Supporting Information

Template protection of gold nanocluster for detection of organophosphorus pesticides

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1. Preparation of the BSA-AuNCs

BSA-AuNCs were prepared following previous method. Briefly, 5 mL BSA solution (50 mg mL^{-1}, 37 ^oC) was mixed 5 mL aqueous $HAuCl_4$ solution (10 mM, 37 ^oC). 2 min later, adding 1 M NaOH solution (0.5 mL). The final solution was incubated at 37 ^oC for 12 h then stored at 4 ^oC.

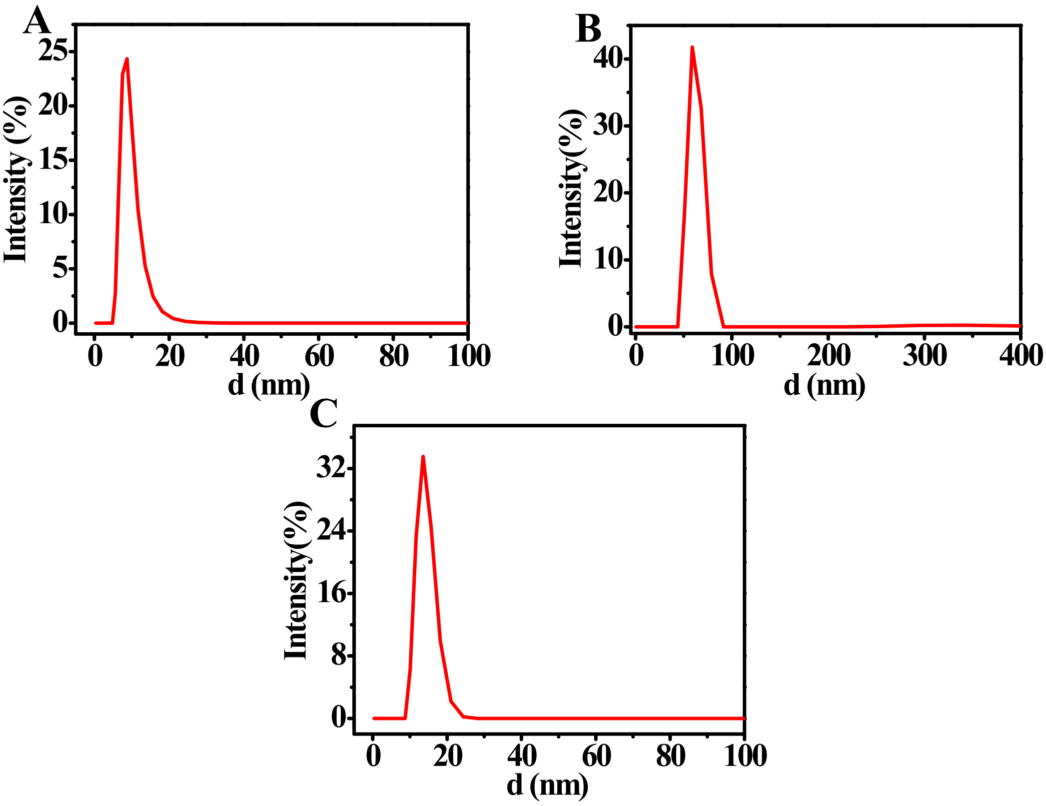

Fig. S1. DLS of (A) BSA-AuNCs; (B) BSA-AuNCs was incubated with 10 μg mL^{-1} trypsin in Tris-HCl (50 mM, pH 8.5) for two hours in 37 °C bath; (C) BSA-AuNCs/ trypsin incubated with 5 ug mL^{-1} glyphosate.

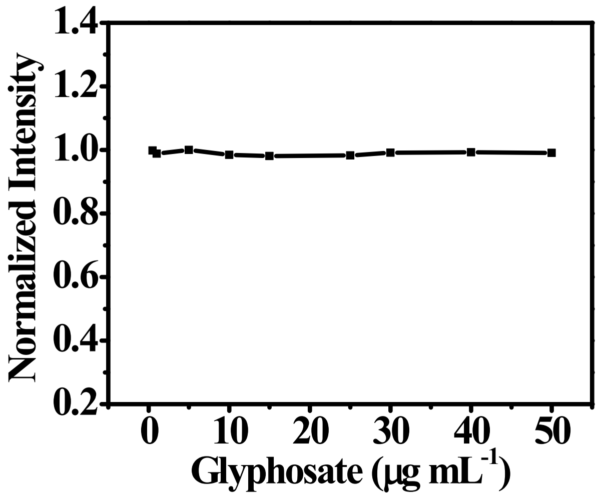

Fig. S2. The influence of different concentration (0.5, 1.0, 5.0, 10.0, 15.0, 25, 30, 40, and 50 μg mL^{-1}) of glyphosate on the fluorescent intensity of BSA-Au NCs.

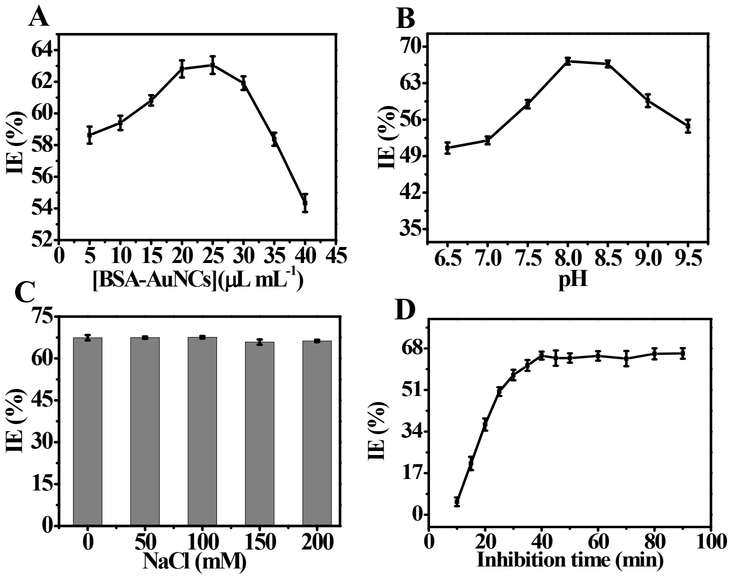

Fig. S3. Effect of (A) the concentration of BSA-AuNCs, (B) pH, ionic strengths (ionic strengths were controlled by various concentrations of NaCl) and (D) inhibition time and on inhibition efficiency of BSA-AuNCs/ trypsin/glyphosate. The slit widths of emission and excitation were 5 nm.

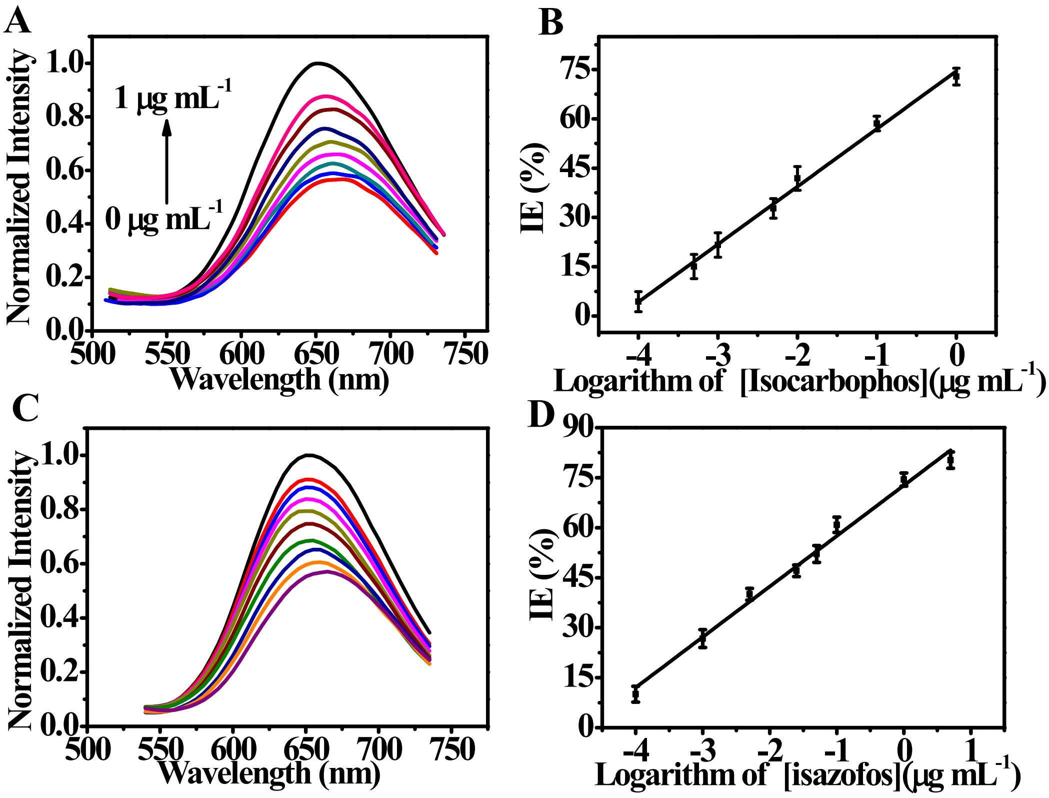

Fig. S4. (A, C) Fluorescence spectra of BSA-AuNCs/trypsin system in the presence of various concentration of isocarbophos (from bottom: 0.1 ng mL^{-1} to 1 ug ml^{-1}) and isazofos (from bottom: 0.1 ng mL^{-1} to 5 ug ml^{-1}). (B, D) the linear plot of the inhibition efficiency versus the logarithm concentration of isocarbophos and isazofos. The slit widths of emission and excitation were 5 nm.

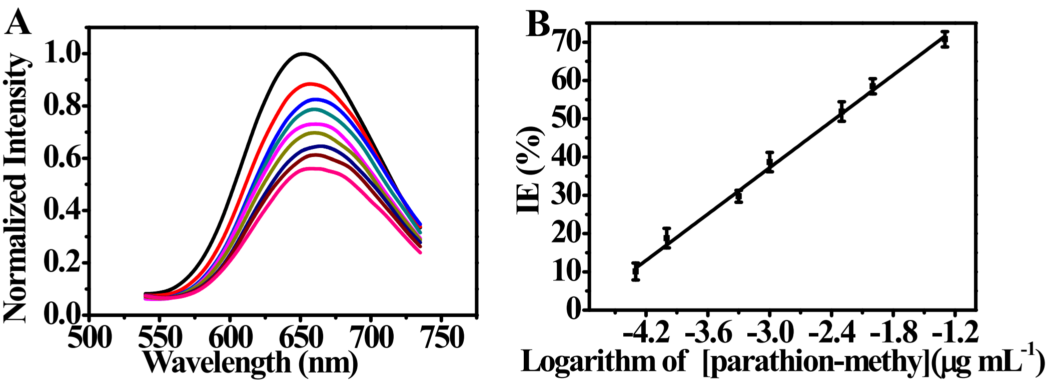

Fig. S5. (A) Fluorescence spectra of BSA-AuNCs/trypsin system in the presence of various concentration of parathion-methyl (from 0.05 ng mL^{-1} to 50 ng mL^{-1}. (B) the linear plot of the inhibition efficiency versus the logarithm concentration of parathion-methyl. The slit widths of emission and excitation were 5 nm.

Table S1. Comparison of different typical techniques for the determination of organophosphorus pesticides.

analyte	Method	Linear range	Detection limit	Ref.
parathion	Fluorescence	——	1.3×10^{-6} μg mL^{-1}	1
parathion	Cyclic voltammetric	4.0×10^{-1}-6.0 μ g mL^{-1}	——	2
parathion	Fluorescence	7.49×10^{-5}-7.49×10^{-1}μg mL^{-1}	6.76×10^{-5} μg mL^{-1}	3
parathion	Fluorescence	2.0×10^{-5}-2.0×10^{-2} μg mL^{-1}	6.7×10^{-6} μg mL^{-1}	4
monocrotophos	Electrochemical	10^{-11}-10^{-6} M (2.2×10^{-6}-2.2×10^{-1} μg mL^{-1})	2.7×10^{-12} M (6.0×10^{-7} μg mL^{-1})	5
monocrotophos	Electrochemical	1–50 nM (2.2×10^{-4}-1.1×10^{-2} μg mL^{-1})	1.0 nM (2.2×10^{-4} μg mL^{-1})	6
dimethoate	Colorimetric	2.5×10^{-7}-1×10^{-4} M (5.7×10^{-2}-23 μg mL^{-1})	0.3 ppm (0.3×10^{-3} μg mL^{-1})	7
dimethoate	Chemiluminescent	——	5×10^{-5}μg mL^{-1}	8
Paraoxon	Fluorescence	5.0×10^{-5}–5.0×10^{-2} μg mL^{-1}	5.0×10^{-5} μg mL^{-1}	9
parathion-methyl	Fluorescent	4×10^{-5} - 4×10^{-3} μg mL^{-1}	1.8×10^{-5} μg mL^{-1}	10
paraoxon	Fluorescent	2.5×10^{-4} - 5.0×10^{-2} μg mL^{-1}	1.0×10^{-4} μg mL^{-1}	11
methyl parathion	Fluorescent	2.63×10^{-5} -2.63×10^{-1} μg mL^{-1}	1.263×10^{-5} μg mL^{-1}	12
Glyphosate	Surface-enhanced Raman scattering	0.0001-10 ppm (0.0001ug mL^{-1}-10 ug mL^{-1})	0.1 ppb (0.0001ug mL^{-1})	13
Glyphosate	Fluorescent	1.0×10^{-4}-5 μg mL^{-1}	3.7×10^{-4} μg mL^{-1}	Present work

Table S2. Recovery ratios of parathion-methyl in real samples.

Determination methods		BSA-AuNCs/trypsin sensor			Chromatography		
Samples	Added (ng mL^{-1})	Measured (ng mL^{-1})	Recovery (%)	RSD (n = 3 %)	Measured (ng mL^{-1})	Recovery (%)	RSD (n = 3 %)
Pakchoi	5	4.94	98.8	4.26	5.21	104	2.92
	50	51.6	103	1.28	48.8	97.6	1.62
Tomato	5	4.82	96.4	2.92	4.86	97.2	2.79
	50	48.5	97.0	3.98	49.1	98.2	2.17
Wheat Flour	5	5.41	108	2.81	5.30	106	2.62
	50	49.8	99.6	1.92	49.8	99.6	3.42

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