Electrochemical Sensors with Antifouling Properties for Sensitive Detection of Isoproturon Based on Glassy Carbon Electrode Modified with Nafion Membrane

Xiaoyi Long^{1,2}, Chaorui Deng², Gansheng Xiao², Fuliang Cheng², Ying Zhou²,
Lei Zhao^{3,*}, Longfei Cai^{4,*}, Jinyin Chen^{1,*}, Juan Du^{5,*}

¹ Jiangxi Key Laboratory for Postharvest Technology and Non-destructive Testing of Fruits & Vegetables, Jiangxi Agricultural University, Nanchang 330045, China

² Department of Chemistry, Jiangxi Agricultural University, Nanchang 330045, China

³ Innovation and entrepreneurship guidance center for undergraduate, Jiangxi Agricultural University, Nanchang 330045, China

⁴ Department of Chemistry, Hanshan Normal university, Chaozhou, 521041, China

⁵ College of Food Science and Engineering, Jiangxi Agricultural University, Nanchang 330045, China

*E-mail: zhaolei330045@126.com (L. Zhao), cailf@hstc.edu.cn (L. Cai), jinyinchen08@126.com (J. Chen), dujuanjulia@163.com (J. Du)

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An ultra-high antifouling electrochemical sensor has been established and described for determination of isoproturon (ISO) in the practical complex sample owing to its chemical stability. The complexity of practical sample severely influences the reliability and stability of sensors for ISO detection. Therefore, design an effective antifouling electrode is necessary. Glassy carbon electrode (GCE) modified with Nafion membrane was applied to monitor ISO via square wave voltammetry (SWV), showing great promising practical application for pesticide residue detection. The proposed sensor can sensitively detect trace levels of ISO with a linearity ranging from 0.09 to 20.00 μM , with a limit of detection (LOD) of 0.03 μM ($S/N=3$), which was superior to that of nanomaterial modified ISO electrochemical sensors. The high sensitivity is mainly attributed to the specifically electrocatalytic activity towards ISO catalyzed by hydrogen radical derived from the sulfonic group of Nafion. Additionally, the sensor for detecting ISO in actual test specimens like tomato, lettuce and water in rice field shows ultra-high stability and repeatability together with reproducibility.

Keywords: Real sample; Isoproturon; Antifouling; Square wave voltammetry; Electrochemical sensor; Ultra-stability

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