Electronic Supplementary Material (ESI) for Analyst.

Sensitive Colorimetric Detection of Protein by Gold Nanoparticles and Rolling Circle Amplification

Chaohui Chen, Ming Luo, Tai Ye, Ningxing Li, Xinghu Ji and Zhike He*

Key Laboratory of Analytical Chemistry for Biology and Medicine (Ministry of Education), College of Chemistry and Molecular Sciences, Wuhan University, Wuhan 430072, P. R. China

* Corresponding author. Tel: +86 27-68756557; fax: +86-27-68754067.

E-mail addresses: zhkhe@whu.edu.cn (Z. He)

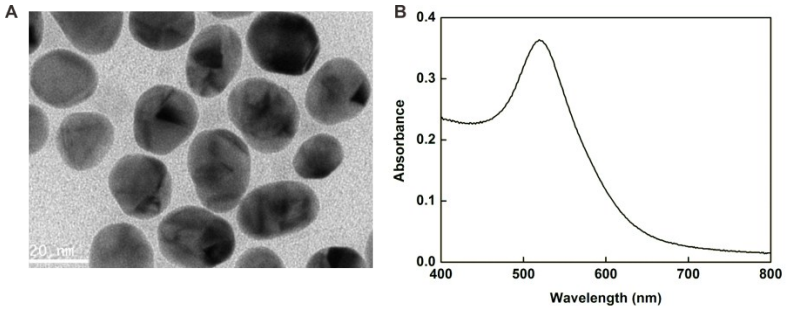

Figure S1. (A) TEM image of the 13 nm Au NPs. Scale bar: 20 nm. (B) UV-vis absorption spectroscopy of the 13 nm Au NPs at 520 nm.

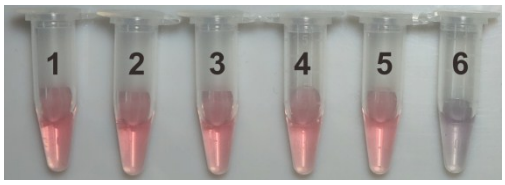

Figure S2. Color responses of AuNPs under different conditions: (1) in the absence of AFP; (2) in the absence of biotinylated antibody; (3) in the absence of SA; (4) in the absence of biotinylated DNA template; (5) without adding salts; (6) with all components.

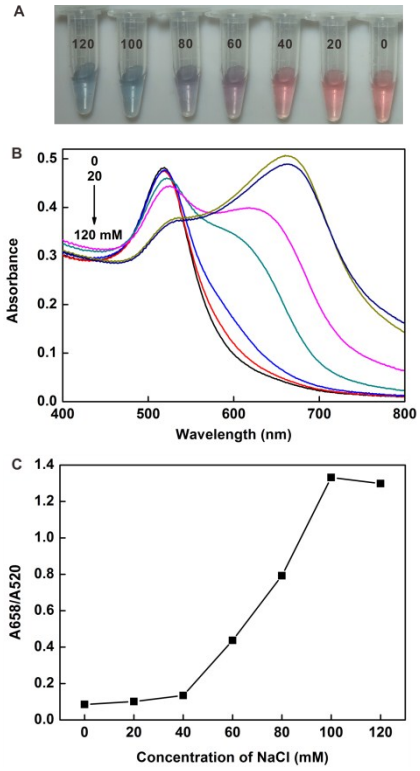

Figure S3. The effect of increasing salt concentration on the single-stranded padlock DNA coated gold nanoparticles.

Preprocess of the RCA products on the immobilized template

After the amplification reaction, the microplate has been washed three times. Then, the padlock DNA (23.8 nM) in 5 mM Tris-HCl buffer (40 mM NaCl, pH = 8.00) was added into the well and incubated for 30 min. After that, the microplate has been heated to 95 °C for 15 min to make the protein denatured and remove the product of RCA from the immobilized template.

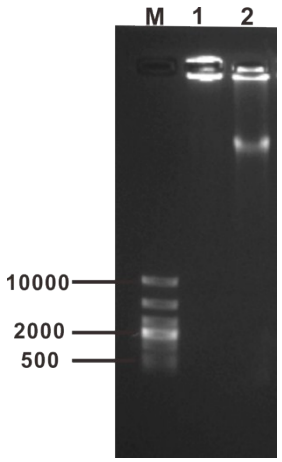

Figure S4. Gel electrophoresis of RCA products: lane M, the DNA ladder marker; lane 1: the products of homogeneous RCA; lane 2: the products of RCA on immobilized template.

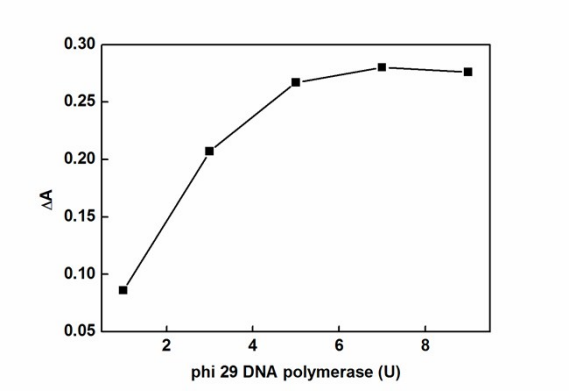

Figure S5. The effect of the amount of phi 29 DNA polymerase on the relative absorption intensity of the sensing system.

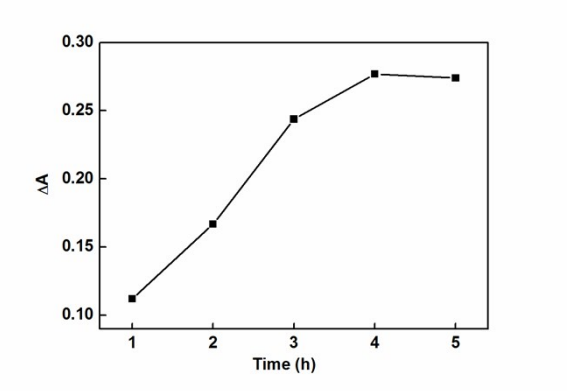

Figure S6. The effect of the incubation time of the RCA reaction on the relative absorption intensity of the sensing system.

Table S1. Analytical results for the determination of AFP in 10-fold diluted human serum with this amplification strategy.

Sample number	Added (pg/mL)	Found (pg/mL)	Recovery (%)	RSD (%)
1	50	47.4	94.7	5.3
2	100	103.8	103.8	6.4
3	250	240.7	96.3	8.7
4	750	719.2	95.9	7.5
5	1000	989.1	98.9	11.3