

Development of Non-enzymatic Electrochemical Sensor for Organophosphate Pesticide Detection using Copper (II) Oxide Nanorod Electrodes

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Supplementary Materials

Figure S1

UV-vis spectroscopy of complex product between electrodes and a) Chlorpyrifos and Pirimiphos, b) Parathion and Paraoxon.

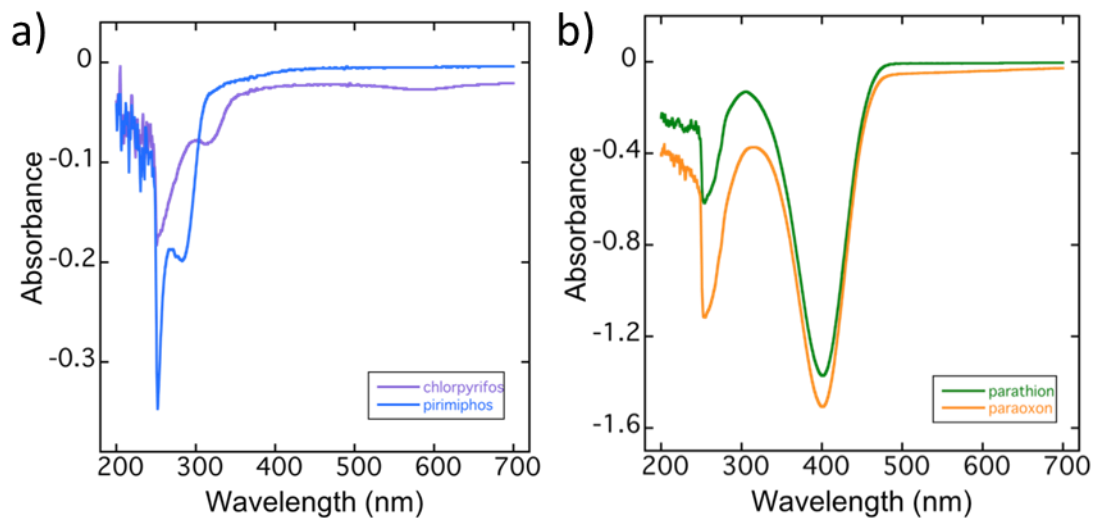


Table S1.

Comparison of various electrochemical sensor study for detection of organophosphate pesticides.

Types of pesticide	Sensing material integrating with structural support	Methods	Detection Limit/ Detection ranges	Ref.
Chlorpyrifos	AChE immobilized on an oxidized exfoliated graphite nanoplatelet (xGnPs)-chitosan cross-linked composite	Electrochemical	0.005 - 0.039 mM 0.064 - 0.258 mM	19 [†]
Methyl parathion	Recombinant E. coli immobilized on SPCE	Cyclic voltammetry	2-80 μ M	22 [†]
Paraoxon	Esterase 2 from Alicyclobacillus acidocaldarius immobilization on a nitrocellulose membrane	Electrochemical	2.75×10^{-3} ppm	20 [†]
Chlorpyriphos-oxon	poly(3,4-ethylenedioxythiophene) (PEDOT) incorporated in AChE- based screen printed biosensor	Electrochemical	1×10^{-10} M	23 [†]
Organophosphate	AChE on graphene/polyaniline (G/PANI) composite film	Electrochemical	20 ng/mL	24 [†]
Organophosphate	Pd wormlike nanochains/graphitic carbon nitride (Pd WLNCs/g-C ₃ N ₄) nanocomposites and acetylcholinesterase (AChE).	Electrochemical	1.00nM-14.96 μ M	25 [†]
Methyl parathion/ Parathion	ELP-OPH/BSA/TiO ₂ NFs/c-MWCNTs	Amperometric	10nM/12nM	27 [†]
Carbaryl	AChE/Ag NPs-CGR-NF/GCE	Cyclic voltammetry	54.5 μ M	33 [†]
Chlorpyrifos	AChE/Ag NPs-CGR-NF/GCE	Cyclic voltammetry	53 μ M	33 [†]
Paraoxon	TGO-UiO-66/GCE	Electrochemical	0.2 nM	28 [†]
Chlorpyrifos	TGO-UiO-66/GCE	Electrochemical	1.0 nM	28 [†]
Parathion	Nano nickel oxide on SPCE	Electrochemical	24 nM	29 [†]
Pirimiphos	CuO NRs	Cyclic voltammetry	0.294 μ M	This work
Paraoxon	CuO NRs	Cyclic voltammetry	0.557 μ M	This work
Parathion	CuO NRs	Cyclic voltammetry	0.612 μ M	This work
Chlorpyrifos	CuO NRs	Cyclic voltammetry	0.571 μ M	This work

[†]Reference numbers refer to the bibliography of main text.