Electronic Supplementary Information

Target Induced Aggregation of Modified Au@Ag Nanoparticles for Surface Enhanced Raman Scattering and Its Ultrasensitive Detection of Arsenic (III) in Aqueous Solution

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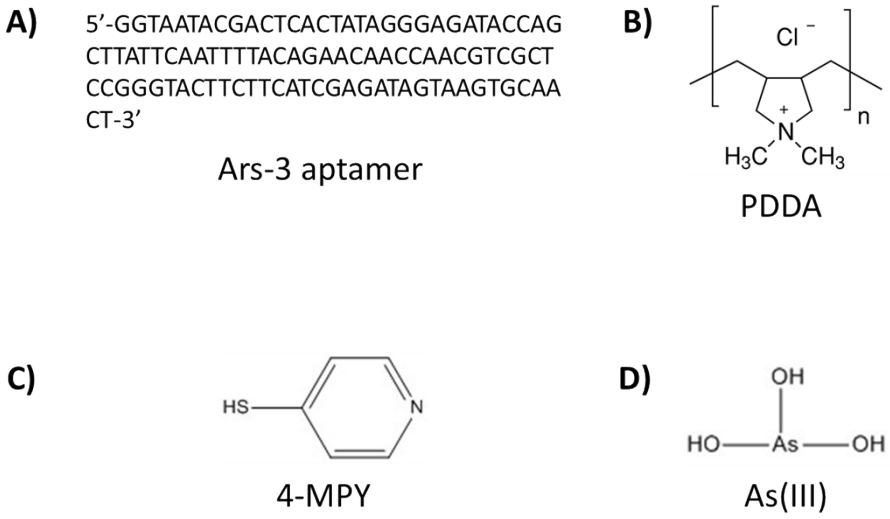

Figure S1. All components of the biosensor used in this work. (A) Sequence of Ars-3 aptamer. (B) Chemical structure of poly(diallyldimethylammonium chloride). (C) Chemical structure of 4-mercaptopyridine. (D) Chemical structure of arsenite [As(III)] inaqueous solution.

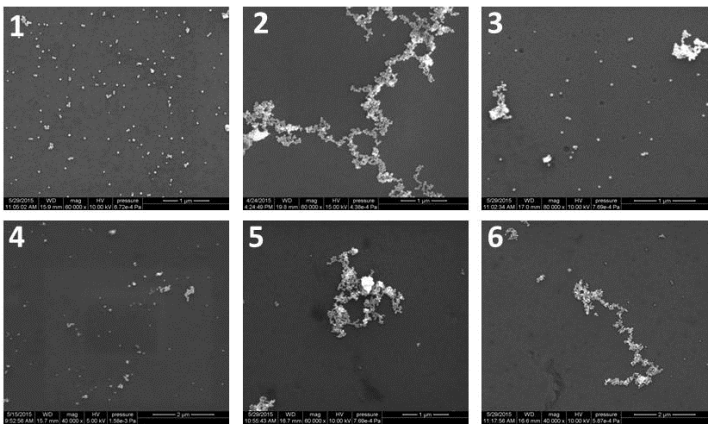

Figure S2. The SEM images of the 4-MPY-modified Au@AgNPs solutions treated with different substances. (1): 4-MPY-modified Au@AgNPs ; (2): 4-MPY-modified Au@AgNPs + 5.2×10^{-7} g/mL PDDA; (3): 4-MPY-modified Au@AgNPs + 11.5 nM aptamer; (4): 4-MPY-modified Au@AgNPs + 11.5 nM aptamer + 5.2×10^{-7} g/mL PDDA; (5): sample D+1 ppm As(III); (6): sample D+2 ppm As(III).

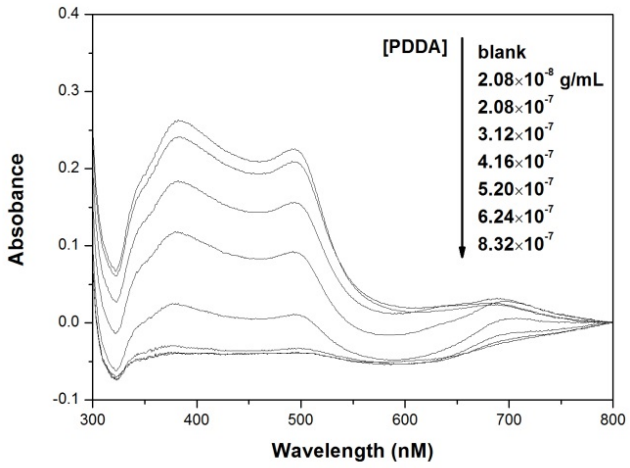

Figure S3. Effect of PDDA concentrations on the aggregation of Au@AgNPs. The absorption spectra of the Au@AgNPs solutions treated with increasing concentration of PDDA.

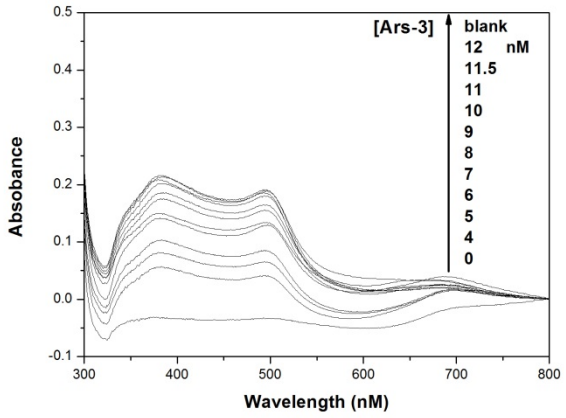

Figure S4. Effect of Ars-3 aptamer concentrations on the aggregation of Au@AgNPs. The concentration of PDDA was 5.2×10^{-7} g/mL.

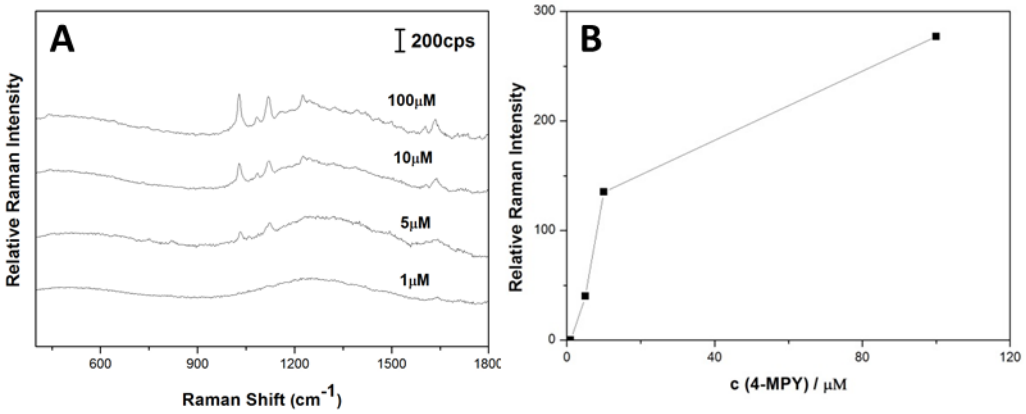

Figure S5. Effect of the concentration of 4-MPY of the sensing system on the Raman signal intensity in the presence of 5.2×10^{-7} g/mL PDDA and 11.5 nM Ars-3 aptamer. (A) The Raman spectra of the 4-MPY-modified Au@AgNPs solutions treated with increasing concentration of 4-MPY. (B) the responding Raman signal intensity of the 4-MPY-modified Au@AgNPs solutions treated with increasing concentration of 4-MPY.

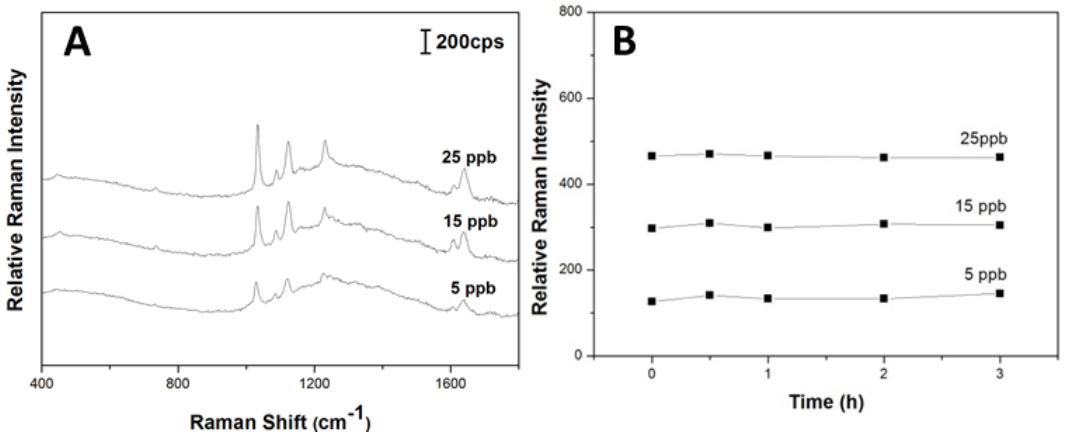

Figure S6. Effect of the time on the Raman signal intensity. (A) The Raman spectra of the 4-MPY-modified Au@AgNPs solutions treated with different concentration of As(III). (B) the responding Raman signal intensity of the 4-MPY-modified Au@AgNPs solutions against different time.

Calculation of the detection limit. According to the previous report,[1, 2] 3σ/slope was used to determine the detection limit. The following is the detail on how to calculate the detection limit.

	1	2	3	4	5	6	7	σ
Raman Intensity	40.745	40.668	40.896	40.158	40.005	40.404	40.419	0.3206

The linear fitting equation at low As(III) concentrations was y=58.135+4.019 × 16.367 x (R=0.998), so the slope is 16.367, thus 3σ/slope is calculated as 59.

References

(1) P. Zhou, Y. G. Wu, S. S. Zhan, L. R. Xu, W. W. Shi, T. Xi and X. J. Zhan, *Chem Commun.*, 2011, 47, 6027-6029.

(2) J. W. Liu, A. K. Brown, X. L. Meng, D. M. Cropek, J. D. Istok, D. B. Watson and Y. Lu, *P Natl Acad Sci USA.*, 2007, 104, 2056-2061.