MOLECULARLY IMPRINTED POLYMER (MIPS) AS ELECTROCHEMICAL SENSOR FOR DETECTION CHOLESTEROL

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ABSTRACT

Molecularly imprinted polymers (MIPs) are synthetic polymeric materials that are inherently long-term stable for chemical sensing purposes. The high selectivity and sensitivity of MIP-based sensor can be achieved if the template molecule is precisely being imprinted in the polymer, and produces an exactly fitted cavity for the template, and thus the development of robust artificial recognition element desirable in the field of sensor fabrication. A non-enzymatic imprinted voltammetry sensor was constructed in this study for cholesterol detection based on emulsion photo-polymerized methacrylic acid MIP microspheres on the carbon paste screen-printed electrode (SPE). The artificial MIP microspheres (microMIPs) recognition element capturing target cholesterol effectively though hydrogen bonding interaction between microMIPs and analyte cholesterol. Electrochemical quantitation of cholesterol concentration was performed by means Square Wave Voltammetry (SWV) technique by using redox couple of potassium ferricyanide [$K_3Fe(CN)_6$]. A decrement in the electrochemical SWV signal indicated that the cholesterol molecules were bound to the microspheres' cavities of the biomimetic MIP sensor, and formed electron transfer barrier to the redox species from electron transfer at the electrode surface. Under optimal conditions, the electrochemical MIP microsensor could detect cholesterol in the linear concentration range of 0.5 mg L^{-1} to 50.0 mg L^{-1} with a detection limit of 0.1 mg L^{-1}. The MIP microspheres-modified carbon SPE electrode providing good operational stability to cholesterol sensing of up to 11 days long.

Keywords: *Molecularly imprinted polymeric microsphere, Sensor, Cholesterol, Cyclic voltammetry (CV), Screen-printed electrode.*