

Iodine-Modified Ag NPs for Highly Sensitive SERS Detection of Deltamethrin Residues on Surfaces

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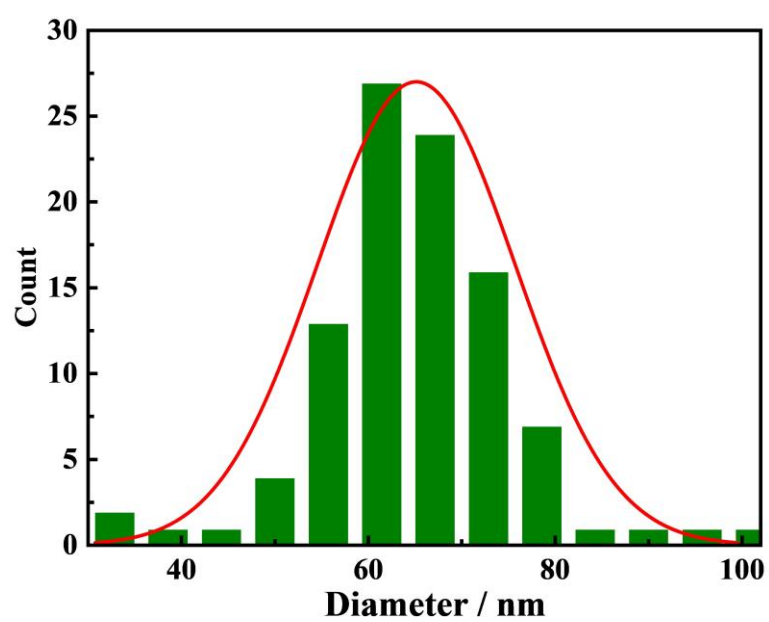


Figure S1. Nano measure of Ag NPs.

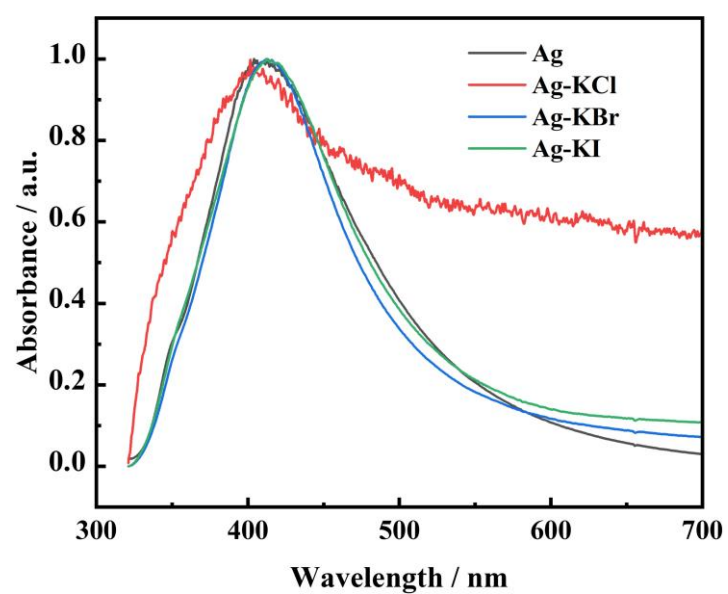


Figure S2. The UV spectra of Ag and the mixture of Ag NPs and 0.1 M KCl (red line), KBr (blue line) and KI (green line).

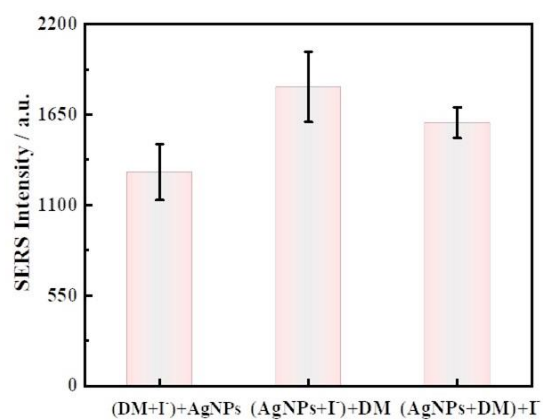


Figure S3. The SERS performance of different mixing orders of Ag NPs, KI and DM.

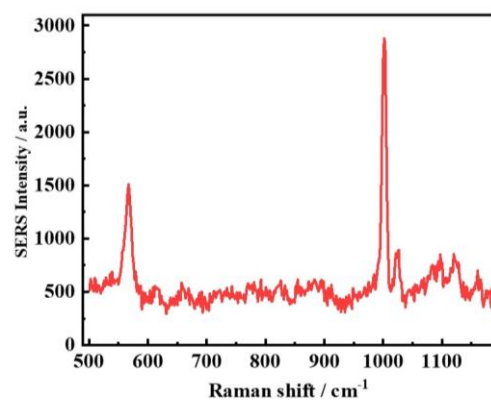


Figure S4. The SERS performance of commercial DM product diluted with methanol.

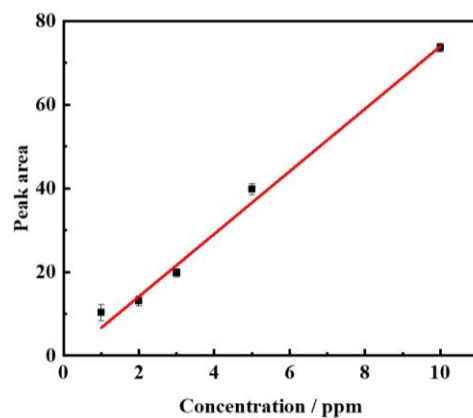


Figure S5. Standard curve of deltamethrin for HPLC. The concentrations of DM were 1 ppm, 2 ppm, 3 ppm, 5 ppm, 10 ppm, respectively. The fitting equation was $y = 0.332 + 7.360 x$ ($R^2 = 0.990$).

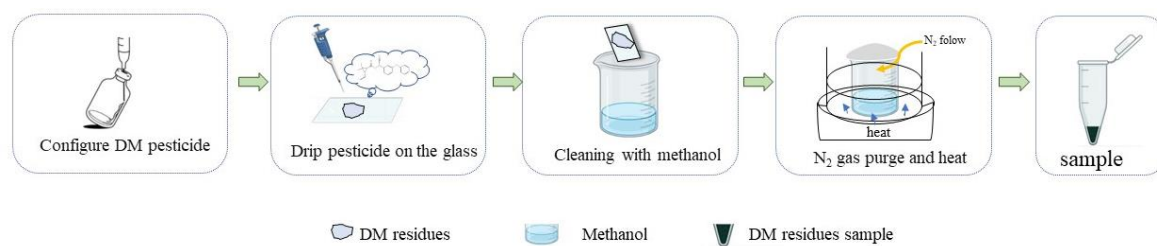


Figure S6. The diagram of setup for surface residue analysis.

Table S1. The assignment of SERS peaks of DM with Iodide assisted Ag NPs FSM sensor.

| SERS (cm ⁻¹) | Powder(cm ⁻¹) | Assignment |
|--------------------------|---------------------------|--|
| 563 | 563 | $\nu(\text{C-Br})_{\text{ip}} +$ |
| 1000 | 999 | $\nu_{\text{ring}} + \delta(\text{C-C})_{\text{ip}}$ |
| 1165 | 1165 | $\delta(\text{C-H})_{\text{ip}}$ |
| 1207 | 1207 | $\nu(\text{C-C})_{\text{ip}}$ |
| 1735 | 1740 | $\nu(\text{C=O})_{\text{ip}}$ |
| 2253 | 2254 | $\nu(\text{C=N})_{\text{ip}}$ |

Table S2. Statistical results of the SERS signal of eight Ag NPs FSMs.

| FSMs | Mean intensity | RSD (%) |
|------|----------------|---------|
| 1 | 1196.5 | 11.6 |
| 2 | 1183.5 | 11.3 |
| 3 | 1277.5 | 11.7 |
| 4 | 1360.5 | 12.7 |
| 5 | 1110 | 7.1 |
| 6 | 1199.5 | 10.9 |
| 7 | 1144.3 | 6.7 |
| 8 | 1170.5 | 4.5 |

Table. S3 Analysis of the variance of results of SERS and HPLC method (n = 3).

| Sample | Deltamethrin insecticide (ug/mL) | SS | df | MS | F | P-value | F crit |
|--------|-------------------------------------|-------|----|------|------|---------|--------|
| A | 1 | 49.91 | 3 | 15.9 | 3.97 | 0.16 | 8.95 |
| B | 2.5 | 65.04 | 3 | 20.8 | 3.82 | 0.13 | 8.95 |
| C | 5 | 89.23 | 3 | 31.2 | 1.29 | 0.41 | 8.95 |