Sensitive Electrochemical Measurement of Thiamethoxam on Nanocomposite Coated Carbon Paste Using FFT Coulometric Admittance Voltammetry and Flow Injection Analysis

Parviz Norouzi^{1,2,*}, Nazanin Ghaheiri¹, Mostafa Aghazadeh¹, Zahra Mofidi¹, Bagher Larijani^{3,*}

¹ Center of Excellence in Electrochemistry, School of Chemistry, College of Science, University of Tehran, Tehran, Iran

² Biosensor Research Center, Endocrinology & Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

³ Endocrinology & Metabolism Research Center, Endocrinology & Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

*E-mail: norouzi@khayam.ut.ac.ir; emri@tums.ac.ir

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The object of this work was to study of the application of a new sensor for determination of Thiamethoxam using Fast Fourier transform Coulometric Admittance Voltammetry (FFTCAV) in a flow-injection analysis. The sensor was constructed by casting mixture of chitosan, multi-walled carbon nanotubes, reduced graphene nanosheets and Au nanoparticles on a carbon paste ionic liquid electrode. The application of nanoparticles created an environment for amplification of the analyte admittance. Also, the sensitivity of the measurement was achieved by integration of the sensor admittance in specific potential range, after background subtraction. The characterization of the sensor surface was studied by scanning electron microscopy and electrochemical impedance spectroscopy methods. The results showed that the sensor response was proportional to concentrations of Thiamethoxam in range of 0.5×10^{-10} to 350×10^{-10} M with a detection limit of 6.2×10^{-12} M. The technique exhibited a good reproducibility and accuracy. Moreover, the constructed sensor exhibits a long-term of usage stability.

Keywords: FFT Coulometric Admittance Voltammetry, Thiamethoxam, Au nanoparticles, Ionic liquid

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