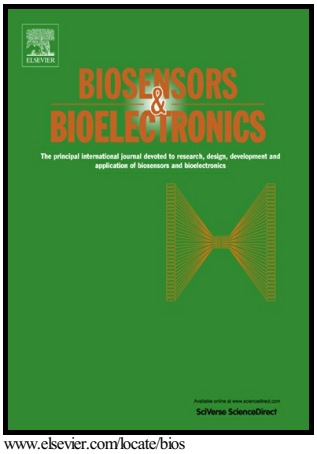

www.elsevier.com/locate/bios

Ultrasensitive microfluidic paper-based electrochemical/visual biosensor based on spherical-like cerium dioxide catalyst for miR-21 detection

Xiaolu Sun, He Wang, Yannan Jian, Feifei Lan, Lina Zhang, Haiyun Liu, Shenguang Ge, Jinghua Yu

PII: S0956-5663(18)30030-7
DOI: https://doi.org/10.1016/j.bios.2018.01.025
Reference: BIOS10218

To appear in: *Biosensors and Bioelectronic*

Received date: 21 October 2017
Revised date: 4 January 2018
Accepted date: 11 January 2018

Cite this article as: Xiaolu Sun, He Wang, Yannan Jian, Feifei Lan, Lina Zhang, Haiyun Liu, Shenguang Ge and Jinghua Yu, Ultrasensitive microfluidic paper-based electrochemical/visual biosensor based on spherical-like cerium dioxide catalyst for miR-21 detection, *Biosensors and Bioelectronic,* https://doi.org/10.1016/j.bios.2018.01.025

Ultrasensitive microfluidic paper-based electrochemical/visual biosensor based on spherical-like cerium dioxide catalyst for miR-21 detection

Xiaolu Sun[a], He Wang[a], Yannan Jian[a], Feifei Lan[a], Lina Zhang[b], Haiyun Liu[a*], Shenguang Ge[a,b*], Jinghua Yu[a]

[a] *Institute for Advanced Interdisciplinary Research, University of Jinan, Jinan 250022,P. R. China.*

[b] *Shandong Provincial Key Laboratory of Preparation and Measurement of Building Materials, University of Jinan, Jinan 250022, P. R. China*

[*]Corresponding author. Tel.: +86-531-82767161; fax: +86-531-82765956. chm_gesg@163.com (S. Ge).

Abstract

In this work, an electrochemical biosensor based on Au nanorods (NRs) modified microfluidic paper-based analytical devices (μPADs) were constructed for sensitive detection of microRNA (miRNA) by using cerium dioxide - Au@glucose oxidase (CeO_2-Au@GOx) as an electrochemical probe for signal amplification. Au NRs were synthesized by in-situ growth method in μPADs surface to enhance the conductivity and modified hairpin probe through Au-S bonds. The construction of "the signal transducer layer" was carried out by GOx catalyzing glucose to produce H_2O_2, which was further electrocatalyzed by CeO_2. After the biosensor was constructed, an obvious electrochemical signal was observed from the reduction of H_2O_2. In order to make the detection more convincing, the visual detection was performed based on the oxidation of 3,3',5,5'-tetramethylbenzidine by H_2O_2 with the help of Exonuclease I. The electrochemical biosensor provided a wide linear range of 1.0 fM to 1000 fM with a relatively low detection limit of 0.434 fM by the electrochemical measurement.