Novel Calcium Potentiometric Selective Electrode Based on Lisinopril Functionalized Multi-walled Carbon Nanotubes-NiO Nanocomposite

Nehad A. Abdallah^{1,2}

¹ Pharmacognosy and Pharmaceutical Chemistry Department, College of Pharmacy, Taibah University, Al-Madinah Al-Mounawarah 30078, KSA

² Experiments and Advanced Pharmaceutical Research Unit, Faculty of Pharmacy, Ain Shams University, Cairo 1156, Egypt.

*E-mail: nehad.amin@gmail.com

doi: 10.20964/2021.08.21

Received: 25 March 2021 / Accepted: 12 May 2021 / Published: 30 June 2021

A novel carbon paste electrode utilizing a lisinopril molecule as a recognition element for the selective determination of free Ca^{2+} ions was developed. The fabrication of the sensor was established by the covalent attachment of lisinopril to the surface of the MWCNTs-NiO nanocomposite. The formed composite was characterized by FT-IR, TEM, and XRD. This unique design has led to high selectivity and stability of the studied carbon paste electrode. It revealed a Nernstian slope of 30.4 ± 0.52 mV/decade with wide linearity ranging from 1×10^{-2} mol L⁻¹ to 1×10^{-8} mol L⁻¹. The electrode showed high sensitivity to Ca^{2+} ion. The LOD was found to be 3.5×10^{-9} mol L⁻¹. The proposed sensor was successfully applied for the determination of Ca^{2+} concentration in various media such as pharmaceutical tablets, tap water, soil drainage water samples and human serum samples. The resulted recovery of the sensor was in the range of 94.2% - 102.1% with acceptable precision and reproducibility.

Keywords: Calcium; Carbon paste electrode; potentiometry; MWCNTs; NiO nanoparticles; Lisinopril

[FULL TEXT](#)

© 2021 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/>).