Determination of Salicylic Acid by Differential Pulse Voltammetry Using ZnO/Al₂O₃ Nanocomposite Modified Graphite Screen Printed Electrode

Mohammad Reza Ganjali¹,²,* Fariba Garkani Nejad ³, Somayeh Tajik ⁴, Hadi Beitollahi ⁴,* Eslam Pourbasheer,⁵ Bagher Larijani⁶

¹ Center of Excellence in Electrochemistry, School of Chemistry, College of Science, University of Tehran, Tehran, Iran
² Biosensor Research Center, Endocrinology & Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
³ Department of Chemistry, Graduate University of Advanced Technology, Kerman, Iran
⁴ Environment Department, Institute of Science and High Technology and Environmental Sciences, Graduate University of Advanced Technology, Kerman, Iran
⁵ Department of Chemistry, Payame Noor University, P. O. Box 19395-3697, Tehran, Iran
⁶ Endocrinology & Metabolism Research Center, Endocrinology & Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
*E-mail: ganjali@khayam.ut.ac.ir (MR Ganjali); h.beitollahi@yahoo.com (H. Beitollahi)

doi: 10.20964/2017.11.49

Received: 5 August 2017 / Accepted: 8 September 2017 / Published: 12 October 2017

A simple strategy for determination of salicylic acid (SA) based on ZnO/Al₂O₃ nanocomposite modified graphite screen printed electrode (ZnO/Al₂O₃/SPE) is reported. Cyclic voltammetry (CV) and differential pulse voltammetry (DPV) were employed to evaluate the performance of the sensor. The ZnO/Al₂O₃/SPE demonstrated noticeable electrochemical catalytic activity. The oxidation of salicylic acid at ZnO/Al₂O₃/SPE was accompanied by the considerable decrease in overpotential and dramatic increase in peak current. The response of salicylic acid under the optimized conditions is linear within the ranges of 0.5-80.0 μM. A low detection limit of 0.25 μM was found for salicylic acid target. The function of this modified electrode in the concentration measurement of the real samples such as urine and pharmaceuticals was acceptable and approved its practical application.

Keywords: Salicylic acid, ZnO/Al₂O₃ nanocomposite, Graphite screen printed electrode, Voltammetry, Real sample analysis