

A novel hierarchical 3D N-Co-CNT@NG nanocomposite electrode for non-enzymatic glucose and hydrogen peroxide sensing applications

Jayaraman Balamurugan, Tran Duy Thanh, Gopalsamy Karthikeyan, Nam Hoon Kim, Joong Hee Lee



PII: S0956-5663(16)30962-9
DOI: <http://dx.doi.org/10.1016/j.bios.2016.09.077>
Reference: BIOS9189

To appear in: *Biosensors and Bioelectronics*

Received date: 13 August 2016
Revised date: 20 September 2016
Accepted date: 22 September 2016

Cite this article as: Jayaraman Balamurugan, Tran Duy Thanh, Gopalsamy Karthikeyan, Nam Hoon Kim and Joong Hee Lee, A novel hierarchical 3D N Co-CNT@NG nanocomposite electrode for non-enzymatic glucose and hydrogen peroxide sensing applications, *Biosensors and Bioelectronics* <http://dx.doi.org/10.1016/j.bios.2016.09.077>

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 galley proof before it is published in its final citable 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

A novel hierarchical 3D N-Co-CNT@NG nanocomposite electrode for non-enzymatic glucose and hydrogen peroxide sensing applications

Jayaraman Balamurugan^a, Tran Duy Thanh^a, Gopalsamy Karthikeyan^a, Nam Hoon Kim^a, Joong Hee Lee^{a,b*}

^aAdvanced Materials Institute of BIN Convergence Technology (BK21 Plus Global) & Dept. of BIN Convergence Technology, Chonbuk National University, Jeonju, Jeonbuk 54896, Republic of Korea

^bCarbon Composite Research Centre, Department of Polymer - Nano Science and Technology, Chonbuk National University, Jeonju, Jeonbuk 54896, Republic of Korea

*Corresponding author: jhl@chonbuk.ac.kr

Abstract

A novel 3D nanocomposite of nitrogen doped Co-CNTs over graphene sheets (3D N-Co-CNT@NG) have been successfully fabricated via a simple, scalable and one-step thermal decomposition method. This hierarchical 3D N-Co-CNT@NG provides an admirable conductive network for effective charge transfer and avoids the agglomeration of NG matrices, which provides better access to the electrode material for glucose and H₂O₂ sensing applications. The 3D N-Co-CNT@NG demonstrates direct as well as non-enzymatic responses to glucose oxidation and H₂O₂ reduction at a low potential. The novel electrode showed excellent electrochemical performance towards glucose oxidation, with high sensitivity of 9.05 $\mu\text{A cm}^{-2} \text{ mM}^{-1}$, a wide linear range from 0.025 to 10.83 mM, and a detection limit of 100 nM with a fast response time of less than 3 s. Furthermore, non-enzymatic H₂O₂ sensors based on the 3D N-Co-CNT@NG electrode exhibited high sensitivity (28.66 $\mu\text{A mM}^{-1} \text{ cm}^{-2}$), wide linear range (2.0–7449 μM), low detection limit of 2.0 μM (S/N = 3), excellent selectivity, decent reproducibility and long term stability. Such outstanding electrochemical performance can be endorsed to the

Download English Version:

<https://daneshyari.com/en/article/5031463>

Download Persian Version:

<https://daneshyari.com/article/5031463>

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