Electronic Supplementary Material (ESI) for Analytical Methods.

Electronic Supplementary Material

Colorimetric determination of tetracyclines based on aptamer-mediated dual regulation of gold nanoparticle aggregation and in situ silver metallization

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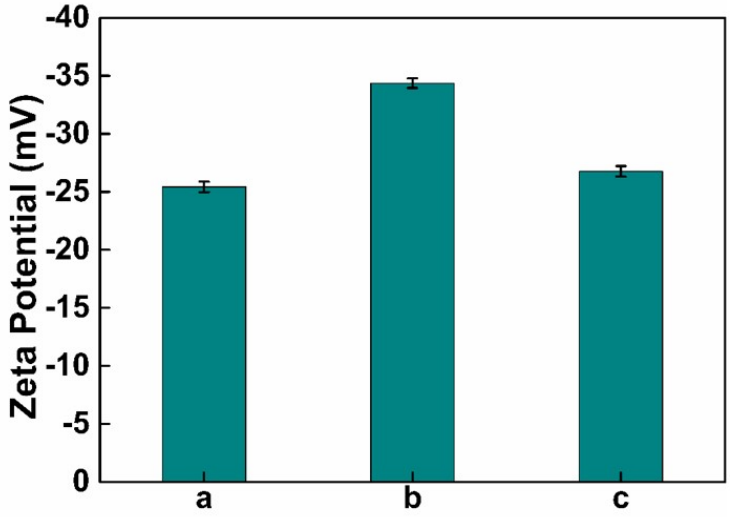

Fig. S1 ζ-potential analysis of different mixtures. (a) AuNPs (b) Apts+AuNPs (c) Apts+$Mg(NO_3)_2$+AuNPs+TET. Substance concentration: 0.0317 μmol·L^{-1} AuNPs, 0.08 μmol·L^{-1} Apts, 500 μmol·L^{-1} $Mg(NO_3)_2$, 4 μmol·L^{-1} TET

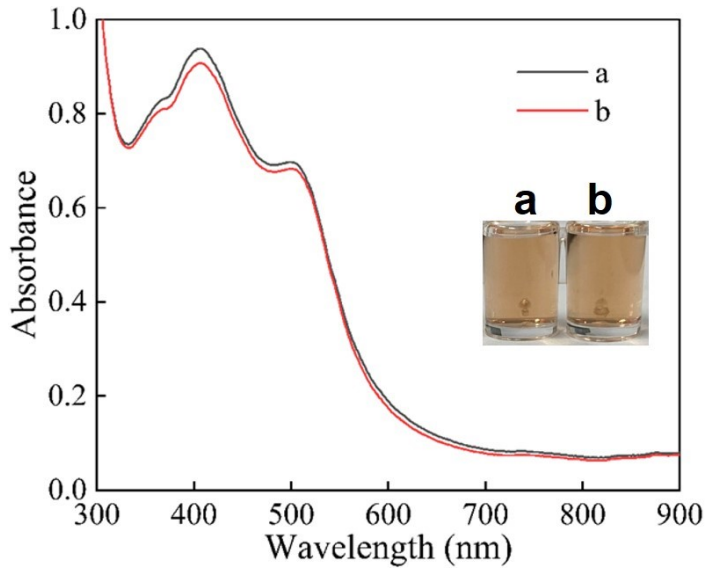

Fig. S2 UV-vis absorption spectra of different mixtures and the corresponding photographs. (a) Random Apts+AuNPs+p-aminophenol+$AgNO_3$. (b) Random Apts+$Mg(NO_3)_2$+AuNPs +TET+p-aminophenol+$AgNO_3$. Substance concentration: 120 μmol·L^{-1} $AgNO_3$, 120 μmol·L^{-1} p-aminophenol, 0.0317 μmol·L^{-1} AuNPs, 0.08 μmol·L^{-1} Apts, 4 μmol·L^{-1} TET, 500 μmol·L^{-1} $Mg(NO_3)_2$

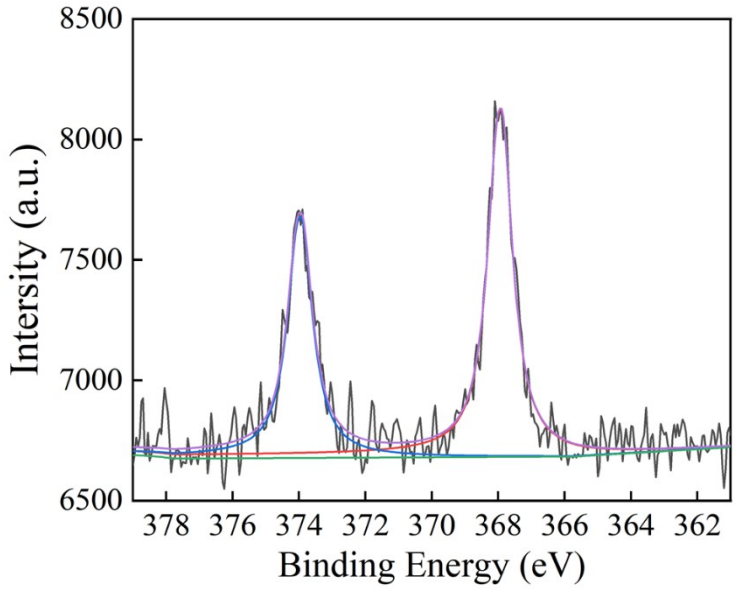

Fig. S3 High resolution XPS spectrum for Ag3d

In 9 groups of experiments, by averaging the $\Delta(A_{600}/A_{410})$ obtained for each concentration of each factor. It is not difficult to find that the optimal levels of Mg^{2+}, Apt, and Ag^{+} are 500 μmol·L^{-1}, 0.08 μmol·L^{-1}, and 120 μmol·L^{-1}, respectively. At this concentration, we measured $\Delta(A_{600}/A_{410}) = 0.60$. This is better than the previous 9 sets of experiments. So Mg^{2+} = 500 μmol·L^{-1}, Apt = 0.08 μmol·L^{-1}, Ag = 120 μmol·L^{-1} were determined.

Table S1 Orthogonal experiment arrangement and results

Experiment number	**Factors**			**$\Delta(A_{600}/A_{410})$**
	Mg^{2+} (μmol·L^{-1})	**Apt (μmol·L^{-1})**	**Ag^{+} (μmol·L^{-1})**	
1	400	0.08	80	0.56
2	400	0.10	100	0.47
3	400	0.12	120	0.39
4	500	0.08	100	0.52
5	500	0.10	120	0.50
6	500	0.12	80	0.43
7	600	0.08	120	0.39
8	600	0.10	100	0.38
9	600	0.12	80	0.47
Excellent level	500	0.08	120	0.60

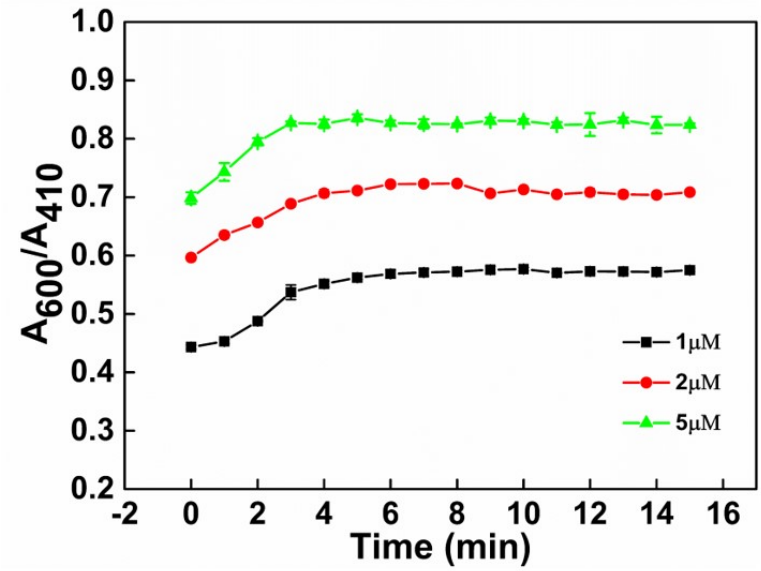

Fig. S4 When the TET concentrations are 1μmol·L^{-1}, 2μmol·L^{-1}, 5μmol·L^{-1}, the values of A_{600}/A_{410} change with time. Substance concentration: 120 μmol·L^{-1} p-aminophenol, 120 μmol·L^{-1} $AgNO_3$, 0.0317 μmol·L^{-1} AuNPs, 0.08 μmol·L^{-1} Apts, 500 μmol·L^{-1} $Mg(NO_3)_2$

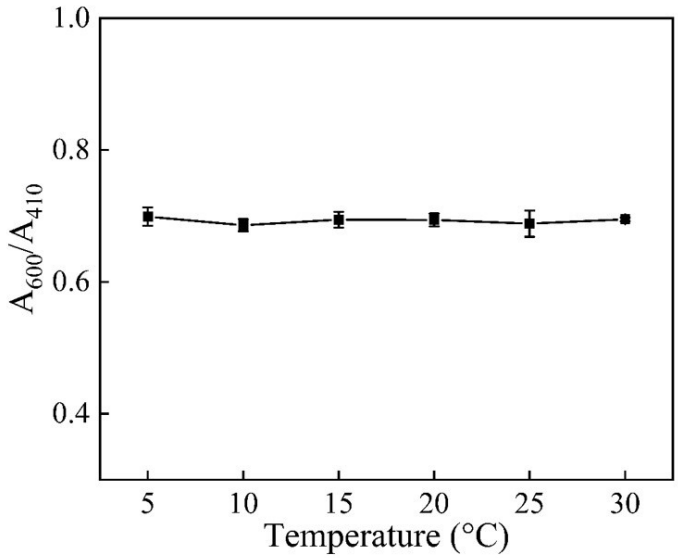

Fig. S5 When the TET concentrations is 2μmol·L^{-1}, the values of A_{600}/A_{410} change with time. Substance temperature: 120 μmol·L^{-1} p-aminophenol, 120 μmol·L^{-1} $AgNO_3$, 0.0317 μmol·L^{-1} AuNPs, 0.08 μmol·L^{-1} Apts, 500 μmol·L^{-1} $Mg(NO_3)_2$

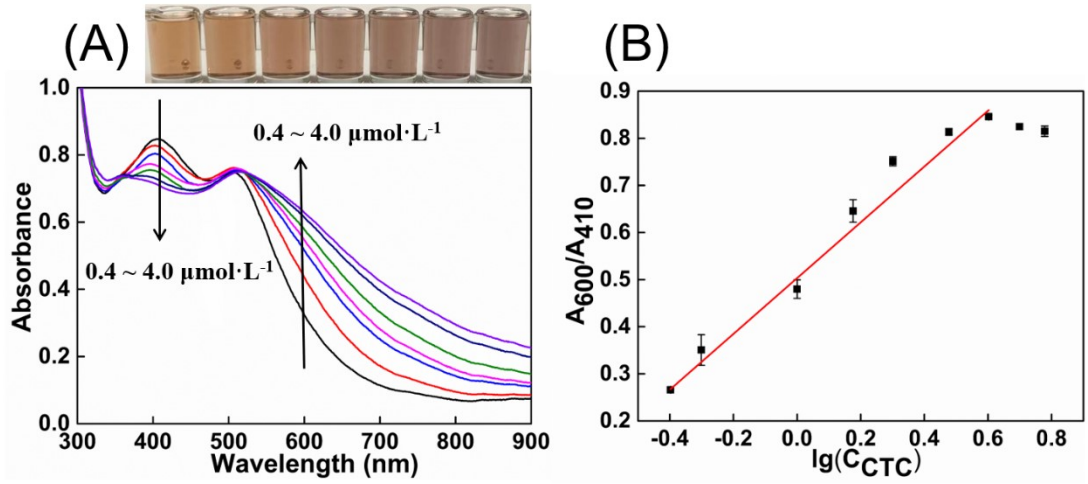

Fig. S6 (A) The UV-vis absorption spectra of the experiment at different concentrations of CTC (0.4, 0.8, 1, 2, 3, 4 μmol·L^{-1}) and the corresponding photographs. The upper illustration shows the photos of the corresponding concentrations. (B) Fitting curve of A_{600}/A_{410} and lg(C_{CTC}). Error bars represent the standard deviation of three independent measurements. Substance concentration: 120 μmol·L^{-1} p-aminophenol, 120 μmol·L^{-1} $AgNO_3$, 0.0317 μmol·L^{-1} AuNPs, 0.08 μmol·L^{-1} Apts, 500 μmol·L^{-1} $Mg(NO_3)_2$

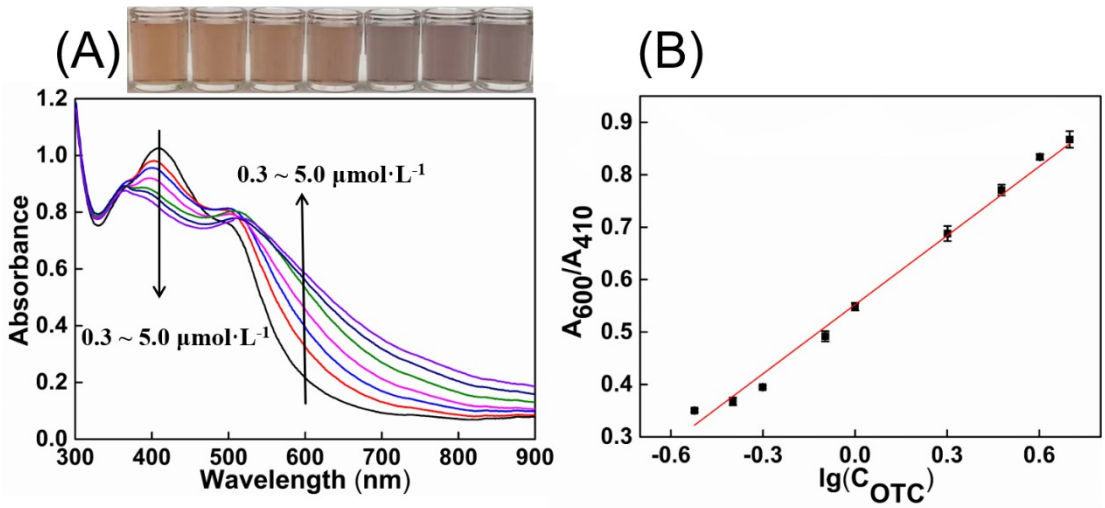

Fig. S7 (A) The UV-vis absorption spectra of the experiment at different concentrations of OTC (0.3, 1, 2, 3, 4, 5 μmol·L^{-1}) and the corresponding photographs. The upper illustration shows the photos of the corresponding concentrations. (B) Fitting curve of A_{600}/A_{410} and lg(C_{OTC}). Error bars represent the standard deviation of three independent measurements. Substance concentration: 120 μmol·L^{-1} p-aminophenol, 120 μmol·L^{-1} $AgNO_3$, 0.0317 μmol·L^{-1} AuNPs, 0.08 μmol·L^{-1} Apts, 500 μmol·L^{-1} $Mg(NO_3)_2$

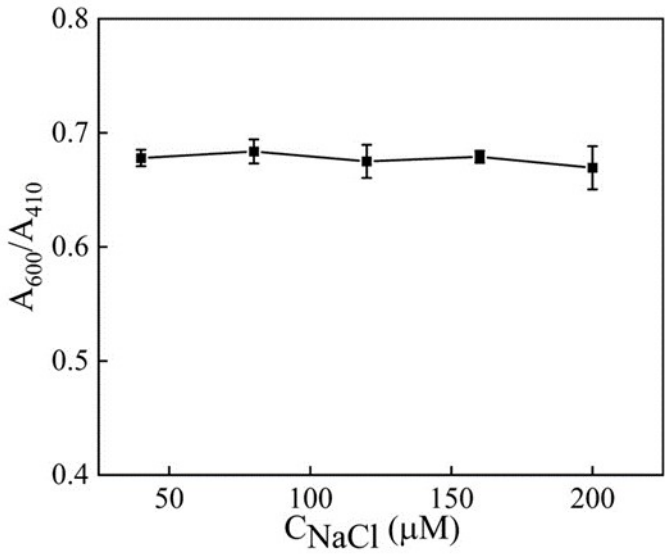

Fig. S8 Effect of salt concentration on TCs detection, NaCl+Apts+$Mg(NO_3)_2$+AuNPs +TET+p-aminophenol+$AgNO_3$. Substance concentration: 120 μmol·L-1 $AgNO_3$, 120 μmol·L-1 p-aminophenol, 0.0317 μmol·L^{-1} AuNPs, 0.08 μmol·L^{-1} Apts, 2 μmol·L^{-1} TET, 500 μmol·L^{-1} $Mg(NO_3)_2$

Table S2 Comparison of different TET determination methods in analytical performances

Probe	Procedure	Time/min	Linear range	LOD ($nmol \cdot L^{-1}$)	References
AuNPs@Apt	AuNPs aggregation using NaCl	10	50 nM~3.0 μM	32.9	*1*
AuNPs@Apt	AuNPs aggregation using CTAB	30	10 nM~2 μM	122	*2*
AuNPs@Apt	AuNPs aggregation using NaCl	20	100 nM~5 μM	71	*3*
Enzyme	-	6	100 nM~10 μM	60	*4*
D-Trp-OMe@AuNCs	-	20	1.5μM ~30 μM	200	*5*
DNAzyme	-	17	11 nM~1 μM	3.1	*6*
AuNPs@Apt	AuNPs aggregation and silver metallization	5	400 nM~6 μM	40.88	This work

AuNPs= Gold nanoparticles, Apt= Aptamer, AuNCs= Gold cluster, D-Trp-OMe= D-tryptophane methyl ester. CTAB= hexadecyltrimethylammonium bromide.

References

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