Supporting Information

A Nanocluster beacon based on the template transformation of DNA-templated silver nanoclusters

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Table S1. Sequences utilized for DNA-Ag NCs synthesis and template transformation.

Name	Sequences (5’ to 3’)
template a	CCCTTAATCCCC
template b	CCCCCCCCCCCCC
template c	CCCACCCACCCGCCCA
s-a5’	CCCTTAATCCCCAATCATCTCTTCC
s-b3’	GGAAGAGATGATTCCCCCCCCCCCC
s-b5’	CCCCCCCCCCCCGGAAGAGATGATT
s-c5’	CCCACCCACCCGCCCAGGAAGAGATGATT
cs	GGAAGAGATGATT
n-b3’	TGAGTGATGTAGATGTCCCCCCCCCCCC
A-b3’	AAAAAAAAAAAAAAAACCCCCCCCCCCC
A-b5’	CCCCCCCCCCCCAAAAAAAAAAAAAAAA
s-a3’	AATCATCTCTTCCCCCTTAATCCCC
Linker	TTTTTTTTTTTTTTTTGGAAGAGATGATT
Linker-6	TTATCGTTTTTTTTTTTTTTTTGGAAGAGATGATT
Linker-6-co	AATCATCTCTTCCAAAAAAAAAAAAAAAACGATAA
probe a-HBB	CCCTTAATCCCCCTTCTCCTCAGG
probe b-HBB	AGTCAGGTGCACCCCCCCCCCCC
target-HBB	GTGCACCTGACTCCTGAGGAGAAG
M1	GTGCACCTGACTCCTG**T**GGAGAAG
M2	GTGCACCTGACTCCTG**T**GGA**T**AAG
M3	GTGCACCTGACTCCTG**T**G**T**A**T**AAG
M4	GTGCACCTGACTCCTG**T**G**T**A**T**A**G**G
N	GCTAGAGATTTTCCACACTGACT

Experiment Section

1. Chemicals and materials

DNA sequences used in this work were purchased from Shanghai Sangon Biotechnology Co. Ltd. (Shanghai, China) and directly used without further purification. Sequences were listed in Table S1. All the DNA samples were prepared with sodium phosphate buffer (PB, 200 mM, pH 7.4). Sodium borohydride (98%) was bought from Sigma-Aldrich Co. (USA). Silver nitrate and other salts were obtained from Beijing Chemical Co. (China). The double-distilled water for solution preparation was purified by a Milli-Q system (Millipore, Bedford, MA, USA).

2. Preparation of DNA-Ag NCs

DNA-Ag NCs were synthesized according to previous references. Briefly, 10 μM DNA were mixed with 60 μM $AgNO_3$. After incubating at room temperature for 10 min, 60 μM fresh $NaBH_4$ were added with vigorously shaking for 1 min. The molar ratio of DNA:Ag^+:$NaBH_4$ was 1:6:6. The solution was kept in dark at room temperature for 4 h to form Ag NCs.

3. DNA detection

For DNA detection, the prepared dark DNA-Ag NCs were diluted to 0.5 μM for hybridizations. After adding C_{12} template and target DNA, samples were incubated at room temperature for 1 h before characterizations.

4. Characterizations

UV-visible absorption spectra were recorded on an Agilent Cary 60 UV-Vis spectrophotometer at room temperature. The fluorescence spectra were obtained on an Agilent Cary Eclipse fluorescence spectrophotometer with the slit widths of 20 nm for both excitation and emission. The luminescence decay curves were performed by a FLS920 spectrofluorometer.

5. Native polyacrylamide gel electrophoresis (PAGE)

The prepared DNA solutions were diluted with 6 × loading buffer (TEK buffer, pH 8.0, 50% glycerol, 0.25% bromphenol blue), then analyzed in 15% native polyacrylamide gel. The electrophoresis was conducted in 1 × TBE (pH 8.0) at 110V constant voltage for 1 hour. After staining with ethidium bromide, the gels were scanned by a UV transilluminator.

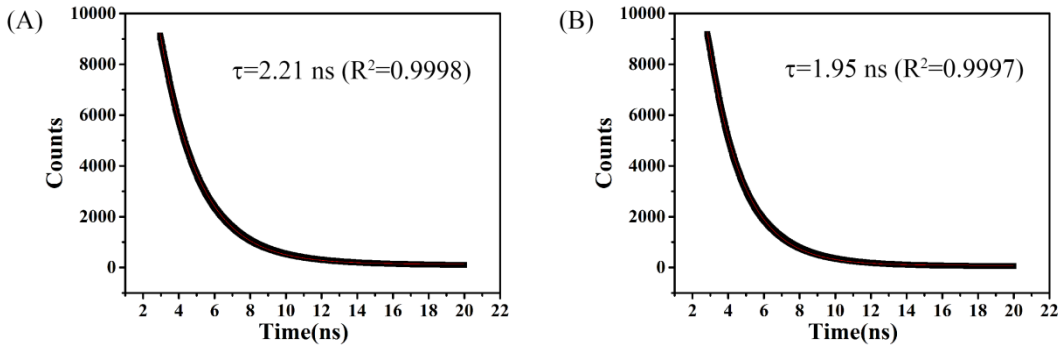

Fig. S1. The fluorescence decay of (A) s-a5'-Ag NCs and (B) s-a5'-Ag NCs + s-b5' and their fitting lines with a monoexponential function.

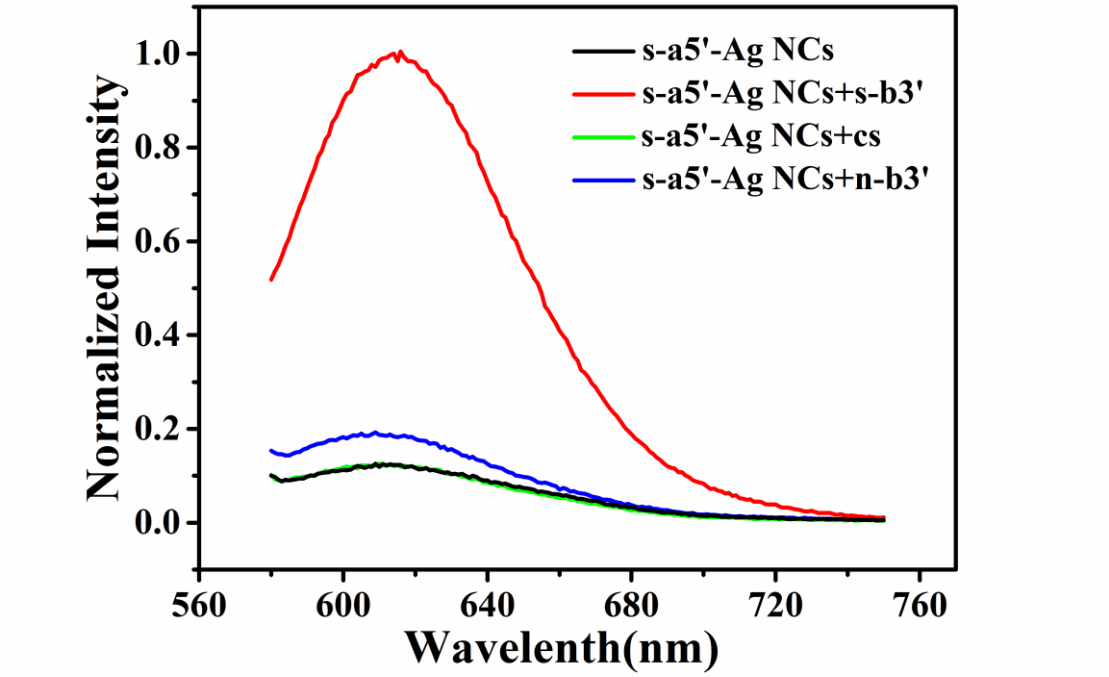

Fig.S2. The fluorescence spectra of s-a5'-Ag NCs, s-a5'-Ag NCs+s-b3', s-a5'-Ag NCs +cs and s-a5'-Ag NCs+n-b3'.

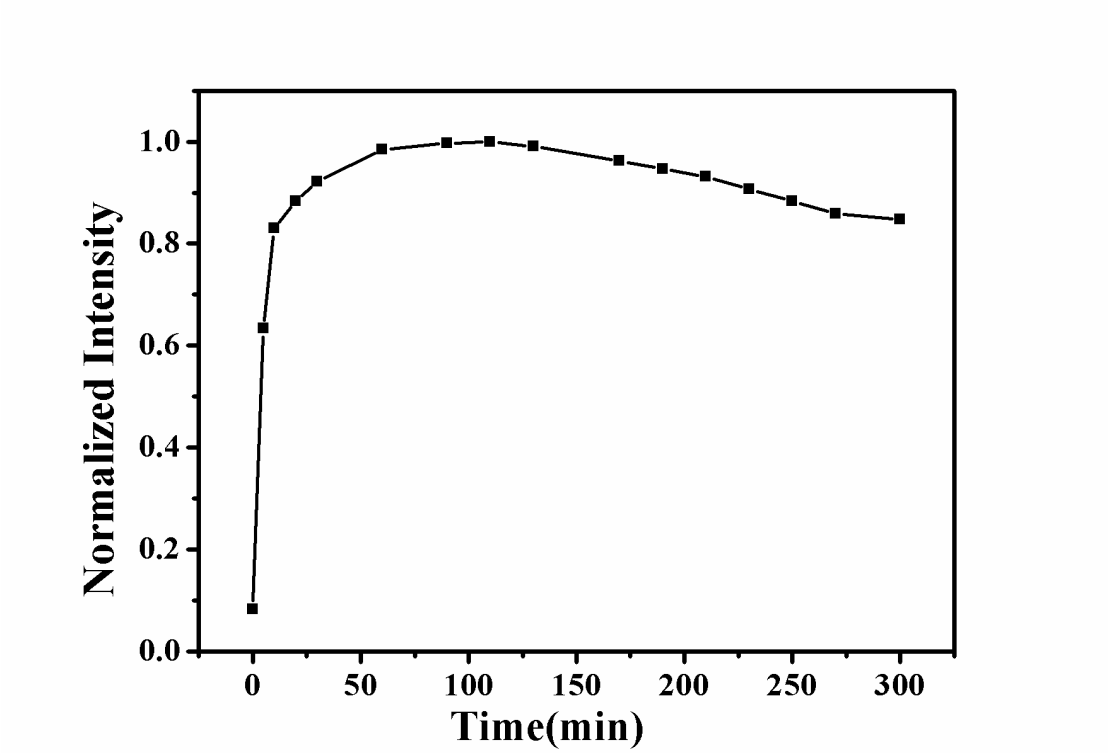

Fig. S3. The fluorescence intensity of s-a5'-Ag NCs with reaction time after the addition of A-b3' and Linker.

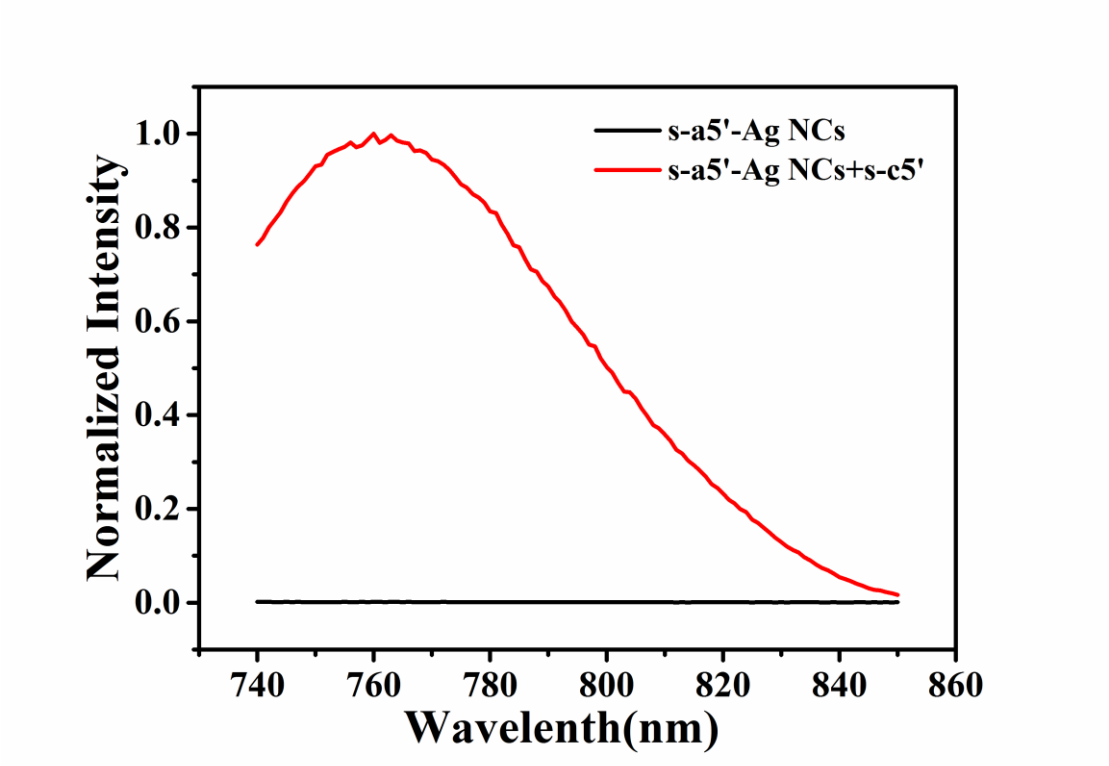

Fig. S4. The fluorescence spectra of s-a5'-Ag NCs and s-a5'-Ag NCs + s-c5'.

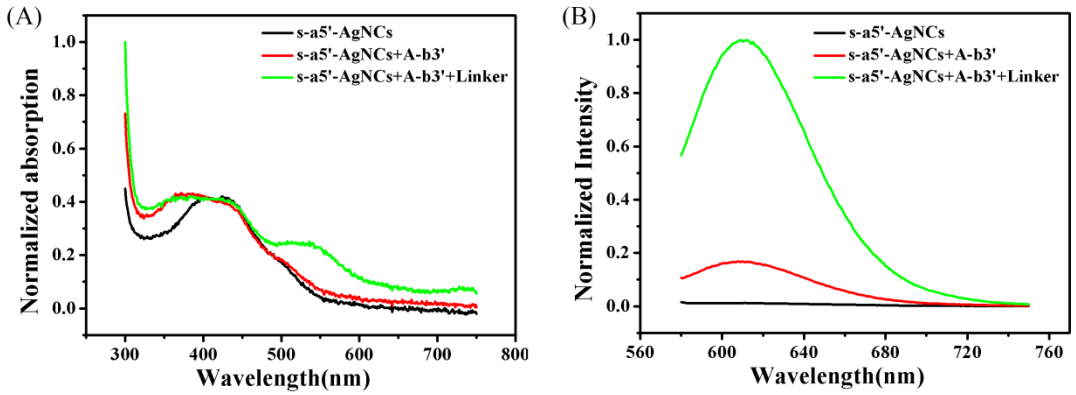

Fig. S5. (A)The UV-Vis spectra of s-a5'-Ag NCs, s-a5'-Ag NCs+A-b3' and s-a5'-Ag NCs+A-b3'+Linker. (B)The fluorescence spectra of s-a5'-Ag NCs, s-a5'-Ag NCs+A-b3' and s-a5'-Ag NCs+A-b3'+Linker.

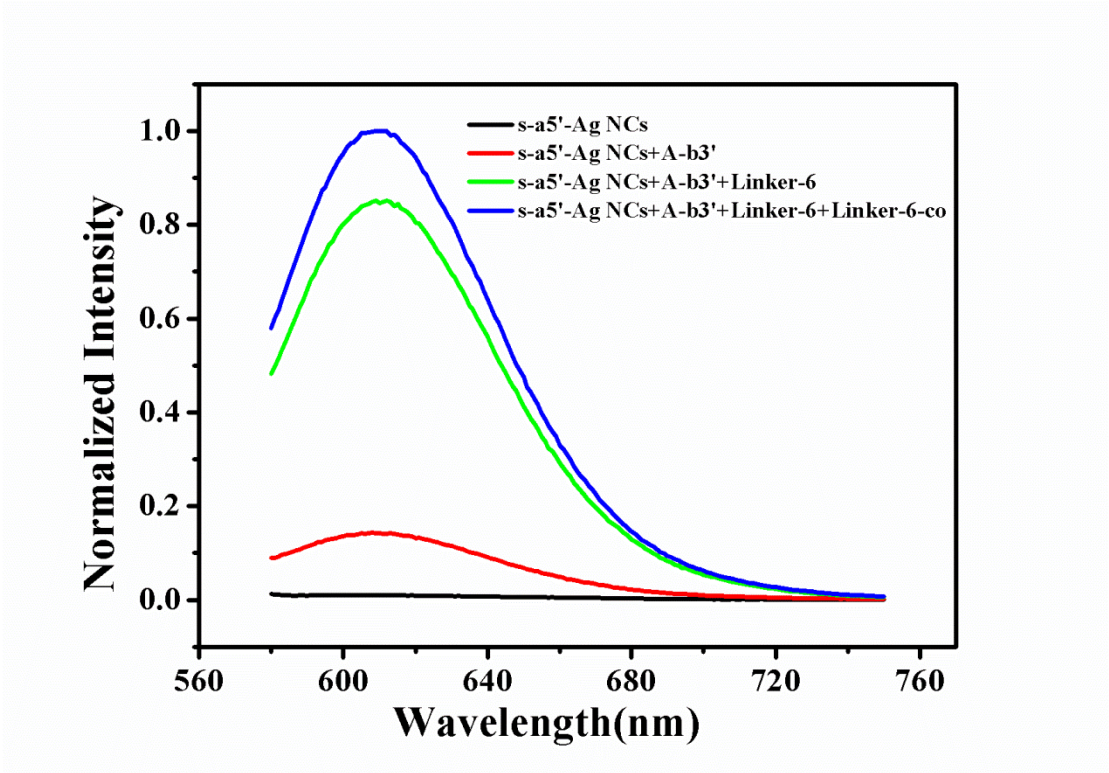

Fig. S6. The fluorescence intensity of s-a5'-Ag NCs, s-a5'-Ag NCs+A-b3', s-a5'-Ag NCs+A-b3'+Linker-6 and s-a5'-Ag NCs+A-b3'+Linker-6+Linker-6-co.

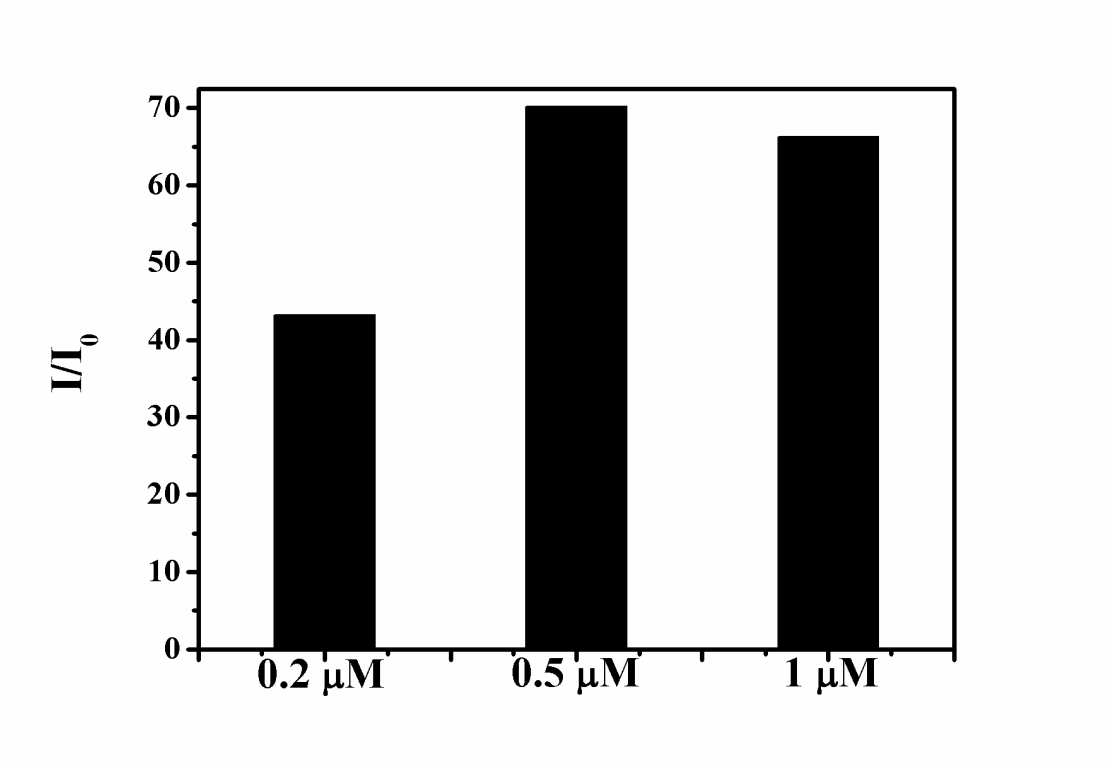

Fig. S7. The optimization of DNA and Ag NCs concentration utilizing s-a5'-Ag NCs, A-b3' and Linker. I_0 was the fluorescence intensity of dark Ag NCs. I was the fluorescence intensity of dark s-a5'-Ag NCs reacting 1 h after the addition of Linker and A-b3'.