Supporting Information

A Water-stable Luminescent Metal-organic Framework for Rapid and Visible Sensing of Organophosphorus Pesticides

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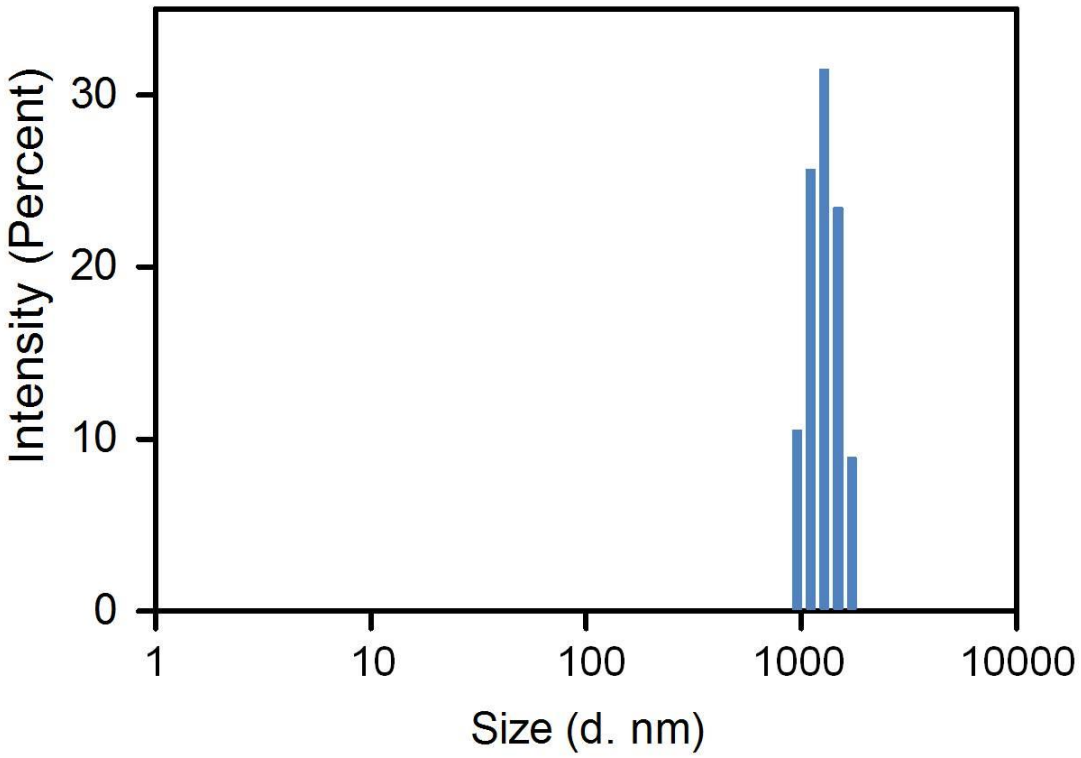


Figure S1. Size distribution of the rod-like Zr-LMOF suspended in water. The average diameter is 1290 nm, which is consistent with those results shown in Figure 2D.

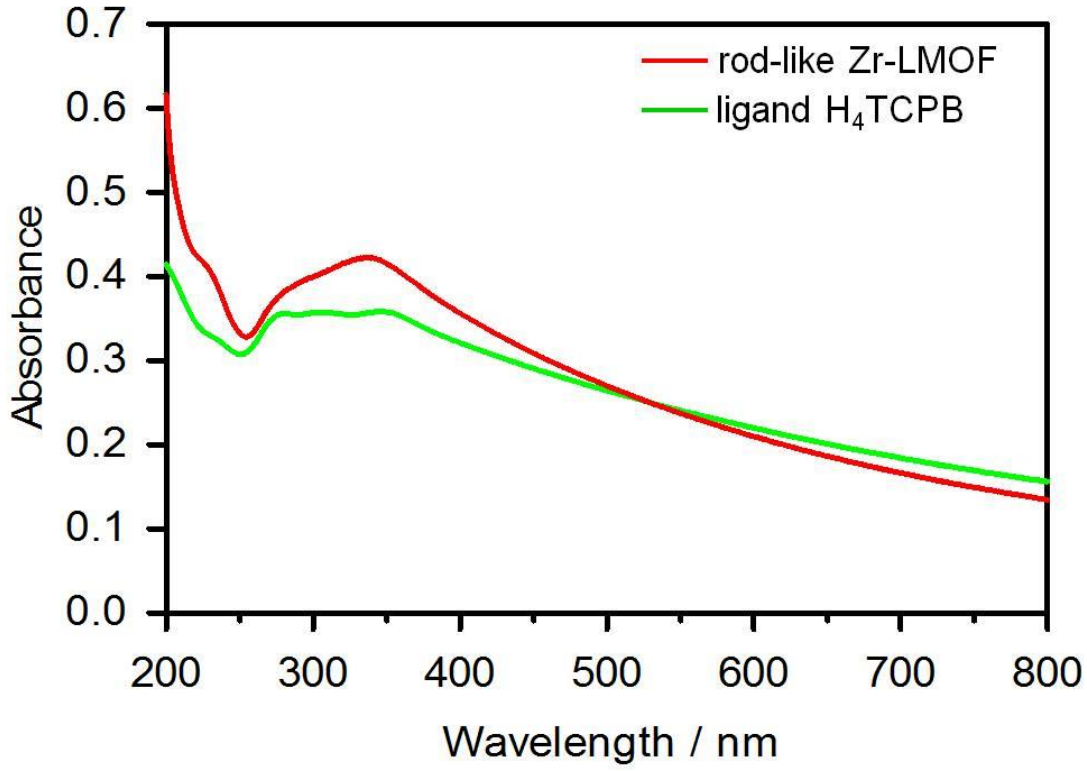


Figure S2. UV−visible absorption spectra of the ligand H_4TCPB and rod-like Zr-LMOF suspended in water.

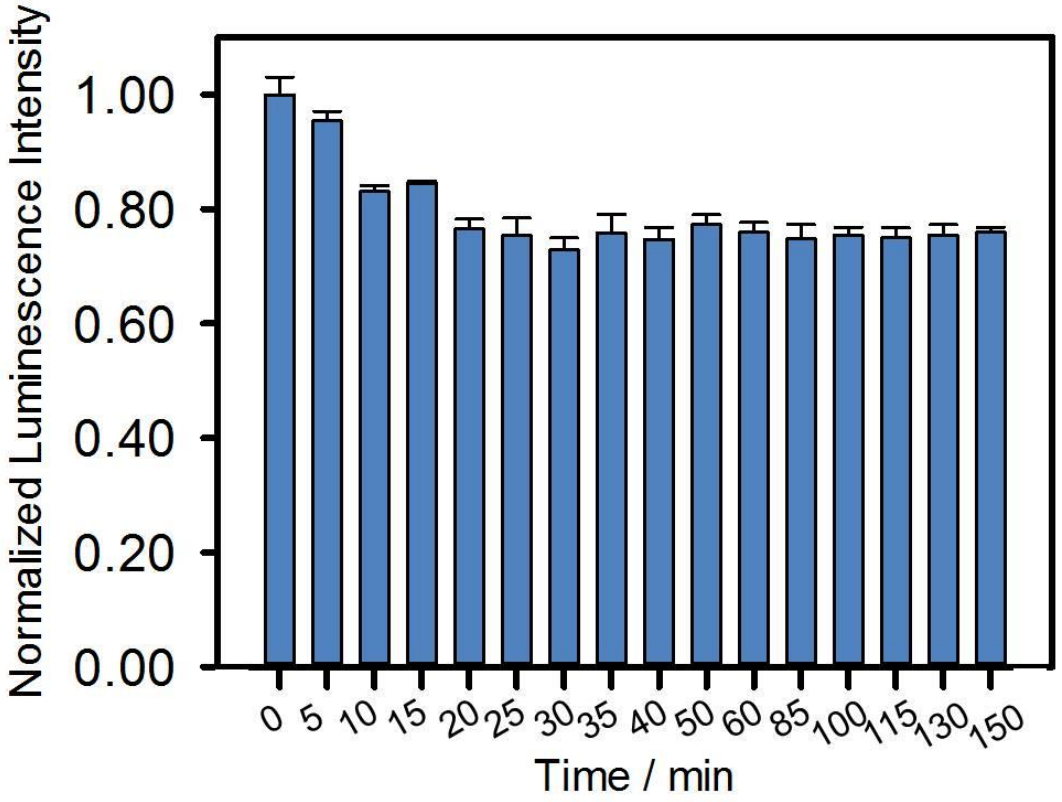


Figure S3. The stability against photobleaching of the rod-like Zr-LMOF under continuous irradiation with 365 nm ultraviolet light.

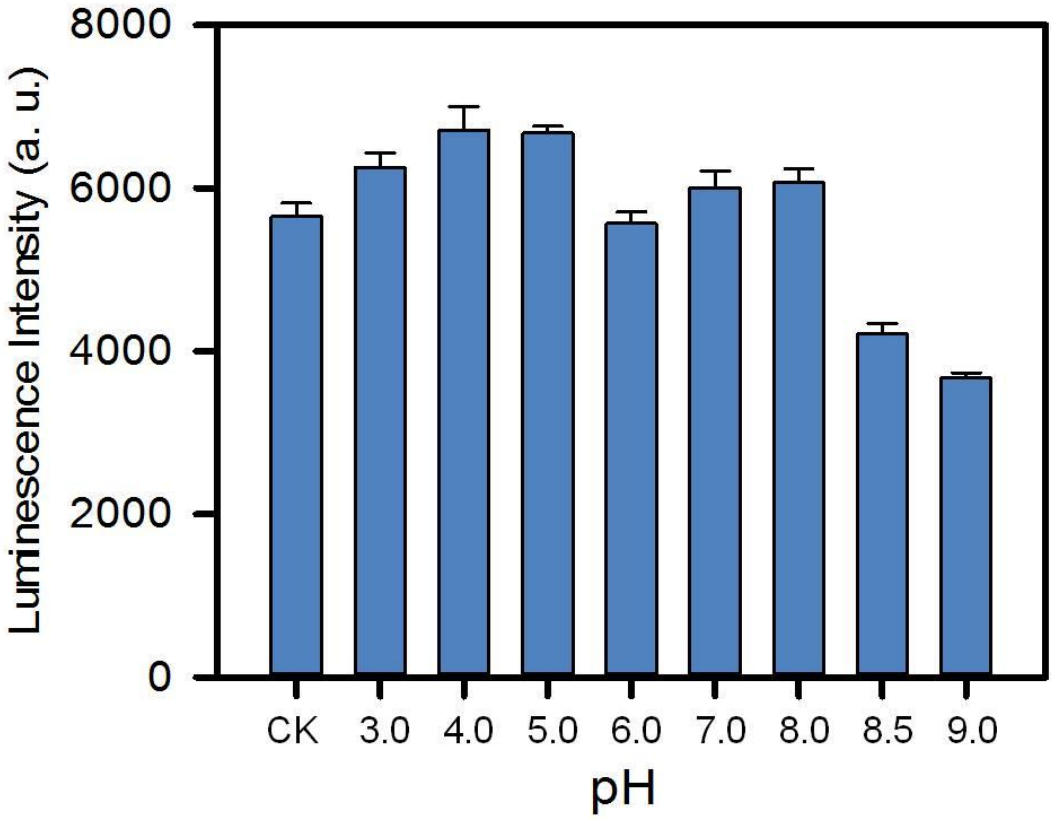


Figure S4. The effect of different pHs on the luminescence intensity of the rod-like Zr-LMOF.

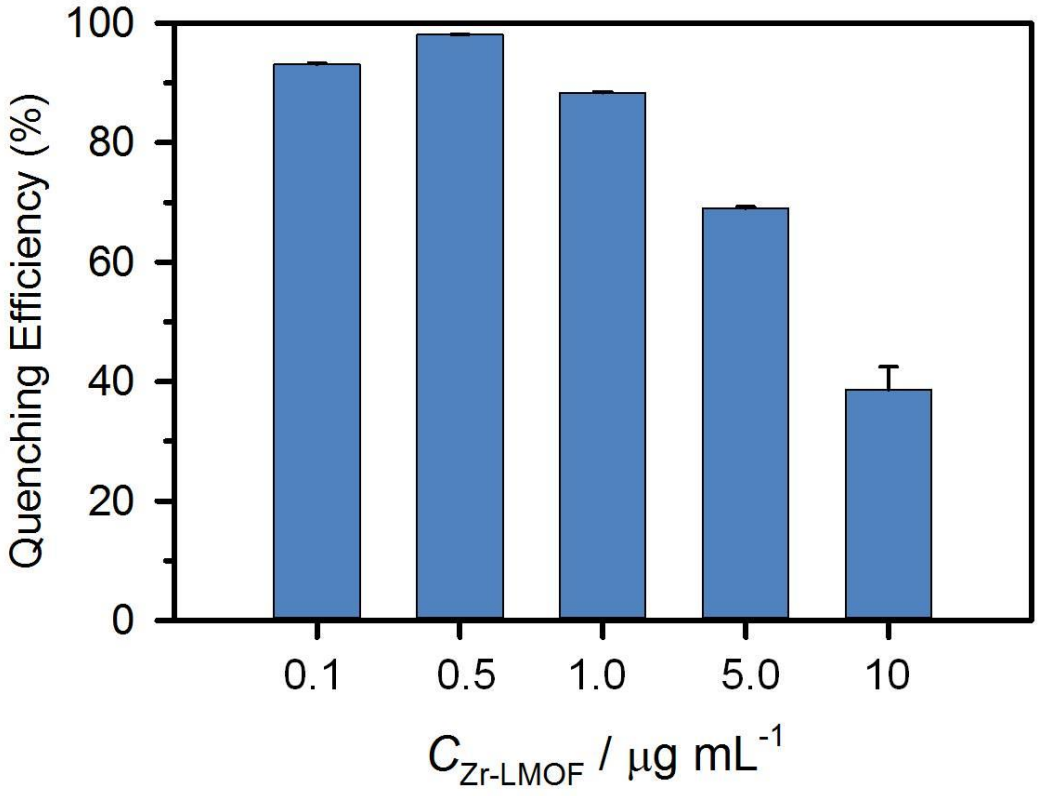


Figure S5. Photoluminescence response of different concentration of Zr-LMOF against 5 mg kg^{-1} parathion-methyl.

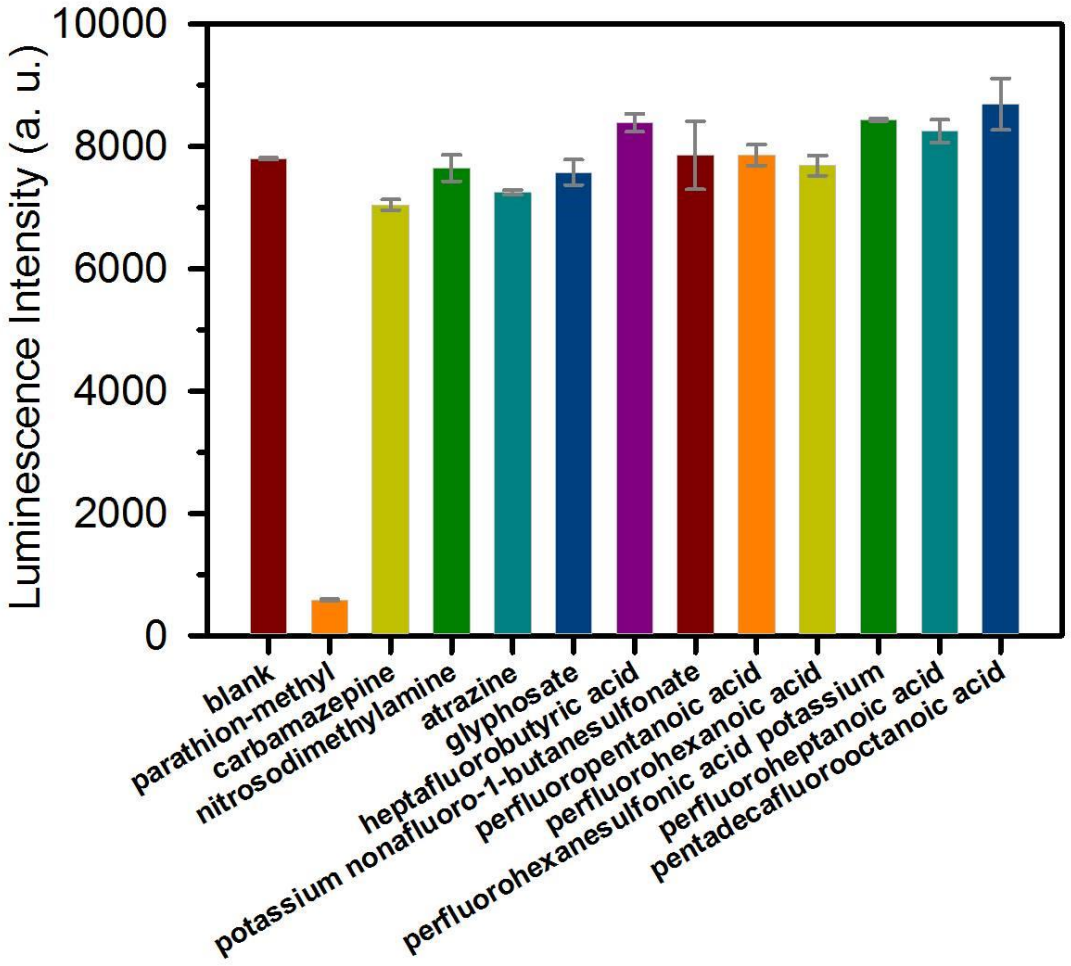


Figure S6. Luminescence intensity comparison of Zr-LMOF upon addition of parathion-methyl and different organic contaminants at the same concentration of 5 ppm.

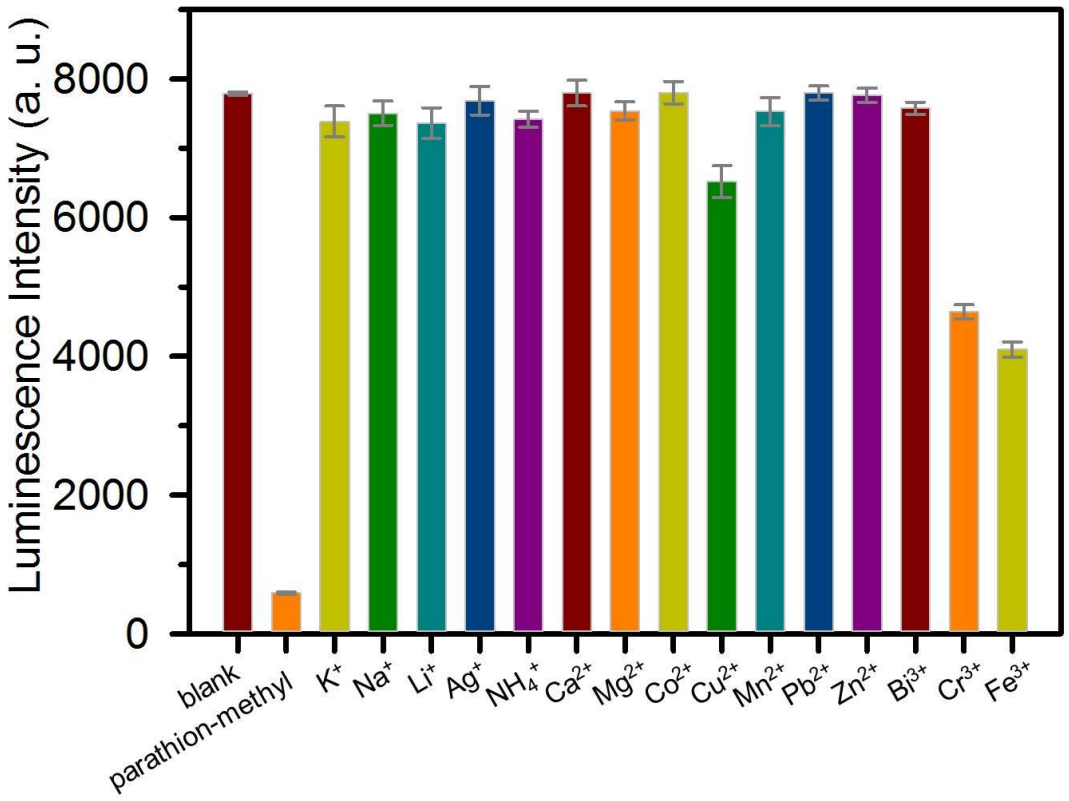
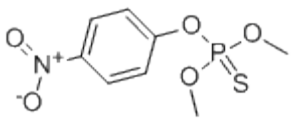
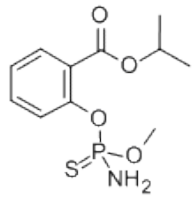
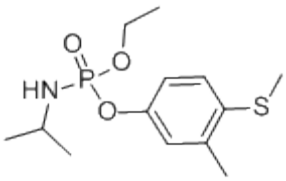
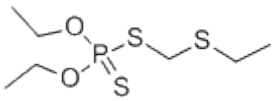
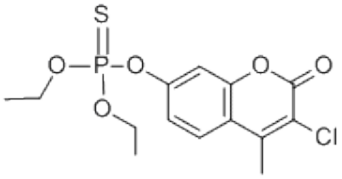
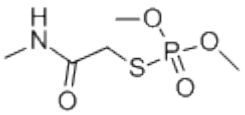
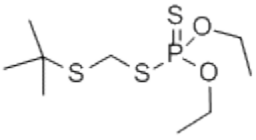


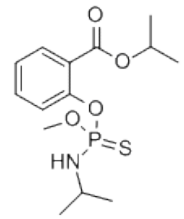
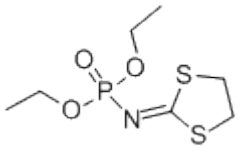
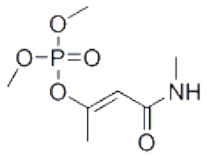
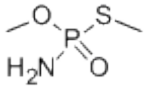
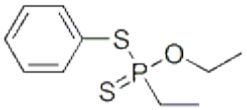
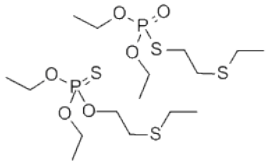
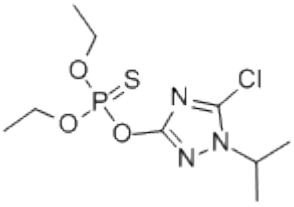
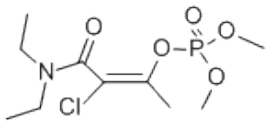
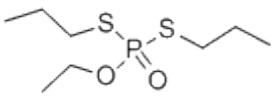
Figure S7. Luminescence intensity comparison of Zr-LMOF upon addition of parathion-methyl and different cations. Compared with various cations (1.0 mM), parathion-methyl (0.02 mM) produces a more obvious quenching signal (the second bar) at a much lower concentration (50 times lower).

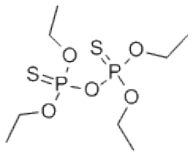
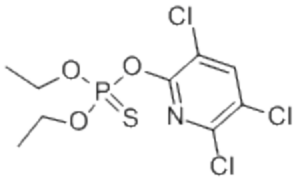
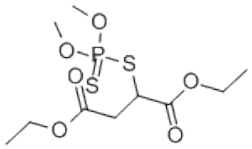
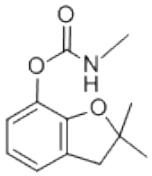
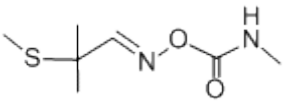
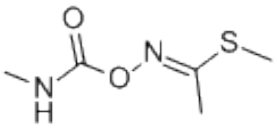
Table S1. Performance of our Zr-LMOF based luminescent sensor and those of other reported sensors for the detection of parathion-methyl.

Methods	Linear range	Detection limit	Reference
This work	0.07 – 5 mg kg^{-1}	0.115 μg kg^{-1} (0.438 nM)	Current work
Reduced Graphene Oxide/Palladium Tetraphenylporphyrin Nanocomposite based electrochemical sensor	0.1 – 125 μM	7.4 nM	1
Praseodymium molybdate decorated reduced graphene oxide based electrochemical sensor	0.002 – 1.55 μM, 1.55 – 114 μM	1.8 nM	2
CuO-TiO2 Nonenzymatic electrochemical sensor	0 – 2000 μg kg^{-1}	1.21 μg kg^{-1}	3
Near infrared fluorescent probe	0.10 – 38.00 μM	60 nM	4
Molecularly imprinted microsphere paste modified electrode sensor	1×10^{-3} – 8 nM	3.4×10^{-4} nM	5
Fluorescent nanoprobe	0.1 – 30 mg kg^{-1}	85 μg kg^{-1}	6
CdTe quantum dots-based fluorescence sensor	25 – 3000 μg kg^{-1}	18 μg kg^{-1}	7
MOFs-based fluorescence sensor	1.0 μg kg^{-1} – 10 mg kg^{-1}	0.12 μg kg^{-1}	8
Enzyme-Linked Immunosorbent Assay (ELISA)	0.4 – 19.3 μg kg^{-1}	0.2 μg kg^{-1}	9

Table S2. Molecular structures of the 22 highly toxic or frequently used pesticides (19 organophosphorus and 3 non-organophosphorus pesticides).

Serial number	Name	Molecular formula	Molecular structures
1	parathion-methyl	$C_8H_{10}NO_5PS$	
2	isocarbophos	$C_{11}H_{16}NO_4PS$	
3	fenamiphos	$C_{13}H_{22}NO_3PS$	
4	phorate	$C_7H_{17}O_2PS_3$	
5	coumaphos	$C_{14}H_{16}ClO_5PS$	
6	omethoate	$C_5H_{12}NO_4PS$	
7	terbufos	$C_9H_{21}O_2PS_3$	

8	isofenphos-methyl	$C_{14}H_{22}NO_4PS$	
9	phosfolan	$C_7H_{14}NO_3PS_2$	
10	monocrotophos	$C_7H_{14}NO_5P$	
11	methamidophos	$C_2H_8NO_2PS$	
12	fonofos	$C_{10}H_{15}OPS_2$	
13	demeton	$C_{16}H_{38}O_6P_2S_4$	
14	isazofos	$C_9H_{17}ClN_3O_3PS$	
15	phosphamidon	$C_{10}H_{19}ClNO_5P$	
16	ethoprophos	$C_8H_{19}O_2PS_2$	

17	sulfotep	$C_8H_{20}O_5P_2S_2$	
18	chlorpyrifos	$C_9H_{11}Cl_3NO_3PS$	
19	malathion	$C_{10}H_{19}O_6PS_2$	
20	carbofuran	$C_{12}H_{15}NO_3$	
21	aldicarb	$C_7H_{14}N_2O_2S$	
22	methomyl	$C_5H_{10}N_2O_2S$	

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