A Nanocomposite of Graphitic Carbon Nitride and Carbon Dots as a Platform for Sensitive Voltammetric Determination of 2-chlorophenol in Water

Theo H.G. Moundzounga¹, Moses G. Peleyeju^{1*}, Saheed O. Sanni, Michael J. Klink^{1,2},
Ekemena Oseghe³, Elvera Viljoen¹, Augustine E. Ofomaja

¹ Department of Chemistry, Vaal University of Technology, Andries Potgieter Boulevard, Vanderbijlpark, 1911, South Africa

² Biotechnology, Vaal University of Technology, Andries Potgieter Boulevard, Vanderbijlpark, 1911, South Africa

³ School of Science, Engineering and Technology, Nanotechnology and Water Sustainability (NanoWS) Research Unit, University of South Africa, Johannesburg, South Africa.

*E-mail: mgpeleyeju@gmail.com, mosesp@vut.ac.za

doi: 10.20964/2021.05.15

Received: 20 December 2020 / Accepted: 8 February 2021 / Published: 31 March 2021

Herein, we report the preparation, characterisation and application of graphitic carbon nitride/carbon nanodots nanocomposite (g-C₃N₄/CDs) as a platform for the sensing of 2-chlorophenol in water. The g-C₃N₄/CDs was prepared via microwave irradiation and characterised by transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD). The electrochemical properties of modified glassy carbon electrodes were studied using cyclic voltammetry (CV). In comparison to unmodified GCE, there was a marked enhancement of the oxidation peak of the analyte when GCE modified with the nanocomposite material was used. The composite modifier also performed better than the single-component modifiers. The oxidation peak currents varied linearly with the concentrations in the range 0.5 to 2.5 µM with a detection limit of 0.67 µM. The sensor was used to determine the analyte in real water samples with good recoveries.

Keywords: Graphitic carbon nitride, Carbon nanodots, 2-Chlorophenol, Electrode modifiers, Electroanalysis.

[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/>).