

Supporting Information

Quantitative Detection of Dithiocarbamate Pesticides by Surface-Enhanced Raman Spectroscopy Combined with Exhaustive Peak-Seeking Method

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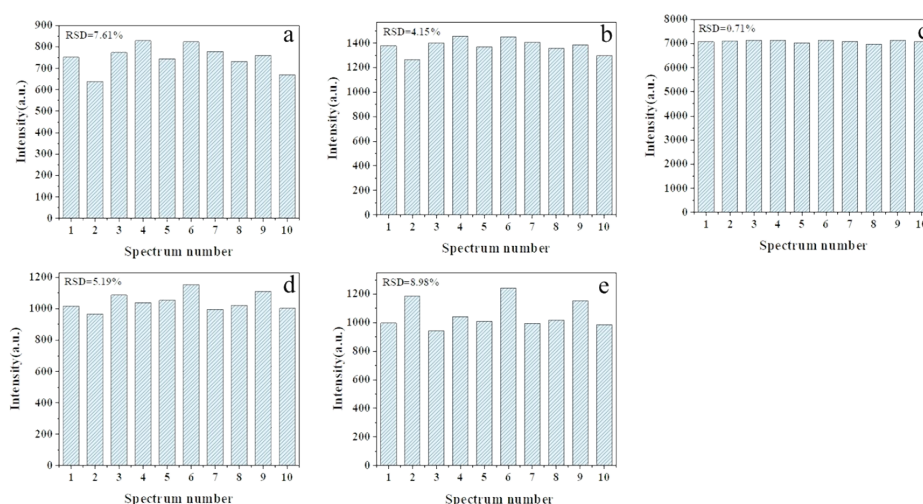


Figure S1. Calculated RSD of the peak intensity at 1384 cm⁻¹ of multiple collected the thiram SERS spectra of (a) 10² ppm, (b) 10 ppm, (c) 1 ppm, (d) 10⁻¹ ppm, and (e) 10⁻² ppm.

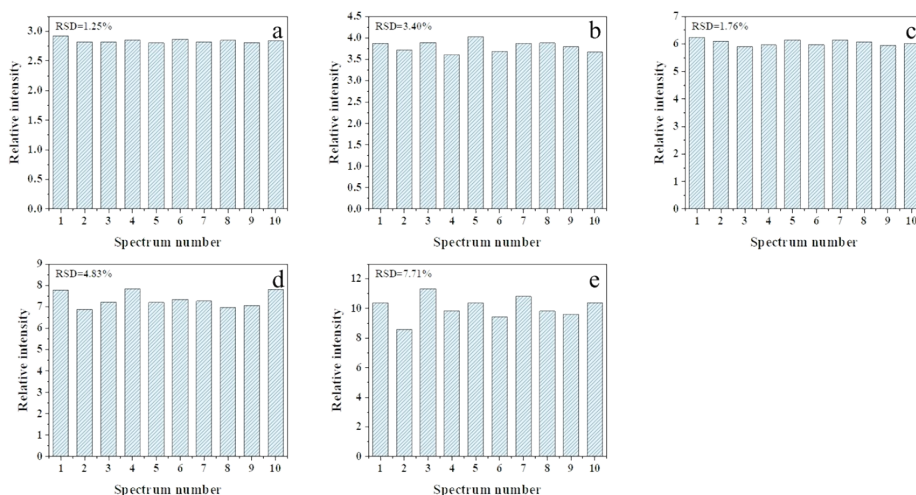


Figure S2. Calculated RSD of peak intensity ratio of $1384\text{ cm}^{-1}/1148\text{ cm}^{-1}$ of multiple collected the thiram SERS spectra of (a) 10^2 ppm, (b) 10 ppm, (c) 1 ppm, (d) 10^{-1} ppm, and (e) 10^{-2} ppm.

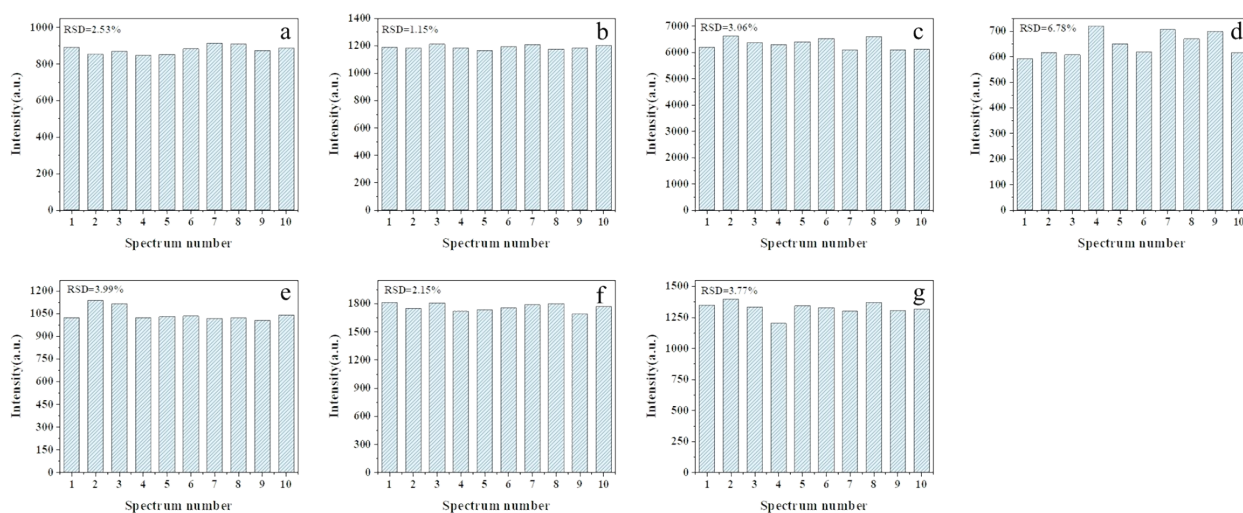


Figure S3. Calculated RSD of the peak intensity at 1384 cm^{-1} of multiple collected the ziram SERS spectra of (a) 10^2 ppm, (b) 10 ppm, (c) 1 ppm, (d) 10^{-1} ppm, (e) 10^{-2} ppm, (f) 10^{-3} ppm and (g) 10^{-4} ppm.

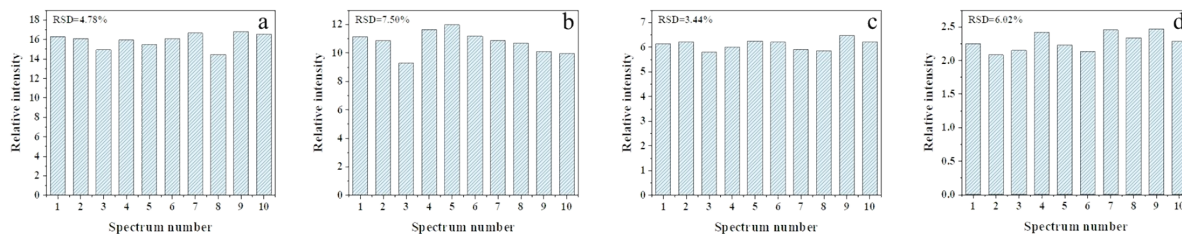


Figure S4. Calculated RSD of peak intensity ratio of $1384\text{ cm}^{-1}/938\text{ cm}^{-1}$ of Multiple collected the thiram SERS spectra of (a) 10^2 ppm, (b) 10 ppm, (c) 1 ppm and (d) 10^{-1} ppm.

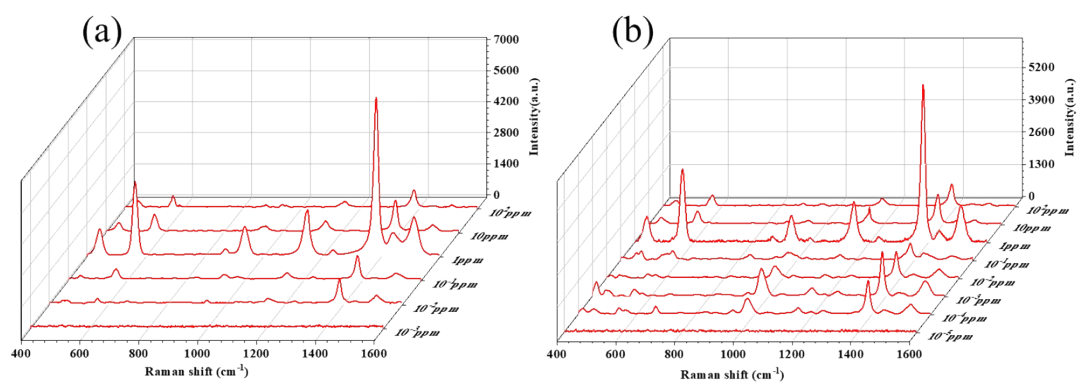


Figure S5. SERS spectra of aqueous solutions of (a)thiram and (b)ziram at different concentrations in Ag colloid-NaBr systems.

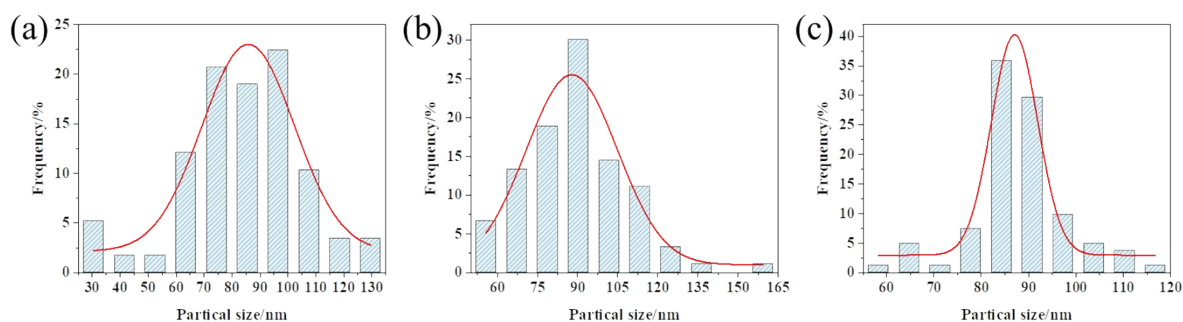


Figure S6. Particle size distribution of Ag NPs with different centrifuge conditions based on TEM images; (a)untreated Ag colloid; (b)just one-time centrifugation at 5000r/min for 5 min; (c)two times centrifugation at 3000r/min for 1 min and 5000 r/min for 5 min.

Table S1. Summary data of particle size distribution of Ag NPs with different centrifuge conditions based on TEM images.

Centrifuge conditions	D_T	PDI_T
A: uncentrifuged	84.3083	1.16546
B: 5000 rad/min	89.8121	1.14304
C: 3000 rad/min + 5000 rad/min	87.8099	1.0396

Table S2. Calculated RSD of the peak intensity at 1148 cm⁻¹ of multiple collected the thiram apple juice SERS spectra.

C _{thiram} /ppm	Intensity(a.u.)										RSD /%
	1	2	3	4	5	6	7	8	9	10	
75	321.46	341.75	219.81	245.08	223.74	385.10	248.92	336.28	306.92	191.67	22.79
50	331.58	278.82	300.97	195.39	216.97	166.21	261.44	238.97	299.94	228.93	20.64
25	489.51	780.25	537.96	1001.83	725.97	687.10	661.80	517.49	745.75	650.49	22.16
10	456.73	407.40	436.50	455.31	444.17	385.35	432.01	408.58	444.00	437.37	5.37
5	540.32	538.01	521.21	540.72	526.54	550.45	537.56	585.46	533.92	526.76	3.34
1	1001.23	981.42	969.29	980.96	921.02	963.04	966.66	955.66	1013.06	972.89	2.59
0.5	372.02	399.40	423.32	336.20	364.48	342.92	327.23	330.17	403.09	388.42	9.24
0.1	343.84	347.66	355.46	341.76	349.56	369.18	342.36	356.64	345.04	317.32	3.85
0.05	265.48	240.01	274.01	272.41	287.62	264.19	278.77	261.44	299.84	243.29	6.82
0.02	352.19	484.18	402.70	256.05	375.93	387.65	366.05	257.51	472.17	364.85	20.21

Table S3. Calculated RSD of the peak intensity at 938 cm⁻¹ of multiple collected the ziram apple juice SERS spectra.

C _{thiram} /ppm	Intensity(a.u.)										RSD /%
	1	2	3	4	5	6	7	8	9	10	
75	132.11	203.22	182.93	136.79	168.05	138.18	135.91	101.19	123.28	150.59	20.37
50	127.39	107.83	198.00	93.90	120.00	159.75	92.94	98.97	72.11	145.42	30.81
25	108.30	125.89	103.97	171.42	132.07	123.08	120.45	158.23	113.50	65.57	23.84
10	97.53	100.76	92.40	85.59	98.83	104.79	111.63	108.99	120.09	96.39	9.83
5	133.45	143.84	142.26	126.32	139.03	143.22	144.04	144.71	133.64	137.31	4.38
1	363.13	391.42	387.12	343.75	378.34	389.71	391.96	368.76	363.66	373.63	4.19
0.5	209.14	200.63	204.75	202.74	206.35	201.63	203.65	204.66	217.28	214.45	2.67
0.1	231.93	237.81	207.13	218.59	222.92	238.95	218.30	235.24	205.80	196.55	6.67
0.05	223.35	219.49	220.11	217.54	227.42	218.43	209.71	212.62	218.89	207.52	2.79