Electronic Supplementary Material (ESI) for Analytical Methods.
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Supporting information

Silver decahedral nanoparticles with uniform and adjustable sizes for surface-enhanced Raman scattering-based thiram residue detection

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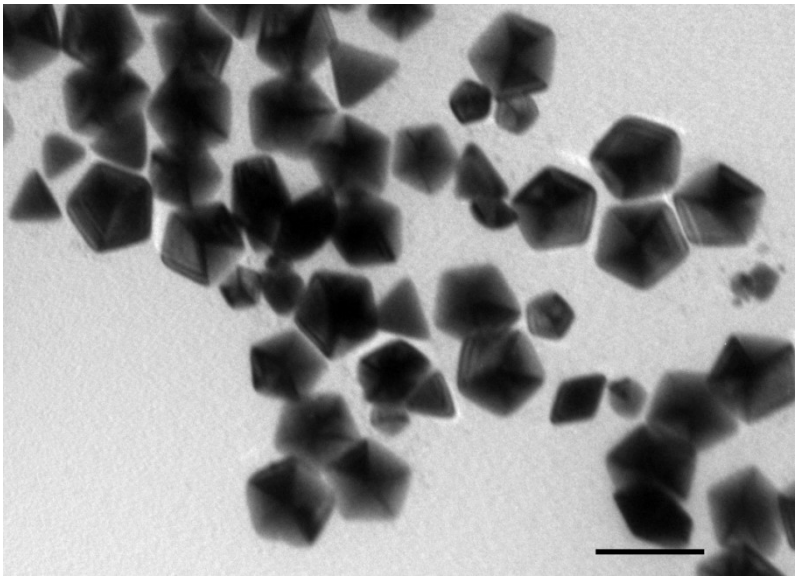

Fig. S1 The TEM images of the AgDeNPs obtained by increasing the molar ratio of Ag ions to decahedral seeds. (Scale bar: 200 nm)

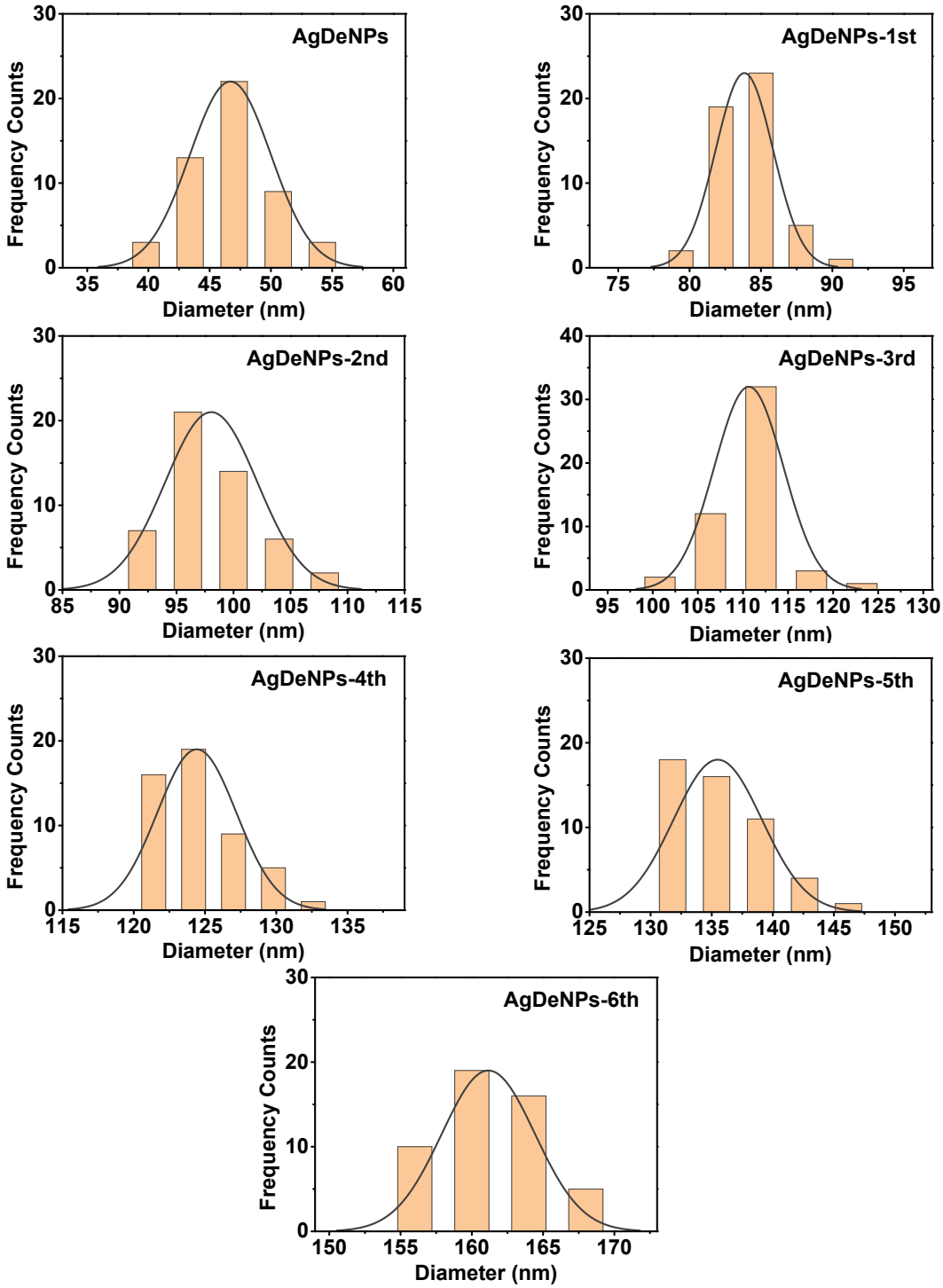

Fig. S2 The size distributions of the AgDeNPs with different sizes: 47±4, 85±3, 96±4, 112±5, 124±3, 135±5 and 161±4 nm.

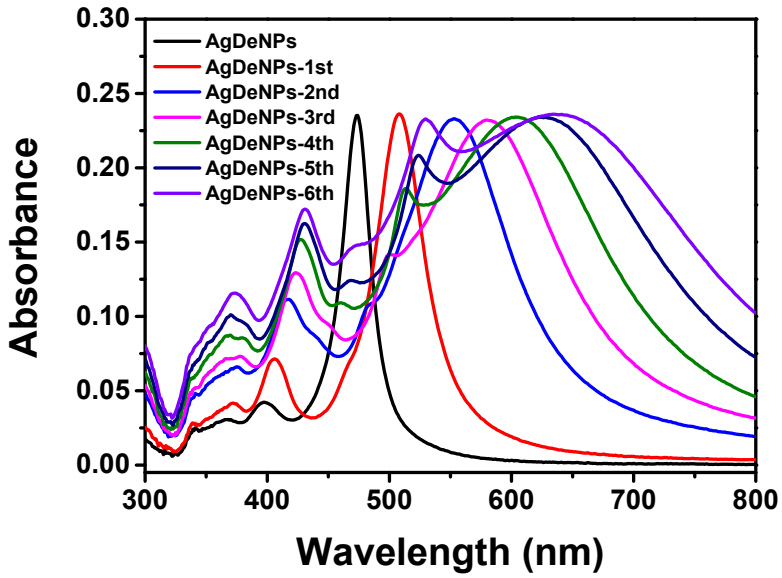

Fig. S3 Extinction spectra of nanoparticle solutions of different sizes being diluted, and the extinction value for each sample is 0.23±0.01.

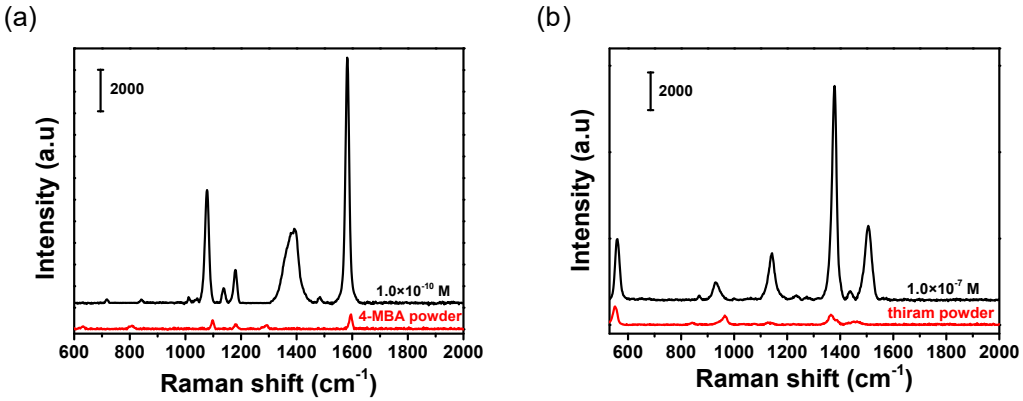

Fig. S4 Comparison of SERS spectra of (a) 4-MBA solution at concentration 1.0×10^{-10} M with Raman spectra of 4-MBA solid powder, (b) thiram solution at concentration 1.0×10^{-7} M with Raman spectra of thiram solid powder.

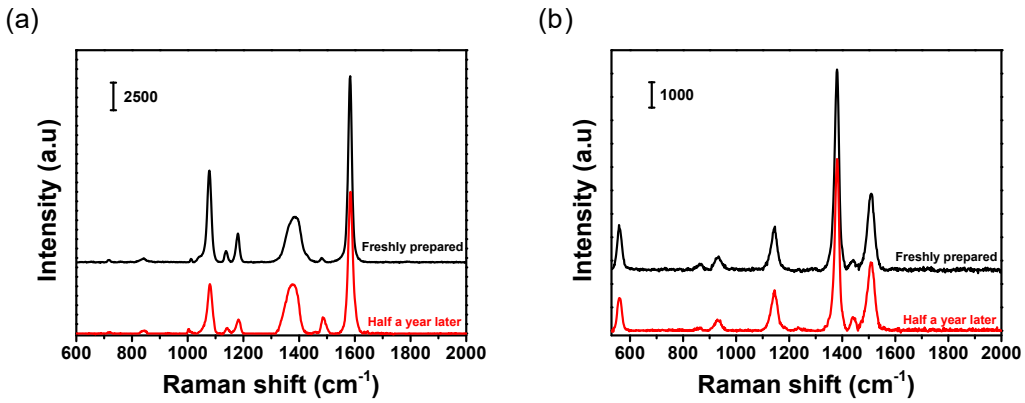

Fig. S5 The SERS spectra of (a) 4-MBA with concentration of 1.0×10^{-8} M and (b) thiram with concentration of 1.0×10^{-7} M were detected by SERS substrates prepared with freshly synthesized AgDeNPs-1st and that placed for half a year, respectively.

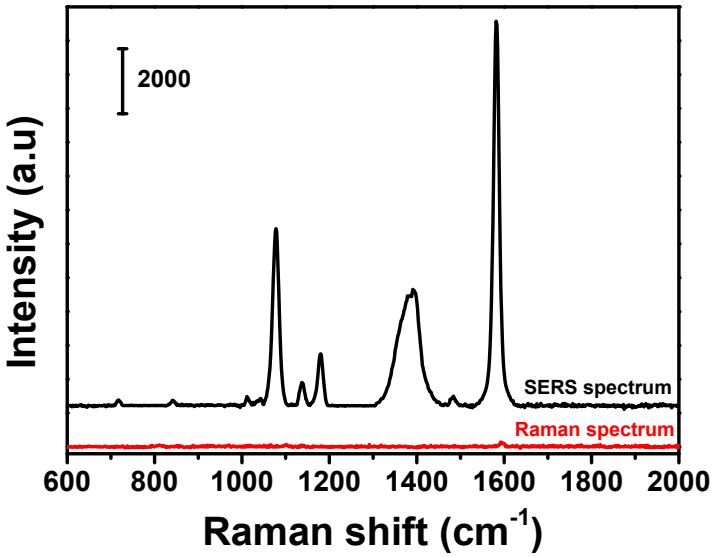

Fig. S6 SERS spectra for 4-MBA at concentration 1.0×10^{-10} M and Raman spectra for 4-MBA at concentration 0.1 M.

Since we ensure the same detection conditions for the two tests, we use formula EF =(I_{SERS}/ I_{Raman}) × (C_{Raman}/ C_{SERS}) to calculate the enhancement factor, which has been deduced by previous work.[1, 2] Where I_{SERS} and I_{Raman} represent the SERS intensity of 4-MBA molecules adsorbed on AgDeNPs-1st substrate at 1585 cm^{-1} and the normal Raman intensity of 4-MBA molecules at 1593 cm^{-1} respectively, C_{SERS} and C_{Raman} represent the concentration of 4-MBA molecules in SERS and Raman spectra respectively, the C_{Raman} is 0. 1M and the C_{SERS} is 1.0×10^{-10} M. The calculated enhancement factor is 8.7×10^{10}.

References

1. Y. Gu, S. Xu, H. Li, S. Wang, M. Cong, J. R. Lombardi and W. Xu, *J. Phys. Chem. Lett.*, 2013, **4**, 3153-3157.
2. A. Moeinian, F. N. Gur, J. Gonzalez-Torres, L. Zhou, V. D. Murugesan, A. D. Dashtestani, H. Guo, T. L. Schmidt and S. Strehle, *Nano. Lett.*, 2019, **19**, 1061-1066.