Poly(o-phenylenediamine)-Multiwalled Carbon Nanotube Nanocomposite Based Electrochemical Sensing Platform for Paraquat Detection

Tharini Jeyapragasam^{1,*}, Ramachandran Raju², Shen-Ming Chen^{3,*}, Ramiah Saraswathi⁴, Ashraf A. Hatamleh⁵, Tse-Wei Chen^{3,6}, Syang-Peng Rwei^{6,7}

¹ Sethu Institute of Technology, Pulloor-626115, Kariapatti, TN, India

² Madura College, Department of Chemistry, Madurai- 625021, TN, India

³ Department of Chemical Engineering and Biotechnology, National Taipei University of Technology, Taipei 106, Taiwan, ROC.

⁴ Department of Materials Science, School of Chemistry, Madurai Kamaraj University, Madurai - 625 021, Tamilnadu, India

⁵ Department of Botany and Microbiology, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia.

⁶ Research and Development Center for Smart Textile Technology, National Taipei University of Technology, Taipei 106, Taiwan, ROC

⁷ Institute of Organic and Polymeric Materials, National Taipei University of Technology, Taipei 106, Taiwan, ROC

*E-mail: smchen78@ms15.hinet.net (Shen-Ming Chen), tharinichem@gmail.com (J.Tharini)

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Poly(o-phenylenediamine)-Multiwalled Carbon Nanotube nanocomposite was prepared by the electropolymerization of o-phenylenediamine (PoPD) onto the functionalized multiwalled carbon nanotube nanocomposite (MWCNT) which acts as the good sensing materials for the electrochemical sensing of paraquat. Atomic force microscopy (AFM) image confirms somewhat large agglomerated structures suggesting the deposition of PoPD onto the MWCNT. The electrochemical reduction of paraquat at four electrodes viz. glassy carbon electrode (GCE), MWCNT/GCE, PoPD/GCE and PoPD-MWCNT/GCE are studied. The cyclic voltammograms has been studied for the electrochemical reduction of paraquat at four different electrodes such as glassy carbon electrode (GCE), MWCNT/GCE, PoPD/GCE and PoPD-MWCNT/GCE. Poly (o-phenylenediamine)-Multiwalled Carbon Nanotube nanocomposite shows highest cathodic current compared to other modified eletrodes. Different experimental parameters such as influence of scan rate and pH have been optimized for the sensor studies. The sensor calibration plot for paraquat has been constructed using square wave voltammetry (SWV) sensor in the linear range from 8.8×10^{-7} M to 2.5×10^{-8} M. The developed sensor resulted in a detection limit and current sensitivity values of 1.4×10^{-9} M and $80.38 \mu\text{A } \mu\text{M}^{-1}$ respectively. Real sample

analysis for cabbage samples and interference studies in the presence of selected metal ions and surfactants have been carried out.

Keywords: Paraquat, Square wave voltammetry, multiwalled carbon nanotube nanocomposite, o-Phenylenediamine

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