Preparation of an Electrochemical Sensor Based on a Nitrogen-Doped Graphene Modified Electrode and its Application for the Detection of Methyl Parathion

Xiao-Ya Dong*, Feng Wang, Jing Ma, Bai-Jing Qiu*

The Key Laboratory of Modern Agricultural equipment and technology (MOE), The Key Laboratory of Plant Protection Engineering, High-tech Key Laboratory of Agricultural Equipment and Intelligence of Jiangsu Province, School of Agricultural Equipmental Engineering, Jiangsu University, Zhenjiang 212013, Jiangsu, PR China

*E-mail: dongxiaoya@ujs.edu.cn (Xiao-Ya Dong); qbj@ujs.edu.cn (Bai-Jing Qiu)

doi: 10.20964/2019.12.02

Received: 23 April 2019 / Accepted: 28 August 2019 / Published: 29 October 2019

We report a simple and sensitive electrochemical sensor that was successfully fabricated by using a nitrogen-doped graphene (NG)-modified glassy carbon electrode (GCE) for the electrocatalytic oxidation of methyl parathion (MP). The electrochemical behaviours of MP with the modified electrodes were investigated using cyclic voltammetry (CV) and differential pulse voltammetry (DPV). Due to its unique structure and properties, which originated from the nitrogen doping, NG showed high electrocatalytic activity towards MP in phosphate-buffered saline (PBS). The electrochemical sensor had a broad dynamic linear range and detection limit of 0.017 μM . Under optimized conditions, the proposed sensor showed good stability and satisfactory selectivity. When applied for the detection of MP in river samples, the NG/GCE sensor demonstrated good recovery rates. This work might find promising applications in developing a new type of enzyme-free sensor.

Keywords: Nitrogen-doped graphene, Electrochemical sensor, Methyl parathion, Modified electrode

[FULL TEXT](#)

© 2019 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/>).