Electrochemical immunosensor based on MWCNT-CS as a signal amplification strategy for the detection of capsaicinoids

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We constructed an electrochemical immunosensor based on multiwalled carbon nanotube-chitosan (MWCNT-CS) for on-site detection of capsaicinoids, which are label compounds in waste oils. In this work, we fixed capsaicinoids antibodies (Abs) and ovalbumin (OVA) on the surface of the MWCNT-CS complex. The good adsorbability and conductivity of MWCNT was utilized to greatly enlarge the current response signal. OVA was embedded in the nonspecific sites of the Abs to enhance the detection sensitivity of the immunosensor. Cyclic voltammetry (CV) and differential voltammetry (DPV) were used to characterize the working principle and current response signals of the immunosensor. The parameters affecting the current response signal, such as the pH of the buffer solution, incubation time and Abs concentration, were optimized. The linear range of the immunosensor was 2–100 µg/mL, and the limit of detection (LOD) was 0.25 µg/mL. The aptasensor provides the advantages of high sensitivity, short time consumption and high stability. Overall, the results demonstrated that the developed method could meet the demands of rapid on-site assays for capsaicinoids in waste oil.

Keywords: Capsaicinoids; Immunosensor; Multiwalled carbon nanotube

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