

Supporting Information

Ultrasensitive SERS-Immunochromatographic Assay for Pesticide Detection Using Core-Shell Au@Au Nanoparticles: A 10³-Fold Sensitivity Boost Over LFA

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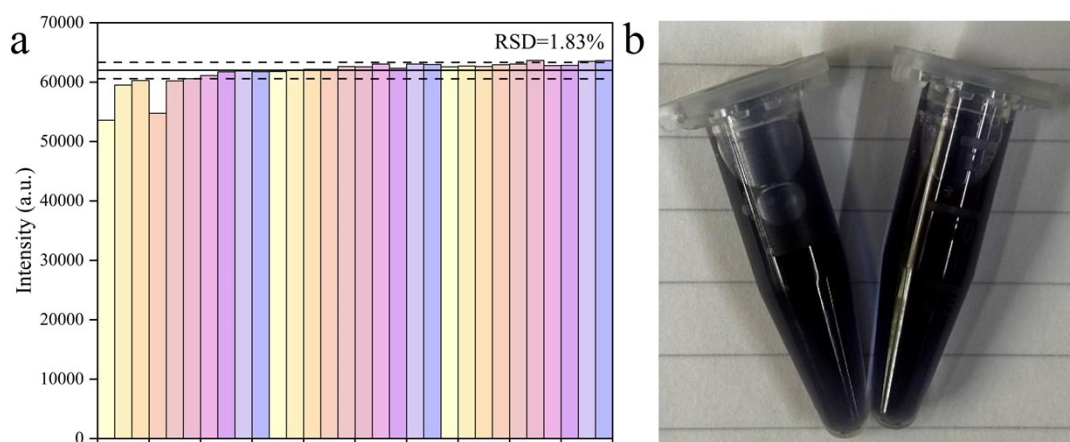


Figure S1. (a) Reproducibility test of the Raman peak at 1072 cm^{-1} for the optimized $\text{Au}^{\text{MPBN}}@Au$ substrate. (b) Photograph of the $\text{Au}^{\text{MPBN}}@Au$ substrate.



Figure S2. Immunoprobe solution under coagulation

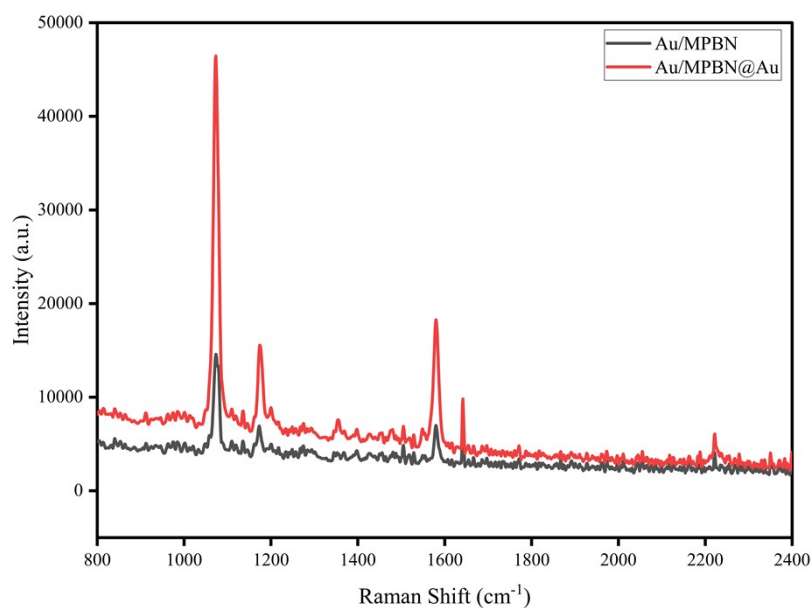


Figure S3. Comparison of SERS performance between Au@MPBN and core-shell Au^{MPBN}@Au

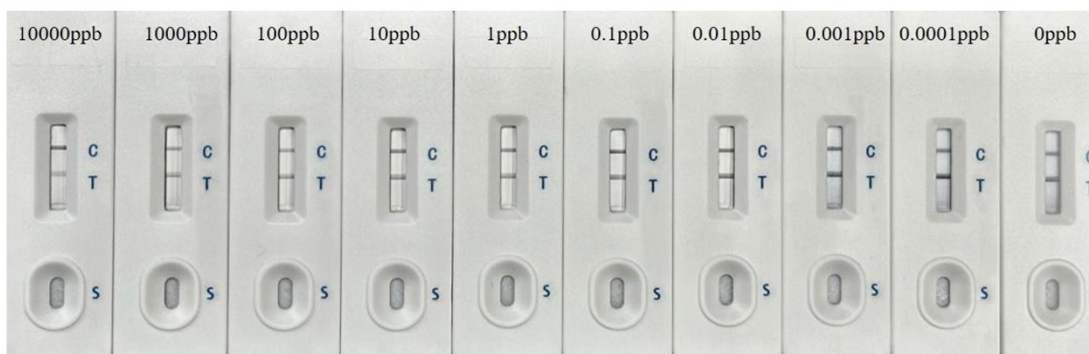


Figure S4. Photographs of packaged test strips after testing with lambda-cyhalothrin standard solutions at concentrations of 0 ppb and 10^{-2} to 10^4 ppb.

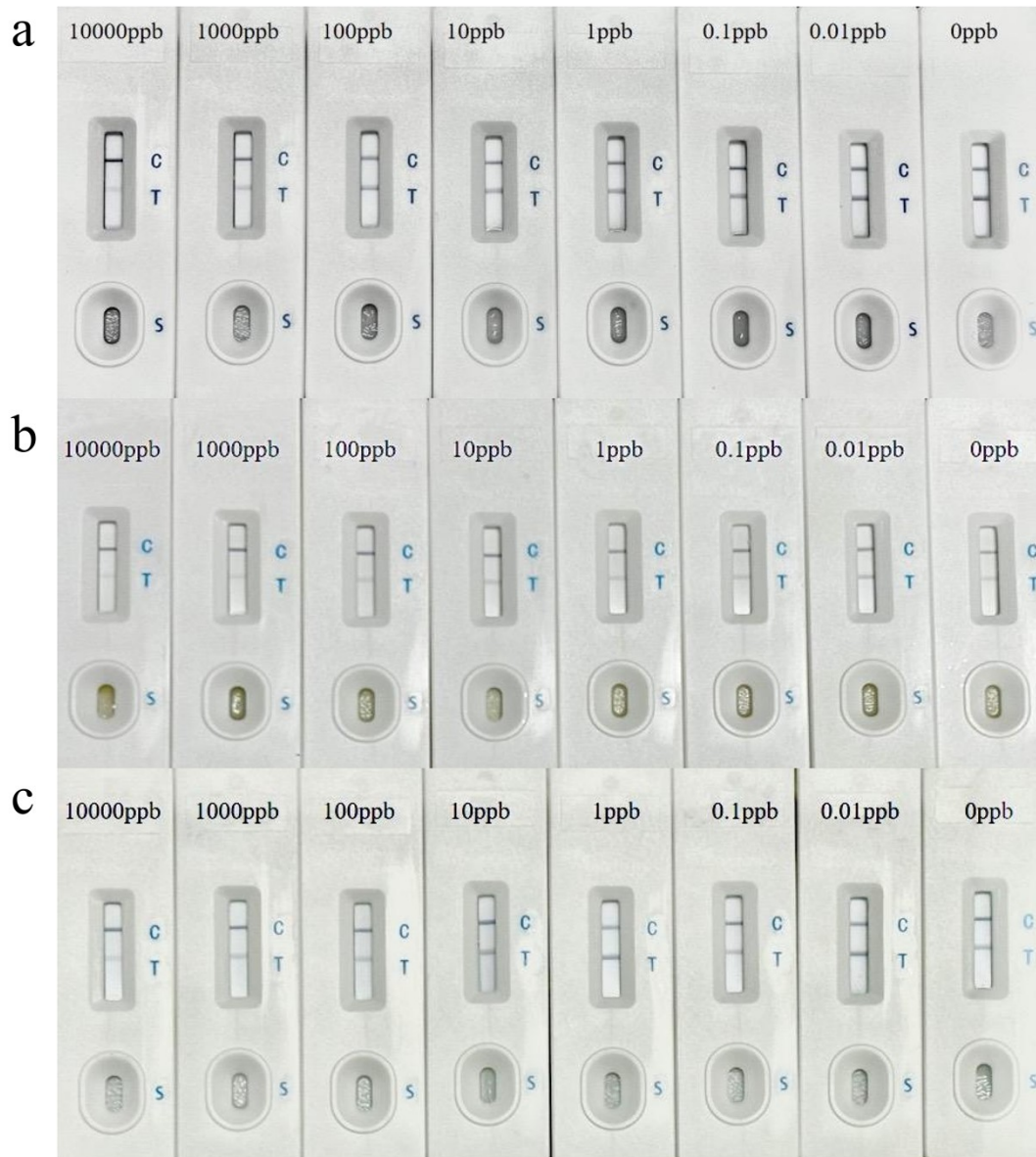


Figure S5. Photographs of packaged test strips from actual samples tested with lambda-cyhalothrin standards at concentrations of 0 ppb and 10^{-2} to 10^4 ppb. (a) Grape; (b) Eggplant; (c) Green pepper.

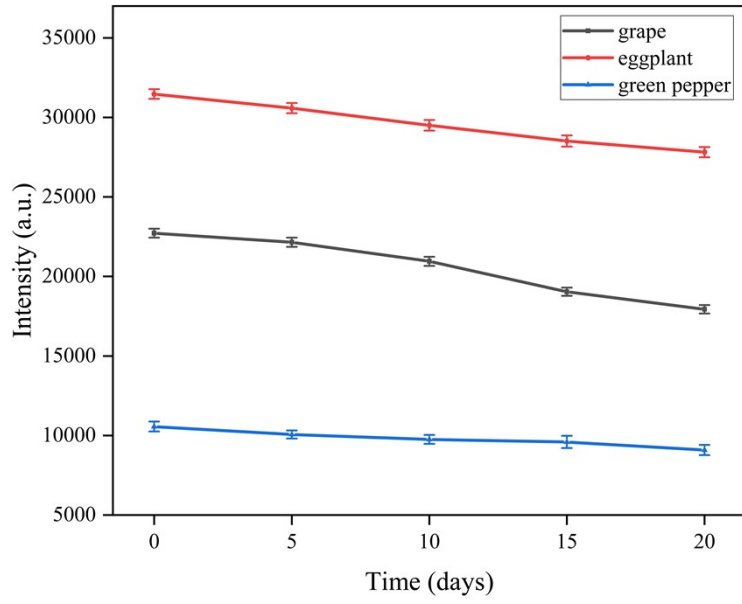


Figure S6. Graph of the relationship between Raman intensity of test strip test line and storage time in actual sample detection.

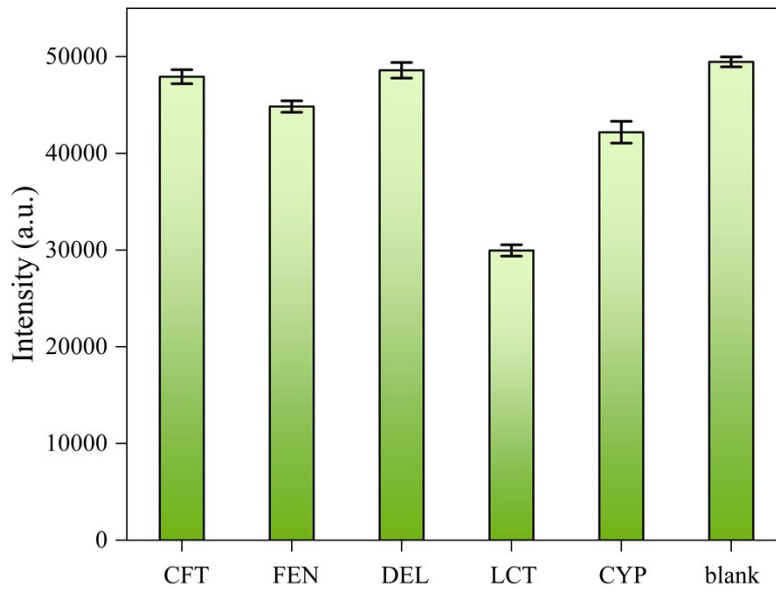


Figure S7. Specificity analysis of SERS-ICA.

Table S1. Comparison of spiked and predicted concentrations of lambda-cyhalothrin and the corresponding recovery rates.

Sample	Spiked concentrations (ppb)	Predicted concentrations (ppb)	Recovery ^a (%)
Grape	1	0.83	83.10
	10	10.88	108.80
	100	111.06	111.06
	1000	980.23	98.02
	10000	8903.68	89.04
Eggplant	1	1.10	110.00
	10	9.75	97.50
	100	113.56	113.56
	1000	918.20	91.82
	10000	9487.65	94.88
Green pepper	1	0.92	92.00
	10	9.24	92.40
	100	104.16	104.16
	1000	1047.55	104.76
	10000	9332.74	93.33

^a Recovery = (Predicted concentration/Spiked concentration) × 100%.

Table S2. Comparison of spiked and predicted concentrations, corresponding recovery rates, and RSD values for blind sample detection of lambda-cyhalothrin.

Sample	Spiked concentrations (ppb)	Predicted concentrations (ppb)	Recovery (%) (mean \pm SD, n = 4)	RSD (%)
Grape	10	9.39	93.95 \pm 15.20	16.17
	100	92.85	92.85 \pm 8.02	8.65
	1000	1017.33	101.73 \pm 4.09	4.02
Eggplant	10	9.3	93 \pm 9.48	10.19
	100	105.83	105.83 \pm 15.12	14.29
	1000	1043.5	104.35 \pm 11.30	10.83
Green pepper	10	11.825	118.25 \pm 13.28	11.23
	100	107.185	107.185 \pm 15.41	14.38
	1000	1028.6	102.86 \pm 12.99	12.62

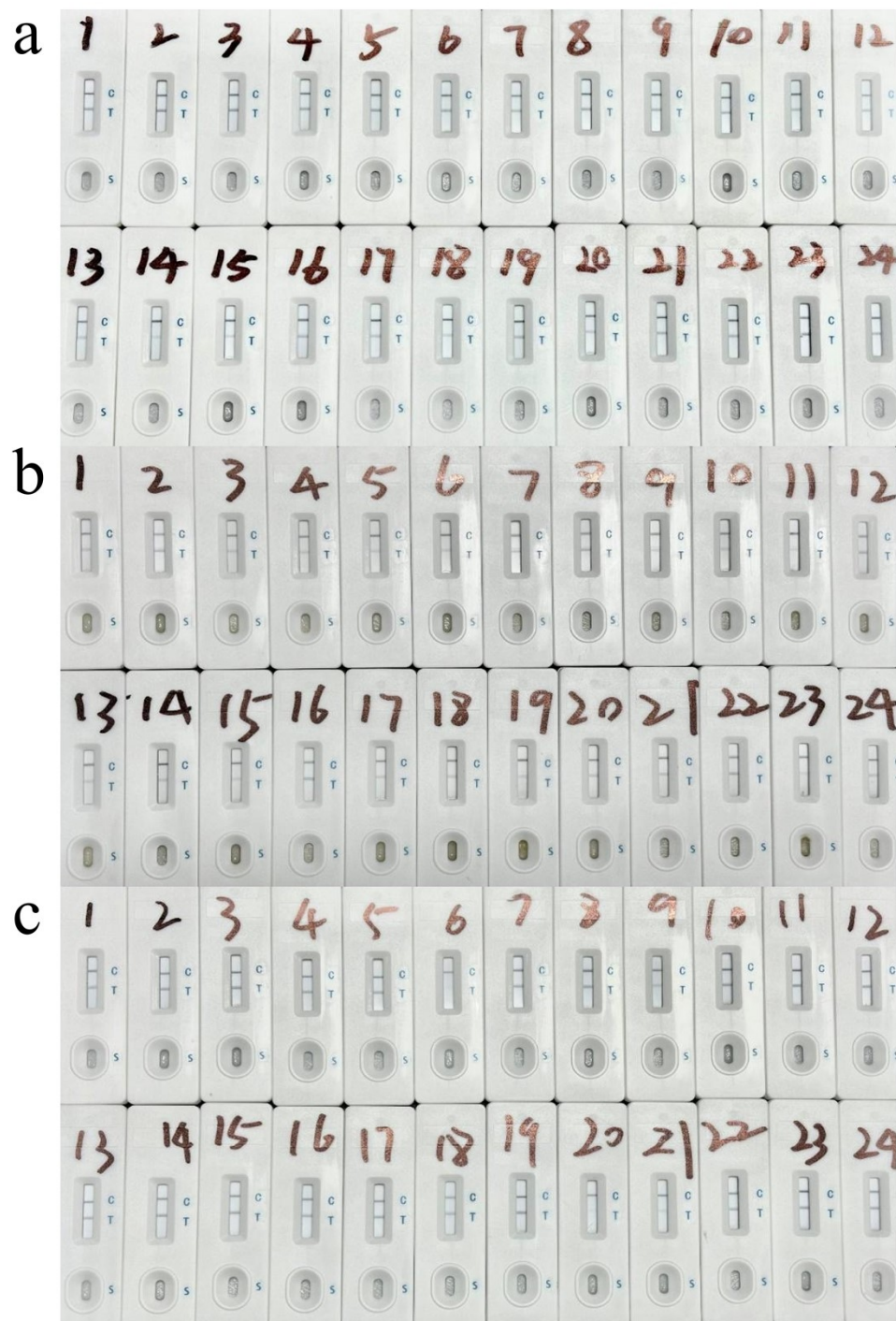


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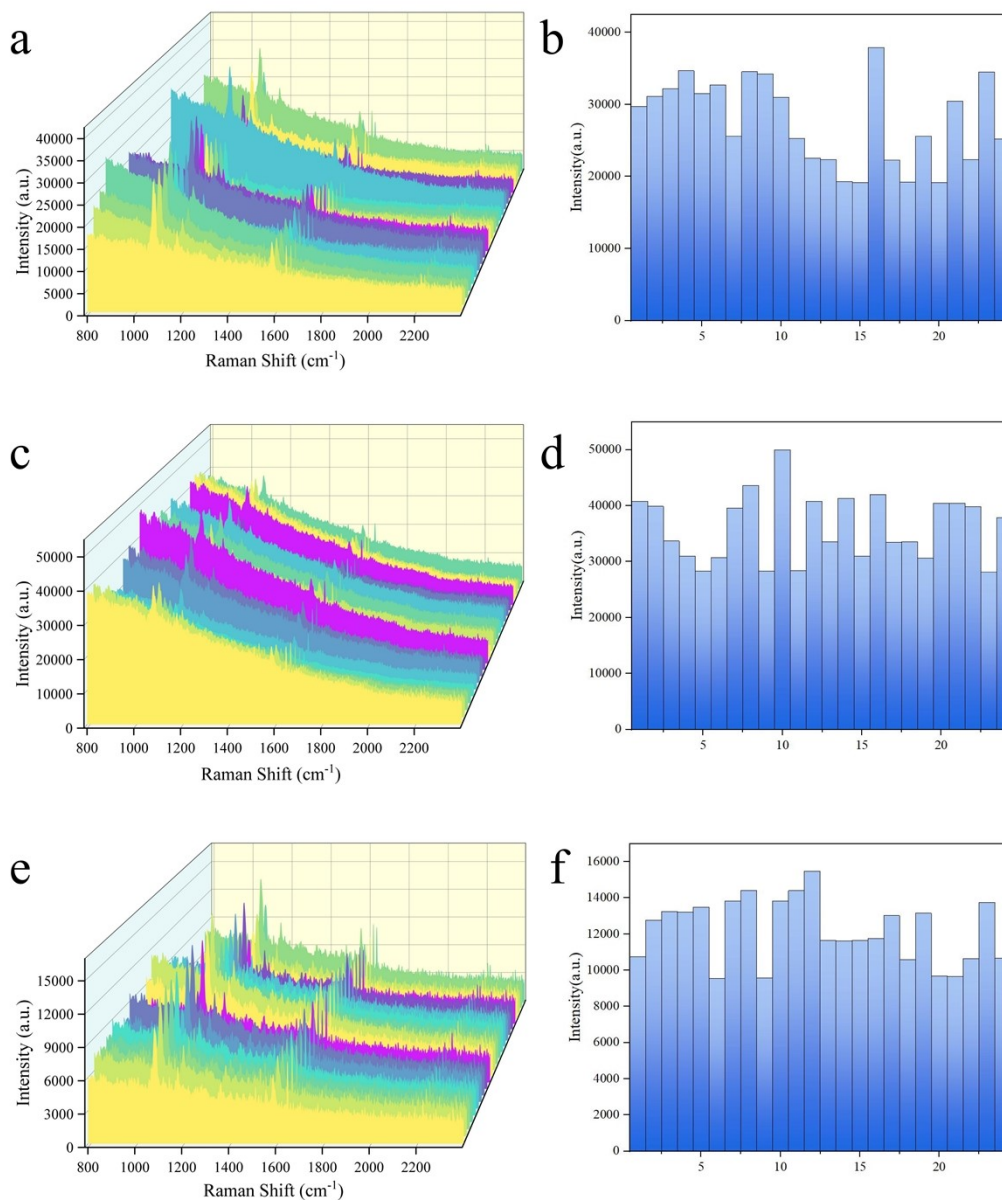


Figure S9. Raman spectra of blind sample detection for three actual samples. (a, c, e) Original Raman spectra of grape, eggplant, and green pepper, respectively. (b, d, f) Raman peak intensities at 1072 cm⁻¹ for different groups of grape, eggplant, and green pepper, respectively.