Supporting Information

Experiment section

Chemicals and Instruments: $AgNO_3$ was purchased from Alfa Aesar. $NaBH_4$ and TNTs was obtained from Aladdin. All other reagents were of analytical reagent grade and used as received. Nanopure water (18.2 MΩ; Millpore Co., USA) was used in all experiments. TEM images were recorded using a JEOL 1011 transmission electron microscope operating at 200 kV. The fluorescence spectra were recorded using a JASCO FP6500 spectrophotometer (JASCO International Co. LTD., Tokyo, Japan). The slit for both the excitation and the emission was set to be 5 nm.

All oligonucleotides were purchased from Sangon Biotechnology Inc. (Shanghai, China) and used without further purification. The sequences used are as follows:

mb-1: 5'-CCC TTA ATC CCC TGT AGC TAG ACC AAA ATC-3'

apt-1: 5'-GAT TCA TTG AGA CGT GAG AAA TCG GGA CTA ACT CCA TCG AGA CAC GGG TGG GGT GGG GTG GGG-3'

lk-1: 5'-GAT TTT GGT CTA GCT ACA GTG TCT CGA TGG AGT-3'

apt-2: 5'-ATA CCA GCT TAT TCA ATT GGG CCC GGG AGA TAG TAA GTG CAA TCT ACC CGA GTA CAA CCC GCT TAC CAC CAG ATA GTA AGT GCA ATC TAC TCC ATC GAG ACA CTT TTT TTT TTT T-3'

Preparation of DNA-templated AgNCs:

DNA mb-1 was first dissolved in ultrapure deionized water. AgNCs were formed by adding $AgNO_3$ to the DNA solution, followed by reduction with $NaBH_4$. Final concentrations were 15 μM in DNA mb-1, 90 μM in $AgNO_3$, and 90 μM in $NaBH_4$ in 20 mM pH 6.6 sodium phosphate buffers. The aqueous solution of $NaBH_4$ was prepared by dissolving NaBH4 powder in water and adding the required volume to the mixture within 30 seconds, followed by vigorous shaking for 1 min. The reaction was kept in the dark for 24 hours at room temperature before use.

LFPs collection:

Volunteers were asked re-cleaned with water and dried in air. Then they blot their fingers on the chips surfaces. The collected samples were kept for 12 hours before use. For TNT imaging, solutions of TNTs with different concentrations were drop-casted on fingers. After drying in air, the fingerprints were collected as described above.

Gel eletrophoresis:

Six samples were prepared by addition of DNA and Tris-Boric acid-EDTA (TBE) (pH 7.4) buffer. The samples were incubated for 40 min at room temperature. The final concentrates in the sample were: DNA (20μM), Tris (100mM), Boric acid (100mM), EDTA (2mM). They were loaded on a 20% polyacrylamide gel electrophoresis and electrophoresed at room temperature at 20 Vcm^{-1} for 1 hour.

LFPs and TNT imaging:

200 μl of DNA solution (with apt-1 and lk-1) was added to the LFPs and incubated for 1 h. The excess solution was removed and the chip was washed with PBS for 3 times. Another DNA solution with mb1-AgNCs was dropped on the fingerprints and incubated for 1h in room

temperature. The chip was washed with PBS for 3 times after removed the solution. The chips were moved onto a UV transilluminator and the images were taken directly by a digital camera. For capturing higher magnification fluorescent images, the chip was loaded on a slide and moved on the fluorescent microscopy and images were obtained under different channels. Detection and imaging of TNT was similar to LFPs, except that the first DNA solution contained apt-2 and lk-1.

Fluorescence measurement:

The treated quartz chip was vertically fixed on the sample stages. The angle between chip surface and incident direction was 45°. Fluorescence data were all recorded on a JASCO FP6500 spectrophotometer. The excitation wavelength was 480 nm for all chips. All of the fluorescence spectra were obtained at room temperature.

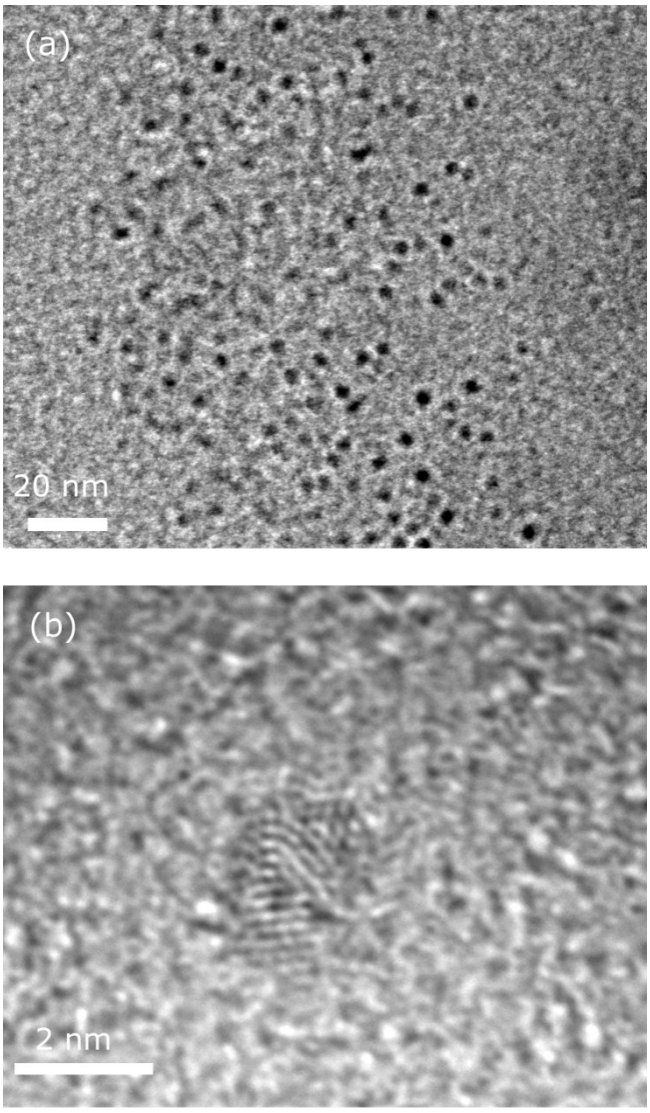


Fig. S1 The TEM images of the DNA-templated AgNCs.

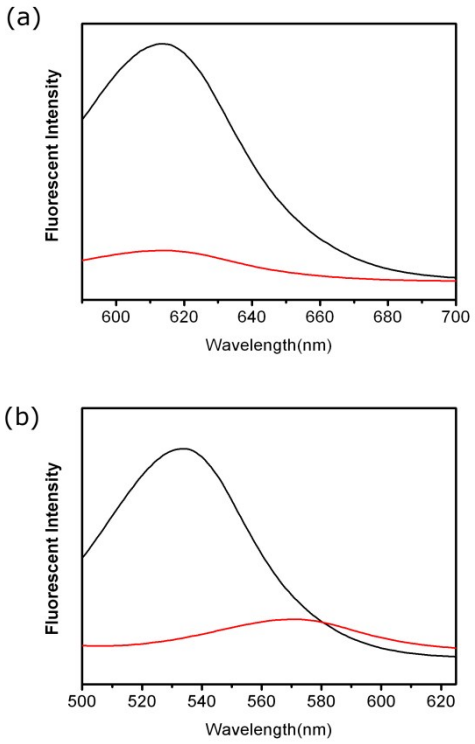
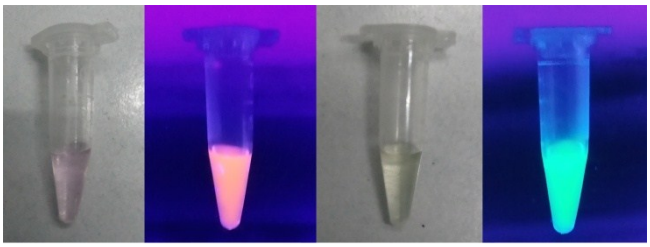


Fig. S2 The fluorescent spectra of the AgNCs (a) excited at 580 nm with G-rich nearby (black line) and without G-rich nearby (red line) (b) excited at 480 nm with T-rich nearby (black line) and without T-rich nearby (redline).



(a) (b) (c) (d)

Fig. S3 Fluorescent images of the DNA modulated AgNCs (a) with G region nearby under bright field (b) with G region nearby under irradiation (c) with T region nearby under bright field (d) with T region nearby under irradiation.

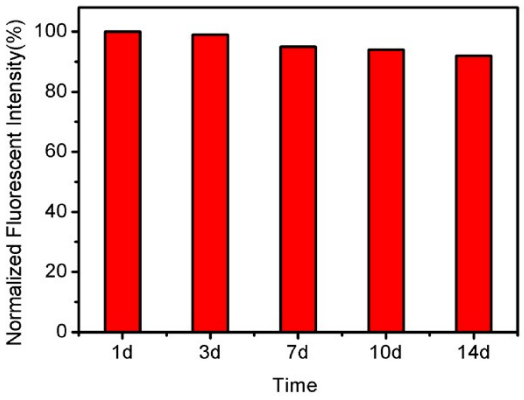


Fig. S4 The fluorescent intensity of the AgNCs kept for 1-14 days.

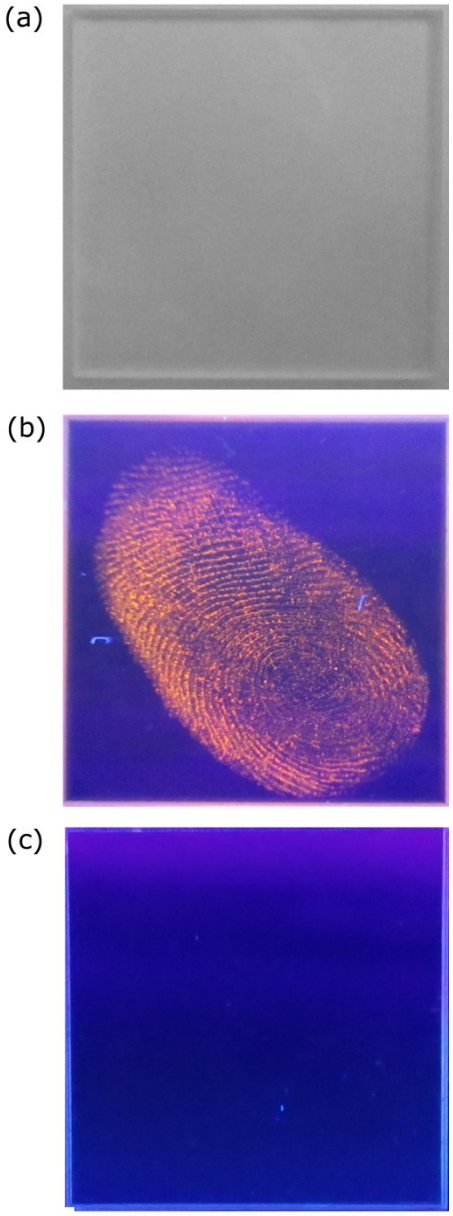


Fig. S5 (a) The photograph of the quartz chip. (b) The visualization of the LFPs by red-emitting AgNCs under irradiation. (c) The LFPs image without AgNCs.

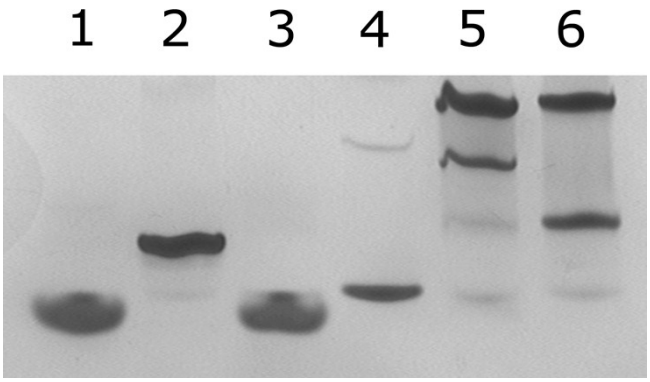


Fig S6 The PAGE experiment result for the DNA hybridization. Each lane represented for mb-1 (lane1), apt-1 (lane-2), lk-1 (lane-3), apt-2 (lane 4), mb-1+apt-1+lk-1 (lane 5), mb-1+apt-2+lk-2 (lane 6), respectively.

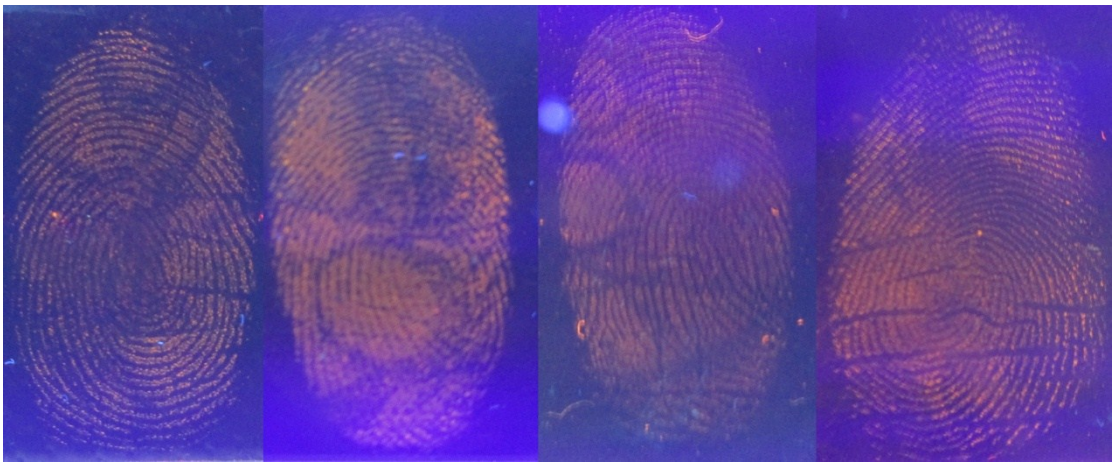


Fig. S7 The luminescence images of fingerprints from other volunteers.

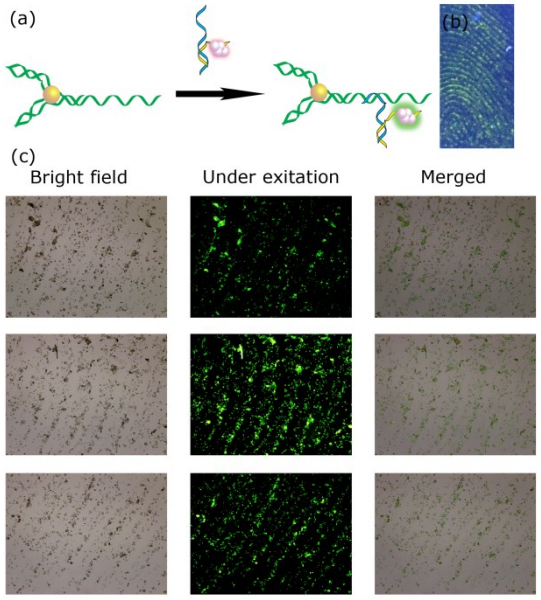


Fig. S8 (a) Principle of the visualization of the TNT in fingerprints by the lighten-up AgNCs. (b) Fluorescent image of TNTs on a quartz chip under irradiation (c) Higher magnification fluorescent images captured by fluorescence microscopy.

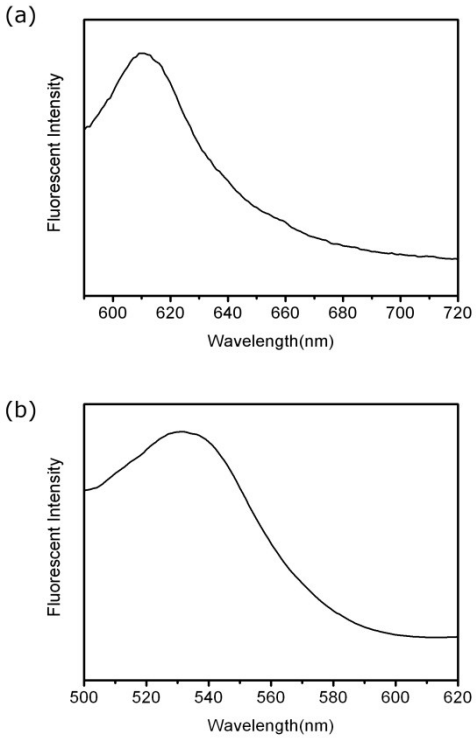


Fig. S9 The fluorescent spectra of the lighted-up (a) fingerprints and (b) TNT on a quartz chip, respectivly.

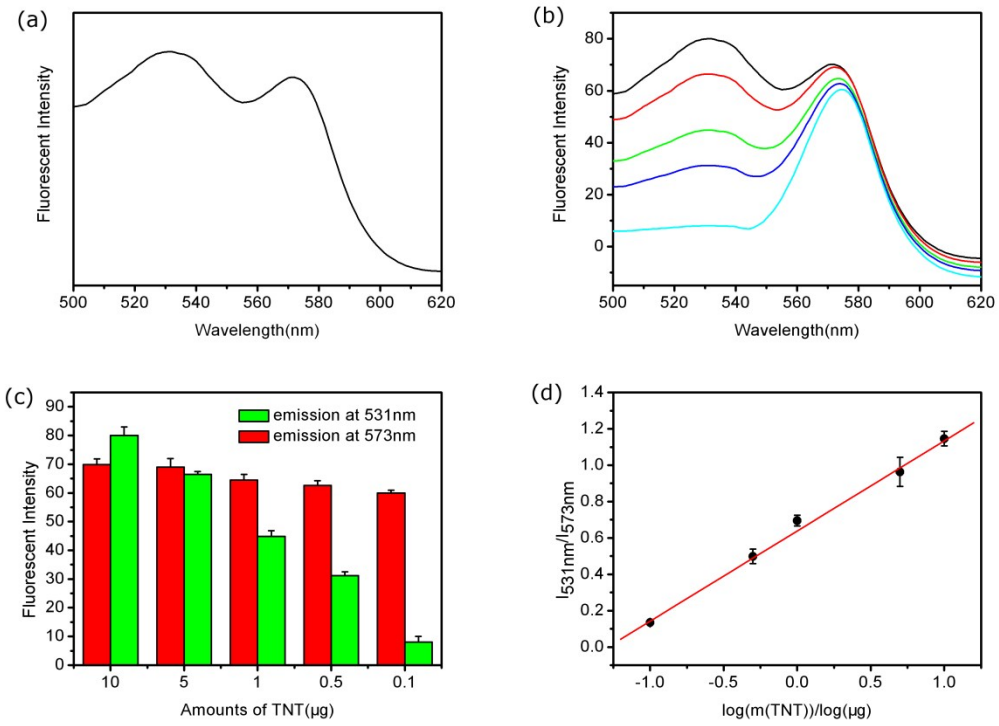


Fig. S10 (a) The fluorescent spectra of the lighted-up fingerprints and TNT on a same quartz chip at 480 nm excitation. (b) The fluorescent spectra for LFPs with TNT concentration in the range from 0.1 to 10 μg. (c) The fluorescent intensity for the LFPs with TNT concentration in the range from 0.1 to 10 μg. (d) The linear region of the relationship between the ratiometric intensity and the concentration of TNT.