

Supplementary Material

A Rapid and sensitive gold nanoparticle-based lateral flow immunoassay for chlorantraniliprole in agricultural and environmental samples

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Table S1. IC₅₀ of different anti-CAP mAbs by ic-ELISA

mAb	IC ₅₀ of mAb (ng/mL)
3G1D10	0.65
2C12D10	0.67
5C5B9	0.24
3H12C8	10.51
1E11E7	1.44

Table S2. Cross-reactivity of analogs structurally related to CAP determined by ic-ELISA

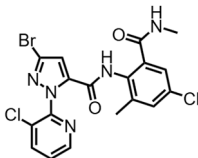
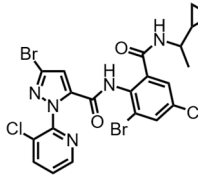
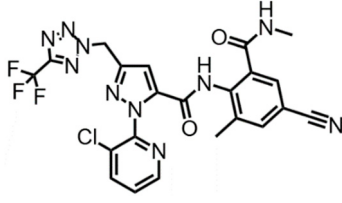
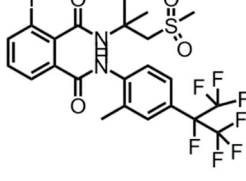
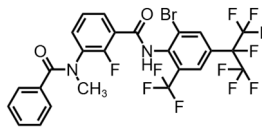
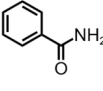
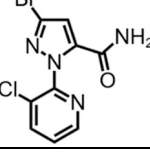
Compound	Structural formula	IC ₅₀ (ng/mL)	CR (%)
Chlorantraniliprole		0.24	100
Cyclaniliprole		69.9	28.8
Tetraniliprole		79.8	0.3
Flubendiamide		>2000	<0.01
Broflanilide		>2000	<0.01
Benzamide		>2000	<0.01
2-(3- chlorine thiophene-2)-3- ketone amino-5- bromine pyrazole		>2000	<0.01

Table S3. The comparison of immunoassays for CAP

Immunoassay	Format	Sensitivity ^a (ng/mL)	Detection time (min)	Reference
ELISA	competitive	1.6	135	[18]
ELISA	competitive	1.5	180	[19]
LFIA	competitive	2.5	15	[32]
AuNP-LFIA	competitive	1.25	10	This work

^a IC₅₀ and visible LOD are used to represent the sensitivity of ELISA and LFIA, respectively.

Table S4. Results of CAP residue detection by UPLC–MS/MS on spiked samples (*n* = 3).

Spiked (mg/kg)	Recovery (%)					Average recovery (%)	RSD (%)
	1	2	3	4	5		
0.005	97.3	99.8	101.8	103.7	96.9	99.9	2.7
0.02	101.5	99.6	91.4	89.9	91.1	94.6	6.1
0.5	98.9	96.9	100.3	105.7	96.5	99.7	3.7

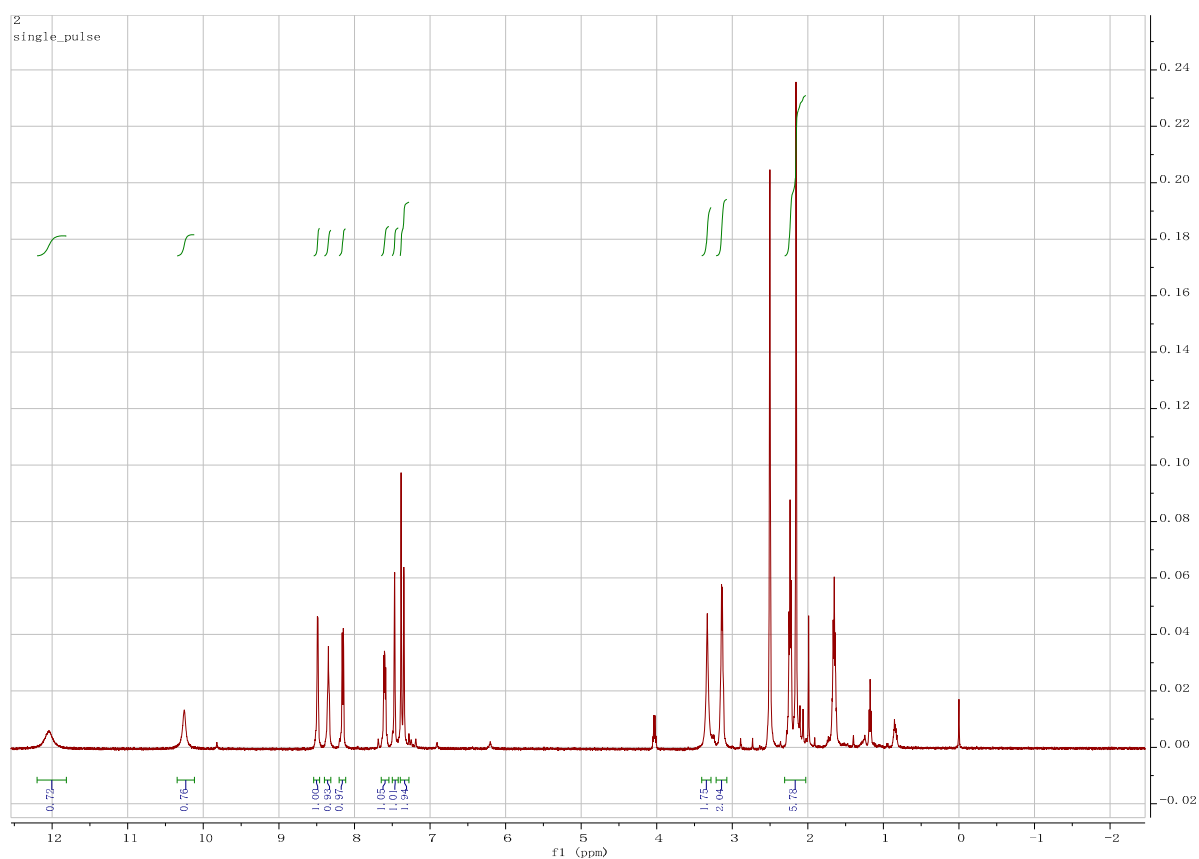


Fig. S1. Illustration of ^1H -NMR for CAP hapten

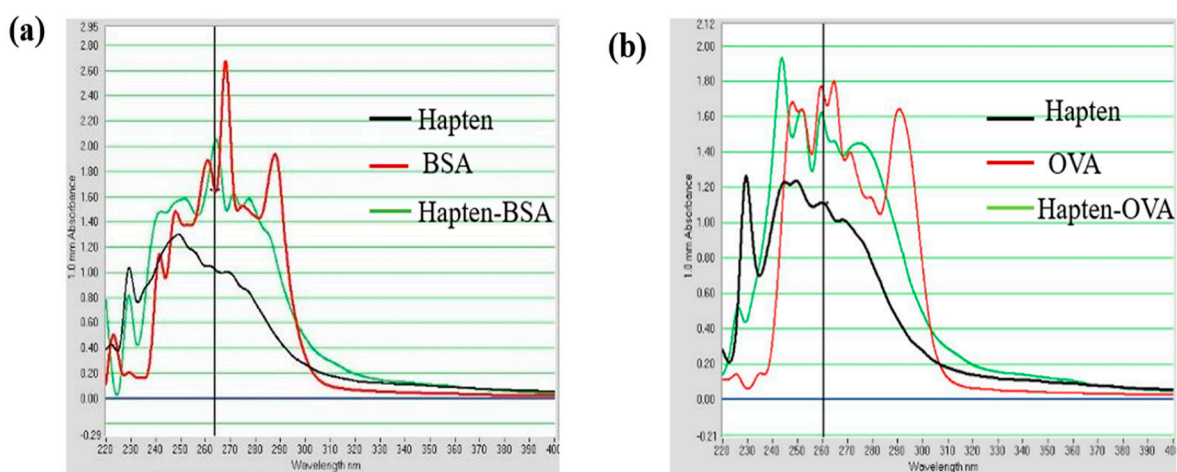


Fig. S2. Ultraviolet absorption spectra of (a) hapten-BSA and (b) hapten-OVA; the concentrations of hap-ten, BSA, OVA, hapten-OVA, and hapten-BSA were 5 mg/mL, 15 mg/mL, 15 mg/mL, 15 mg/mL, and 10 mg/mL, respectively

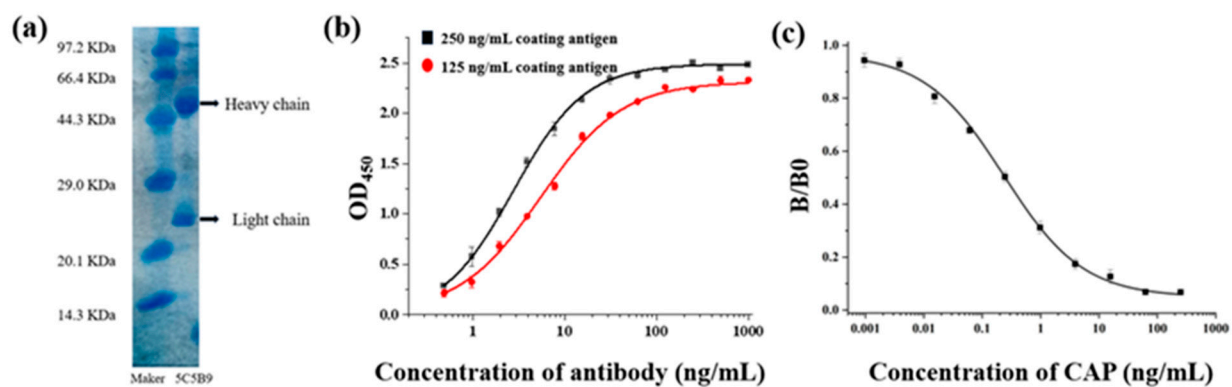


Fig. S3. (a) SDS-PAGE analysis of antibody 5C5B9, (b) Kaff of antibody 5C5B9 by ELISAs, and (c) standard curve of ic-ELISA for CAP

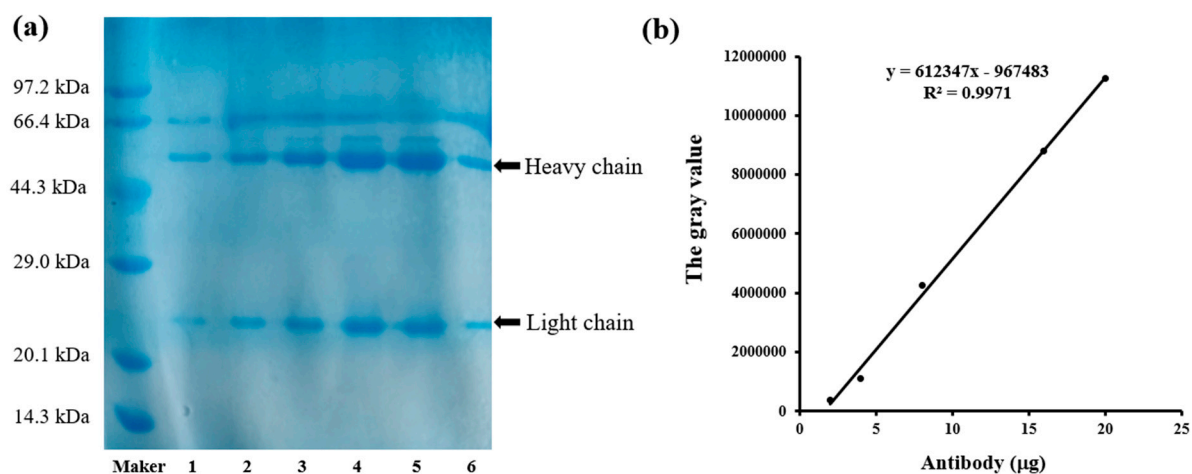


Fig. S4. (a) SDS-PAGE of mAb 5C5B9 and AuNP-labeled mAb; lines 1–5 loaded with 2 μg, 4 μg, 8 μg, 16 μg, and 20 μg mAb 5C5B9, and line 6 loaded with 0.54 mg AuNP-labeled mAb. (b) The standard curve representing the relationship between the gray value of the heavy chain band and the amount of antibody

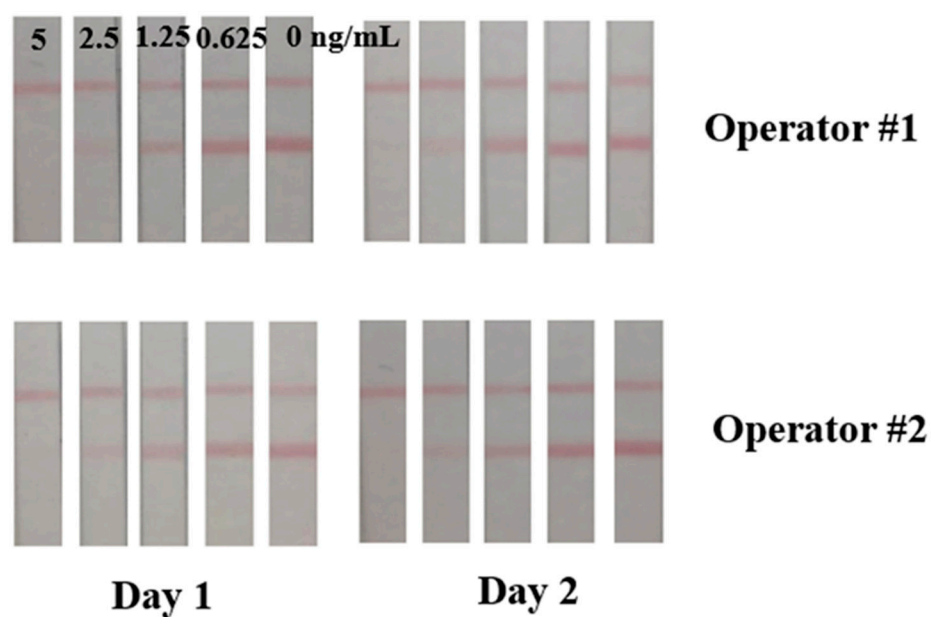


Fig. S5. The sensitivities of the AuNP-LFIA at different detection times with different operators

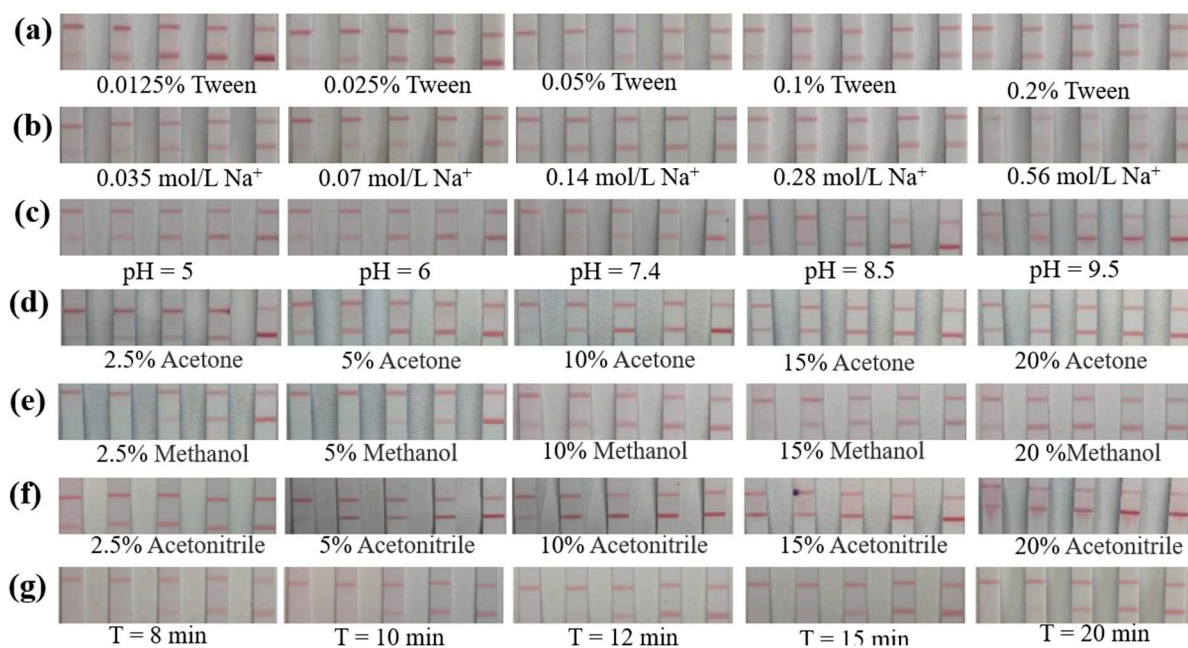


Fig. S6. Optimal parameters for the AuNP-LFIA. (a) Tween-20, (b) Na⁺, (c) pH, (d) methanol, (e) acetone, (f) acetonitrile, (g) time. CAP concentrations (ng/mL, from left to right): 5, 2.5, 1.25, 0.625, and 0

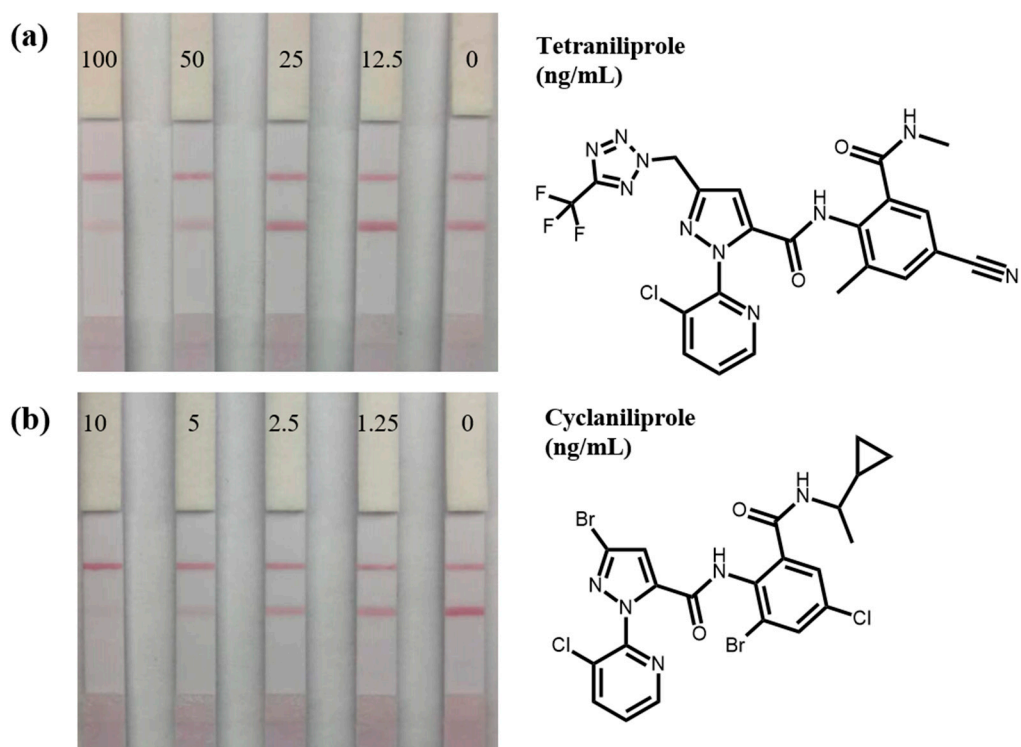


Fig. S7. Images of the AuNP-LFIA for serial concentrations of (a) tetraniliprole and (b) cyclaniliprole

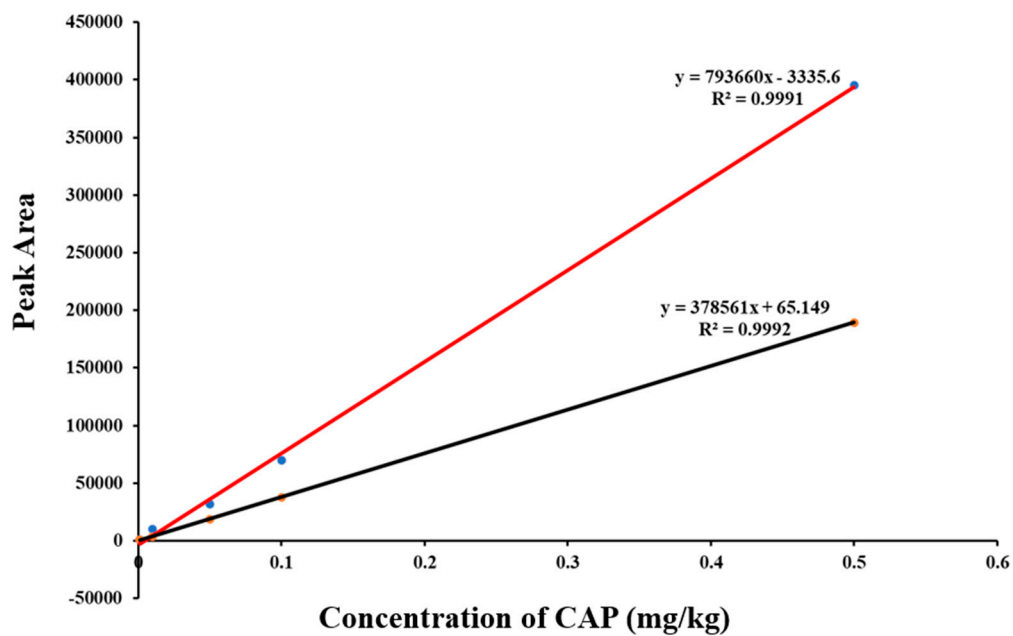


Fig. S8. The solvent standard curve of the solvent and matrix for CAP in brown rice detected by UPLC-MS/MS