polyaniline/Graphene Composite as a Highly Sensitive Electrochemical Glucose Sensor

Weiran Zheng, Liangsheng Hu, Lawrence Yoon Suk Lee,* and Kwok-Yin Wong*

Department of Applied Biology and Chemical Technology and the State Key Laboratory of Chirosciences, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong SAR, China

**Corresponding authors: lawrence.ys.lee@polyu.edu.hk, kwok-yin.wong@polyu.edu.hk*

Abstract

A highly sensitive non-enzymatic glucose sensor based on Cu nanoparticles (CuNPs)/polyaniline (PANI)/graphene nanocomposite was fabricated *via* simple *in-situ* reduction of Cu precursor in polyaniline nanofibers under mild conditions followed by mechanical mixing with graphene suspension to form the composites with different graphene contents (0.5 %, 1 %, and 2 %). The properties of nanocomposites were characterized by SEM, TEM, XRD, UV-Vis, and XPS. The CuNPs ($d = 2-4$ nm) only slightly altered the ordered structure of PANI. It was found that CuNPs have direct electronic interaction with PANI *via* the N atoms on the polymer backbone, which enabled fast electrons transfer from electrode to CuNPs through graphene and PANI. The CuNPs/PANI/graphene nanocomposites were coated on a glassy carbon electrode for the investigation of their electrochemical properties. Both CuNPs/PANI and CuNPs/PANI/graphene showed high sensitivity towards glucose oxidation which occurred at ~ 0.5 V *vs* SCE. The best performance was achieved by the CuNPs/PANI/1% graphene-modified electrode which showed sensitivity of ~ 150 mA cm⁻² M⁻¹, detection limit of 0.27 μ M (S/N = 3), and response time of about 3 s. This system was also highly selective towards glucose oxidation that almost no signal was detected from interferents such as ascorbic acid and dopamine, demonstrating its great potential as a non-enzymatic glucose sensor.

Keywords: Copper nanoparticles, polyaniline, non-enzymatic sensor, glucose electrooxidation, graphene

Download English Version:

<https://daneshyari.com/en/article/4908154>

Download Persian Version:

<https://daneshyari.com/article/4908154>

[Daneshyari.com](https://daneshyari.com)