Selective electrochemical sensor based on molecularly imprinted polymer on the surface of carbon nanotubes for determination of profenofos
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Abstract: This work presents the construction of a sensitive and highly selective sensor for profenofos (PFF) detection. The sensor was fabricated using molecularly imprinted polymer (MIP) coated on the surface of carbon nanotubes as the template and vinyltrimethoxysilane as the precursor with core-shell technique (CNTs@SiO$_2$-vinyl@MIP). The CNTs@SiO$_2$-vinyl@MIP nanocomposites were characterized by atomic force microscopy (AFM) and Fourier transform infrared spectroscopy (FT-IR). The CNTs@SiO$_2$-vinyl@MIP nanocomposites were coated on the surface of glassy carbon (GCE) electrode by drop casting to develop a novel electrochemical sensor. This modified electrode was applied to detect the PFF by cyclic voltammetry and amperometry in 0.01 M phosphate buffer, pH 7.0. The results indicated that PFF provide the oxidation current signal at 0.50 V (vs. Ag/AgCl). Cyclic voltammetric signal of PFF exhibits the linearity range of 2.5-50 µM ($y = 0.0932x + 0.5416$, $r^2 = 0.997$) The developed sensor performs highly sensitive and selective for the analysis of PFF.

Keywords: Electrochemical sensor; Molecularly imprinted polymer (MIP); Profenofos (PFF); Carbon nanotubes (CNTs); Core-shell particles