Molecularly Imprinted Polymer-Based Electrochemical Sensor For The Determination of A Growth Hormone Inhibitor Octreotide

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Abstract

In this study, a new electropolymerized molecular imprinted polymer (MIP) film was synthesized by using cylic voltemetry (CV) in the presence of aniline, which is used as a functional monomer and template molecule octreotide (OC) on a glassy carbon electrode (GCE). The expression of MIP was optimized using $[Fe(CN)_6]^{3/4-}$ as a redox probe.

Removal and rebinding processes were performed with differential-pulse voltammetry (DPV) and electrochemical impedance spectroscopy (EIS) techniques. The analytical performance of MIP/aniline/GCE were investigated by comparing the electrochemical reaction of MIP with non-imprinted polymer (NIP).

The calibration curve of OC on MIP/aniline/GCE was found to be linear in the range of 1×10^{-14} M and 8×10^{-14} M. Limit of detection (LOD) and limit of determination (quantification) (LOQ) were determined 1.16×10^{-15} M and 3.85×10^{-15} M, respectively. The feasibility and validity of the developed sensor was proved by applying it to the artifical serum and pharmaceutical preparation. The selectivity of the sensor was compared by examining the binding of samotostatin from the same growth hormone family. The developed MIP@aniline/GCE sensor shows high sensitivity and selectivity for OC determination in serum. This is the first study in which OC determination was performed by electrochemical analysis.