

Biosensor for Organophosphorus Pesticides Based on Piezoelectric Crystal

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Organophosphorus pesticides have been used on a very large scale in agriculture. They act as inhibitors of cholinesterase, the effect often causes toxicological and ecological problem. This property also serves as the basis for a number of methods used for their analysis. In this paper a piezoelectric quartz crystal coated with acetylcholinesterase has been prepared for the assay of organophosphorus pesticides. A layer of enzyme was attached onto the silver electrode of a 10 MHz piezoelectric crystal precoated with 3-aminopropyltriethoxysilane. The binding of acetylcholinesterase on PZ crystal with organophosphorus compound caused the frequency change of PZ crystal. The difference in change related to the incubation time and the concentration of organophosphorus.

Preliminary results indicated a response to organophosphorus (methyl parathion) at the concentration less than 100 ppb at 25 °C. Increasing incubation time up to 30 min did not give any significant increase in the total signal. The orientation of enzyme and 3-aminopropyltriethoxysilane was compared with other precoated materials, polyethylene-imine (PEI) and protein A, by scanning electron microscope.

Keywords : Biosensor, Piezoelectric crystal, Organophosphorus pesticide