Preparation of disposable enzyme electrode for detection of pesticides in real water sample

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Pesticides are important environmental pollutants since these are toxic and carcinogenic even at low concentration. The expanding use of organophosphate and carbamate insecticides injures human health. These reasons call for the development of an enzyme electrode as a rapid screening and quick analysis tool which is able to be applied in real water sample.
In this study, a screen printed carbon electrode was used to fabricate simple and relatively inexpensive biosensor for pesticide detection. In order to increase the current response of sensor, gold nanoparticles were deposited on the surface of carbon printed electrode. The gold nanoparticles were modified with the functionalized self-assembled monolayer to immobilize enzyme and mediators. The coulometric measurements were conducted to observe the inhibition percentage of the electrode by the exposure to pesticides. From the results, detection range of carbaryl, carbofuran, and parathion was from 5 ppt to 10 ppb, from 5 ppt to 1 ppb, and from 5 ppt to 10 ppb, respectively with showing 20 ~ 90 % of inhibition. The inhibition effects in river and tap water were slightly reduced due to the lower ionic strength compared to the buffer solution.