

Optimizations of a substrate-bound tyrosinase electrode for a measurements of pesticide

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With the growing concern over environmental issues, most of people who should purchase agricultural products are worried about residual pesticide. Due to their toxicity, development of quick analytical methods or an on-line monitoring is required to measure pesticide. Enzyme electrode is a reliable technique for fast screening of pesticides instead of the traditional off-line measurements. It is, however, not yet adequate for practical application to detect pesticides because a supply of an external substrate is needed to activate or maintain the enzyme activity. In this study, an optimization of substrate-bound tyrosinase (TYR) electrode using gold nanoparticles anchored to pyrroloquinoline (PQQ) for the determination of pesticide was described. The activity of TYR was maintained by oxidizing a catechol form of PQQ (PQQH₂) which was generated by the reduction of PQQ at the working electrode, and it permits the measurement of inhibition by pesticide. Thus, using this mechanism various pesticides such as parathion, carbaryl and carbofuran were properly measured through optimizations of a substrate-bound electrode.