Biosensor based on TiO₂ Nanofibers Prepared Using High Energy Electron Beam Treatment for Rapid and Efficient Glucose Determination

Zhitong Hu, Ju Rong, Zhaolin Zhan, Xiaohua Yu*

School of Materials Science and Engineering, Kunming University of Science and Technology, Kunming 650093, China

*E-mail: xiaohua_y@163.com

doi: 10.20964/2019.11.30

Received: 23 June 2019 / Accepted: 22 August 2019 / Published: 7 October 2019

TiO₂ nanofibers (p-TDNF) were synthesized by electrospinning and highly active TiO₂ nanofibers (m-TDNF) were obtained by electron beam treatment of p-TDNF and assessed for the enzyme immobilization and biosensing applications. Studies have shown surface defects and Ti³⁺ are formed on m-TDNF. Significantly, the better electron conduction properties were exhibited for glucose oxidase (GOD) immobilized on m-TDNF, and favorable electrocatalytic properties for glucose detection can be acquired. Impressively, GOD/m-TDNF/Nafion/GCE glucose biosensor exhibits high sensitivity of 12.5 $\mu\text{A}\cdot\text{mM}^{-1}\text{cm}^{-2}$ and low detection limit of 0.9 μM as well as excellent selectivity and stability. Moreover, the accurate glucose determination and good recoveries in human blood serum implied their enormous potentiality in the practical applications. These results indicate that the preparation of m-TDNF offers a novel idea for the development of glucose biosensors.

Keywords: TiO₂ nanofibers, high energy electron beam, surface defects, biosensor

[FULL TEXT](#)

© 2019 The Authors. Published by ESG (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/>).