Electrochemical Nonenzymatic Sensor Based on NiOFe₂O₃@carbon Nanotubes Nanocomposite for Determination of Paraoxon in Fruits and Water

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Here, the NiOFe₂O₃@CNTs nanocomposite modified glassy carbon electrode (NiOFe₂O₃@CNTs/GCE) as nonenzymatic sensor was prepared for electrochemical determination of paraoxon in agricultural wastewater and apple juice. The sol-gel technique was used to synthesize the prepared nanocomposite. The structural and morphological characterizations of the nanocomposite were done by XRD and SEM analyses. The structural results showed that NiOFe₂O₃@CNTs/GCE composite has a high purity and great crystallinity with face-centered cubic structure of NiO nanoparticles (NiO NPs) and γ -Fe₂O₃ nanoparticles (Fe₂O₃ NPs) which well distributed on the walls of CNTs. Electrochemical studies were done by voltammetry and amperometry techniques which exhibited that the synergistic effect of CNTs, NiO and Fe₂O₃ NPs in the nanocomposite can improved the electron transfer properties and electrocatalytic response of the nanocomposite to paraoxon. The limit of detection, sensitivity and linear range were obtained of 0.001 μ M, 0.22246 μ A/ μ M and 10 to 220 μ M, respectively. Applied studies on the paraoxon sensor for determination of paraoxon in prepared real samples showed the good accuracy and acceptable values of recovery and RSD. Thus, the proposed sensor can be reliable and effective for the determination of paraoxon in real samples.

Keywords: NiOFe₂O₃@CNTs; Nanocomposite; Paraoxon; Nonenzymatic sensor; Agricultural wastewater; Amperometry

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