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Construction of electrochemical acetylcholinesterase based biosensor with nanostructured membrane

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Acetylcholinesterae (AChE) based biosensors are analytical tools suitable for a fast and simple assay of neurotoxic compounds. In the present study, we focused our activity at construction of biosensors consisting of a screen printed sensor having on its surface immobilized AChE. Several immobilization protocols including immobilization onto spherical graphite particles and embedding into sol-gel were selected for construction of a voltammetric biosensor. The determination of AChE activity was based on electrochemical oxidation of thiocholine originating from an enzymatic substrate acetylthiocholine. The constructed biosensor was calibrated using the toxic pesticide carbofuran respective organophosphate diisopropylfluorphosphate resulting in limit of detection around 50 nmol/l. The biosensor seems to be suitable for practical performance in assay of pesticides in food and beverages, agrochemistry and similar fields.

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Ultrasensitive detection of pesticides and other food toxicants using biosensor: A modern analytical tool

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Pesticides are commonly being used on a large scale in agricultural practices to increase productivity but have created a negative impact on human health, environment and ecological balance. Thus, there is a need for development of an appropriate sensors based on nanomaterials, such as quantum dots (QDs) and gold nanoparticles (GNPs). These smart materials possess unique properties useful for biosensing applications. We have successfully made use of these NPs for the sensitive detection of 2, 4-dichlorophenoxy acetic acid (2, 4-D), methyl parathion (MP) and dichlorodiphenyltrichloroethane (DDT) based on competitive immunoassay technique. Cadmium telluride (CdTe QD) was employed for the detection of 2, 4-D and MP at 250 pgmL−1 and 100 pgmL−1 levels respectively. A GNPs-based dipstick technique was developed to detect DDT at nano-gram level. These techniques possess several advantages in terms of rapidity, specificity and cost effectiveness allowing for on-site testing of pesticides. Hence, biosensor systems are bringing about a revolution in the field of food and environmental safety.

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