

An electrochemical Sensor Based Crosslinked Polyaniline/G-MWCNTS Core Shell Nanocomposite for Trace Determination of Chlorophenol in Water Samples

Mahmoud A. Hussein¹

¹King Abdulaziz University, Saudi Arabia

Abstract

An efficient electrochemical sensor based cross-linked polyaniline (CPA) /G-MWCNTS core shell nanocomposite (NCs) for trace determination of chlorophenol in water samples has been developed in the presence of a variety of carbon nanomaterials (CNMs) as continuation of our studies[1-4]. CPA was prepared by the chemical oxidative copolymerization of PANI and p-phenylenediamine (PPDA) with triphenylamine (TPA) in the presence of different CNMs material. CNMs include Graphene (G), single-walled carbon nanotube (SWCNTs), multi-walled carbon nanotube (MWCNTs), (G-SWCNTs) and (G-MWCNTs). The morphology, structure, electrical, thermal, and electrochemical properties of the NCs were investigated by different techniques, including FTIR, XRD, RAMAN, SEM, TEM, TGA and sensing measurements. The heat of formation of CPA monomer from TPA, PPDA and aniline (ANI) were computed using Density Functional Theory (DFT) calculations. The NCs of G-MWCNTs demonstrate higher affinity to oxidation of Chlorophenols (CPHs) than glassy carbon electrode (GCE), CPA/GCE and the other NCs. Differential pulse voltammetry (DPV) was used for the trace determination of 2,4-dichlorophenol (2,4-DCP). Under the optimum conditions, the peak current of 2,4-DCP was proportional to its concentration in the range of 0.05-0.6 µmolL⁻¹. The detection limit was 7.6 nmolL⁻¹. The method was successfully applied for the determination of 2,4-DCP in fish farm water with satisfactory recoveries. The suggested method has an advantage to be used for water samples due to its short analytical time, rapid response, high sensitivity, and excellent selectivity with good reproducibility.

Biography:

Dr. M. A. Hussein is an Associate professor of polymer Chemistry at Chemistry Department, King Abdulaziz University, Saudi Arabia. He obtained his PhD in Polymer chemistry from Assiut University, Egypt. He got a post doctoral position in the University of Nice Sophia Antipolis (France) and University Sains Malaysia (Malaysia). He visited school of Industrial technology, University Sains Malaysia and Faculty of Engineering, University of Porto as visiting

ISSN 2161-0398

J Phys Chem Biophys



researcher. His research interests in the area of polymer synthesis, characterization and applications for different fields, polymer composites materials. Dr. Hussein published +80 research articles in ISI journal

References:

- Katowah, D. F.; Rahman, M. M.; Hussein, M. A.; Sobahi, T.; Gabal, M.; Alam, M.; Asiri, A. M., Ternary nanocomposite based poly (pyrrole-co-O-toluidine), cobalt ferrite and decorated chitosan as a selective Co²⁺ cationic sensor. *Composites Part B: Engineering* 2019, 107175.
- Ganash, A. A.; Alqarni, S. A.; Hussein, M. A., Poly (aniline-co-o-anisidine)/graphene oxide Au nanocomposites for dopamine electrochemical sensing application. *Journal of Applied Electrochemistry* 2019, 49 (2), 179-194.
- **3.**] Hussein, M. A.; Abu-Zied, B. M.; Asiri, A. M., Fabrication of EPYR/GNP/MWCNT carbon-based composite materials for promoted epoxy coating performance. *RSC advances* **2018**, 8 (42), 23555-23566.
- Hussein, M. A.; Alam, M.; Albeladi, H. K.; El-Shishtawy, R. M.; Asiri, A. M.; Rahman, M. M., Nanocomposite Containing Cross-linked Poly (Methyl-Methacrylate)/Multiwall Carbon Nanotube as a Selective Y³⁺ Sensor Probe. *Polymer Composites* 2019, 40 (S2), E1673-E1684

<u>5th Edition of International Conference and Exhibition on</u> <u>Polymer Chemistry</u>; London, Uk- March 23-24, 2020.

Abstract Citation:

Mahmoud A. Hussein, An electrochemical Sensor Based Crosslinked Polyaniline/G-MWCNTS Core Shell Nanocomposite for Trace Determination of Chlorophenol in Water Samples,5th Edition of International Conference and Exhibition on Polymer Chemistry' March 23-24, 2020 , London, UK.