Electrochemical sensor based on TiO₂/polyvinyl alcohol nanocomposite for detection of ciprofloxacin in rainwater

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This work was focused on evaluating the electrochemical properties of TiO₂/polyvinyl alcohol (PVA) nanocomposite to determine Antibiotics in rainwater using differential pulse voltammetry (DPV) technique. TiO₂/PVA nanocomposite was coated using a facile dip-coating technique on a glassy carbon electrode (GCE). The morphological and structural properties of TiO₂/PVA nanocomposites were studied by SEM and XRD measurements. The surface morphology of the prepared TiO₂/PVA-GCE nanocomposite indicated that the TiO₂ nanoparticles were uniformly distributed in the structure of the PVA. Cyclic voltammetry results indicated that TiO₂/PVA nanocomposites have a high repeatability response and stability for the detection of antibiotics. The low detection limit, high sensitivity and wide linear range for determination of ciprofloxacin as an antibiotic were obtained 0.04μM, 0.8165μA/μM, and 10μM-120μM, respectively. The high performance of ciprofloxacin determination by TiO₂/PVA-GCE sensor in rainwater as a real sample indicated that the proposed sensor can be an appropriate choice for practical detection of pollutions in water sources.

Keywords: TiO₂/polyvinyl alcohol nanocomposite; Electrochemical sensor; Antibiotics; Rainwater; Differential pulse voltammetry; Cyclic voltammetry

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