Electronic Supplementary Information

Functional Au array SERS chip for pesticides fast inspection in conjunction with surface extraction and coordination transferring

Lei Ouyang,[a, b] Pei Dai, [a] Ling Yao, [a] Qian Zhou, [c] Heqing Tang, [d] and Lihua Zhu [a, b] *

[a] School of Chemistry and Chemical Engineering, Hubei Key Laboratory of Bioinorganic Chemistry & Materia Medica, Huazhong University of Science and Technology, Wuhan 430074, China.

[b] Shenzhen Institute of Huazhong University of Science and Technology, 518000, Shenzhen, China

[c] Hubei Research Institute of Products Quality Supervision and Inspection, Wuhan 430070, China.

[d] College of Resources and Environmental Science, South Central University for Nationalities, Wuhan 430074, China

Content

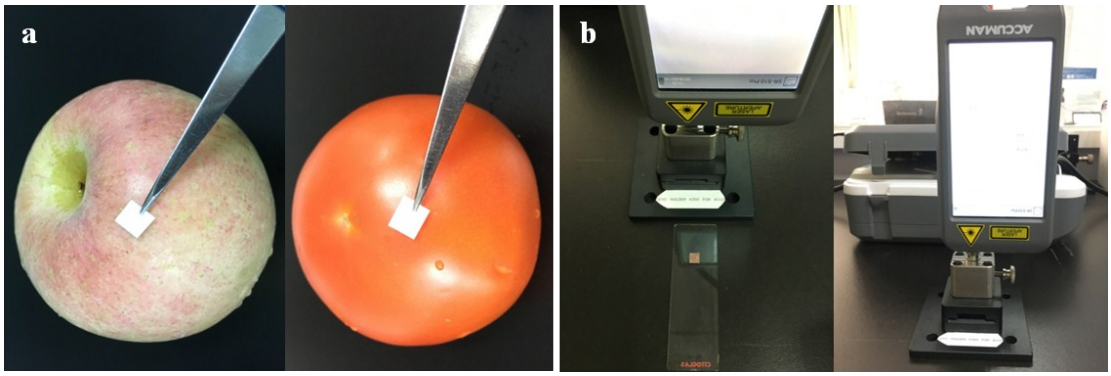

Figure S1 Photos for exhibiting the detection process of pesticides on fruit peels. After the extraction solvent was dropped onto the surface of fruits like apple and tomato, one piece of the Au array chip was pasted onto the peel to transfer the targets containing solvent, and then the chip was placed onto a slide for detection. The SERS detection was performed with a handheld Raman spectrometer with designed sample holder that has optimized focus place for the Au array.

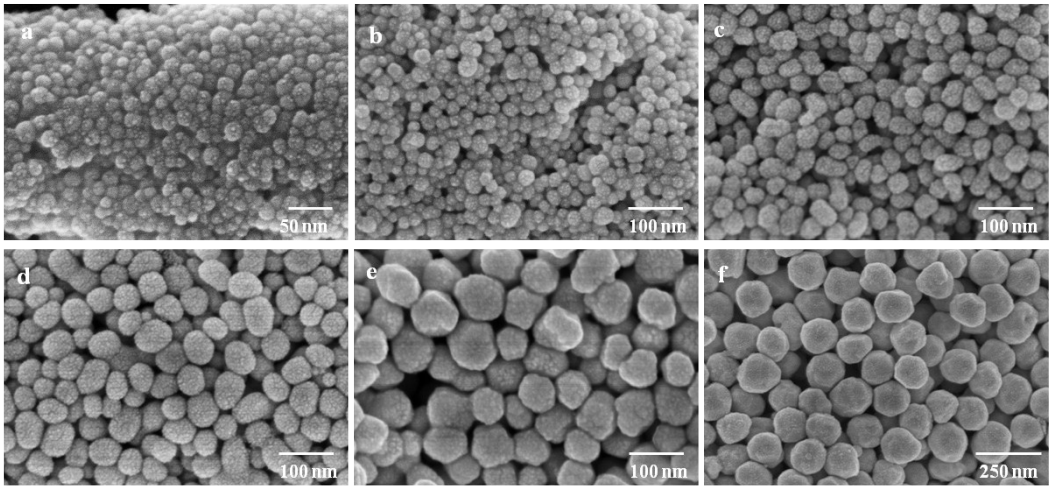

Figure S2 SEM images of assembled Au array chips prepared from Au nanoparticles with different particle sizes of (a) 20 nm, (b) 30 nm, (c) 40 nm, (d) 55 nm, (e) 70 nm, and (f) 140 nm.

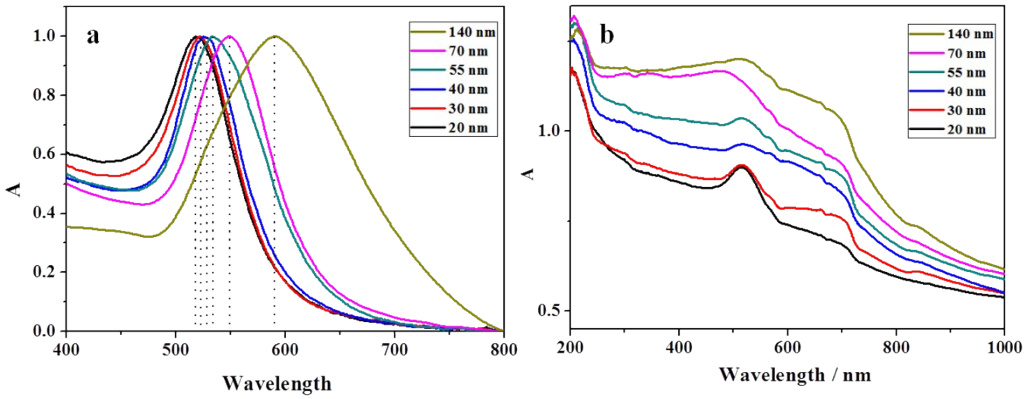

Figure S3 (a) UV-vis absorption spectra of the sols of Au nanoparticles with different particle sizes. (b) UV–vis diffuse reflectance spectra of the Au array chip on the filtration membrane.

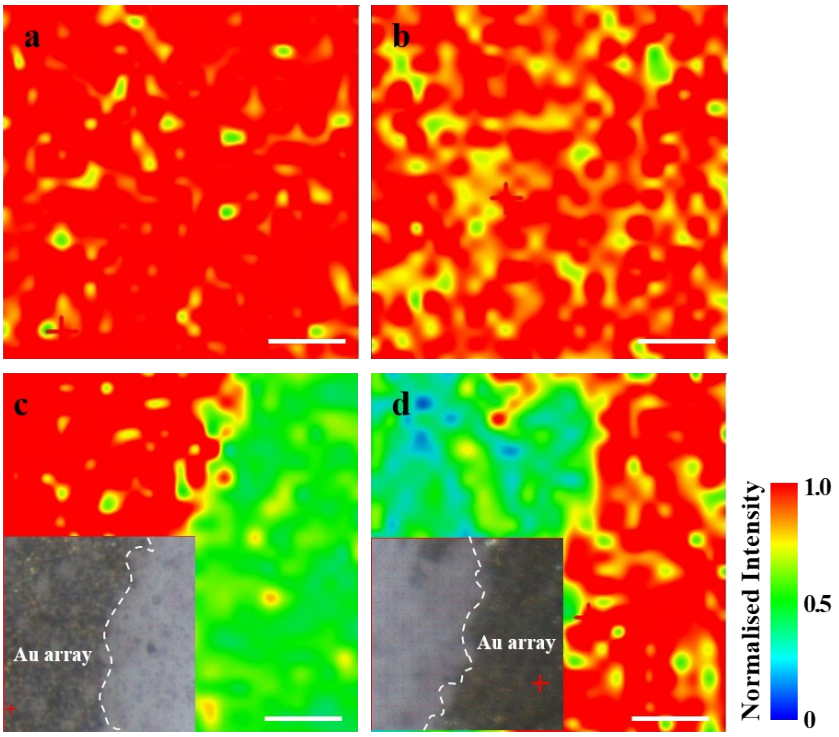

Figure S4 SERS intensity mapping on the Au array membrane. (a) The concentration of thiram was 1 ppm. (b) The concentration of thiram was 10 ppb. (c, d) Intensity distribution on the membrane with Au array (red area) and Au NPs (green and blue area) without assembly for (c) 1 ppm and (d) 10 ppb thiram. The optical microscope images of the scanned area of c and d were shown inset, the white dash line indicated the edges of the Au array. The intensity at 1369 cm^{-1} was normalized to the position with highest intensity. Scale bar 10 μm.

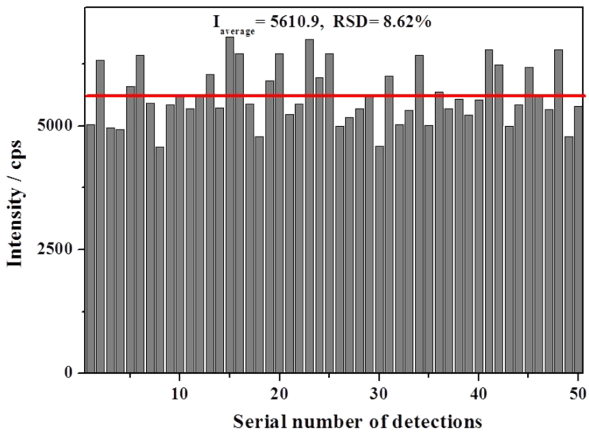

Figure S5 Homogeneity and reproducibility characterization of the Au array chip. Detections at randomly selected ten positions on each Au chip which fabricated from five different batches. The serial number of the 50 detection was given arbitrarily. The intensities at 1369 cm^{-1} for each detection were shown, the RSD for these 50-times detection was 8.62%.

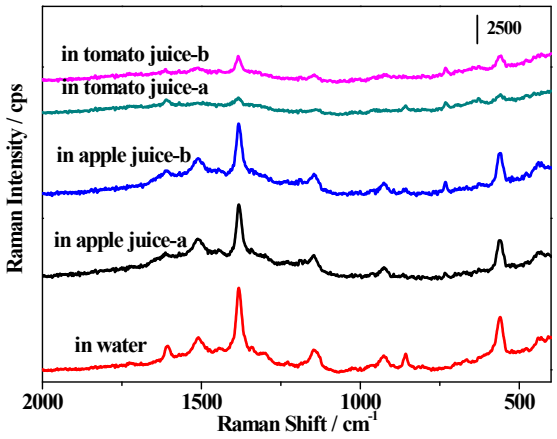

Figure S6 SERS responses of thiram (5 ppm) in water and in vegetable juices.

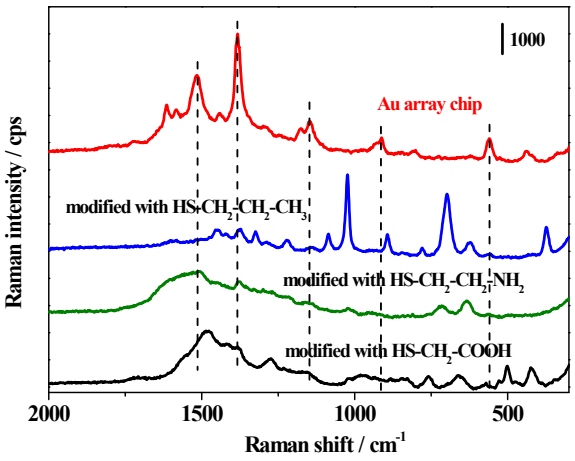

Figure S7 SERS spectra of thiram (5 ppm) detected with thiol-containing molecules (Mercapto acetic acid, mercapto propane and mercapto ethylamine) modified Au array, the Au array without surface modification was also shown for comparison. The results demonstrated that the surface been occupied by other thiol-containing molecules is not sufficient for thiram detection.