Amplified Electrochemical Sensor for Nano-molar Detection of Morphine in Drug Samples

Samad Jafari Zare¹, Mojtaba Masomi^{1*}, Mazyar Sharifzadeh Baei¹, Shahram Naghizadeh Raeisi² and Seyed-Ahmad Shahidi²

¹ Department of Chemical Engineering, Ayatollah Amoli Branch, Islamic Azad University, Amol, Iran

² Department of Food Science and Technology, Ayatollah Amoli Branch, Islamic Azad University, Amol 46311-39631, Mazandaran, Iran

*E-mail: mojtabamasomi@yahoo.com

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In this research, carbon paste electrode (CPE) was modified with MgO/SWCNTs nanocomposite and 1-methyl-3-octylimidazolium tetrafluoroborate (MOCITFB) and then used as a highly sensitive analytical approach for the determination of morphine in drug samples. In this study, the MgO/SWCNTs was synthesized using the simple precipitation method. The TEM image displayed the decoration of MgO nanoparticles with diameter ~ 40 nm at surface of SWCNTs. In addition, the electrochemical behavior of morphine was also investigated at surface of MgO/SWCNTs/MOCITFB/CPE with different pH values. The findings displayed an electro-oxidation mechanism in the presence of one electron and one proton. Moreover, the oxidation signal of morphine showed a linear calibration curve in the concentration range of 3.0 nM to 320 µM with the detection limit of 0.8 nM at surface of MgO/SWCNTs/MOCITFB/CPE. Moreover, the MgO/SWCNTs/MOCITFB/CPE was successfully used for the determination of morphine in injection sample with recovery range of 98.41% to 102.49%.

Keywords: Morphine, MgO/SWCNTs, 1-methyl-3-octylimidazolium tetrafluoroborate, Nanocomposite, Modified sensor

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