

Electronic Supplementary Information (ESI)

for

Intelligent Layered Nanoflare: DNA Computing on a Single Gold Nanoparticle for Multiple Logic Gates Operation

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Table S1. List of oligonucleotides used.

Name	Sequence
Inputs:	
G _{in}	<u>TATGGTTGTTTATGTGTTCCCTGATCTTTAGCCTTA</u>
F _{in}	GTTAGATGTTAGTTTCACGAAGACAATGATTAAGGC
G _{in-6}	TGTTTATGTGTTCCCTGATCTTTAGCCTTA
AND:	
E-SH thiol- TTTT	GTTAGATGTTAGTTTCACGAAGACAATGAT
F _f	GTTTATGTGTTCCCTGATCTTTA <u>GCCTTA</u> ATCATTGTCTTCGTGAAACTAACATCTAAC-FAM
G	TAAGGCTAAAGATCAGGGAACACATAAAACA <u>ACCATA</u>
OR:	
E-SH thiol- TTTT	GTTAGATGTTAGTTTCACGAAGACAATGAT
F-1	<u>GCCTTA</u> ATCATTGTCTTCGTGAAACTAACATCTAAC-TAMRA
G-SH	TGTTTATGTGTTCCCTGATCTTTAGCCTTA TTTT-thiol
G-1	TAMRA-TAAGGCTAAAGATCAGGGAACACATAAAACA <u>ACCATA</u>
NOT:	
G _{not} -SH thiol- TTTT	GTGTTTATAGCGGACCCCTACTGAGTTGTG
G-2	ROX-TGTTTATGTGTTCCCTGATCTTTA CACAATCAGTAGGGGTCCGCTATAAACAC
G	TAAGGCTAAAGATCAGGGAACACATAAAACA <u>ACCATA</u>
AND (three-input):	
E-SH thiol- TTTT	GTTAGATGTTAGTTTCACGAAGACAATGAT
F _f	GTTTATGTGTTCCCTGATCTTTA <u>GCCTTA</u> ATCATTGTCTTCGTGAAACTAACATCTAAC-FAM
G-ATP	TAAGGCTAAAGATCAGGGAACACATAAAACA <u>ACCATA</u> ACCTTC
Apt-ATP:	ACCTGGG GGAGTATTGCGGAG GAAGGT TATGGT
Multiple logic system 1:	
E-SH thiol- TTTT	GTTAGATGTTAGTTTCACGAAGACAATGAT
G-3	ROX-TGTTTATGTGTTCCCTGATCTTTAGCCTTAATCATTGTCTTCGTGAAACTAACATCTAAC-FAM
G-1	TAMRA-TAAGGCTAAAGATCAGGGAACACATAAAACA <u>ACCATA</u>
Multiple logic system 2:	
The combination of the AND, OR, and NOT gates.	

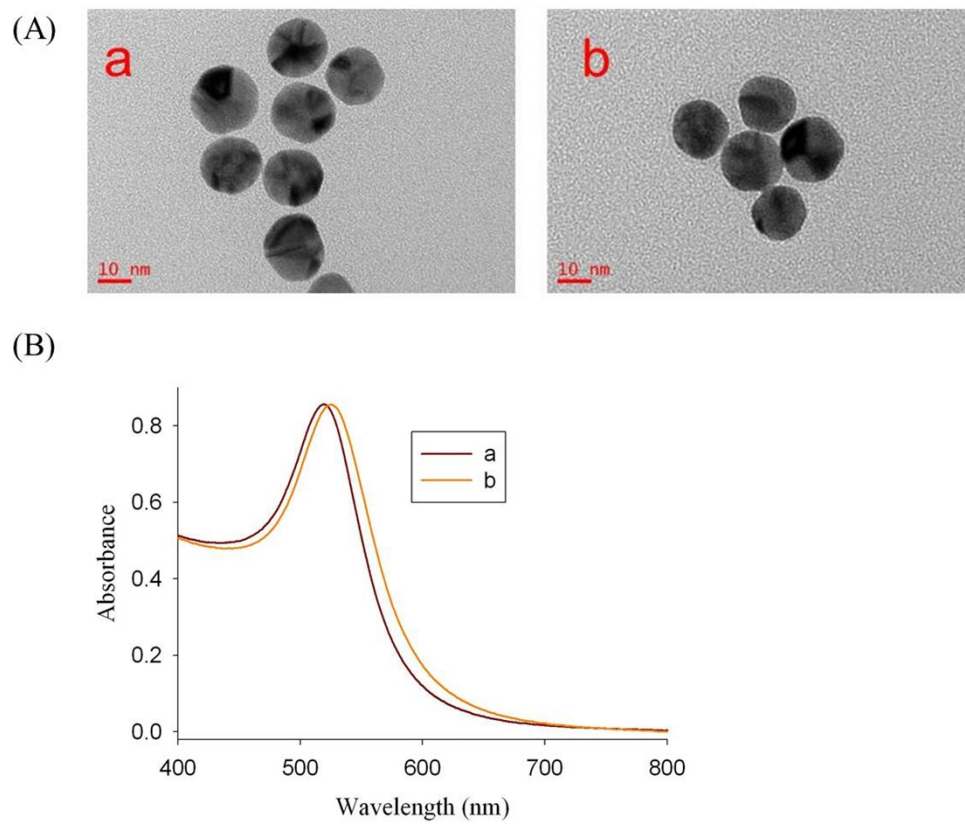


Figure S1. TEM images (A) and UV-vis spectra (B): Au NPs (a) and nanoflare (b).

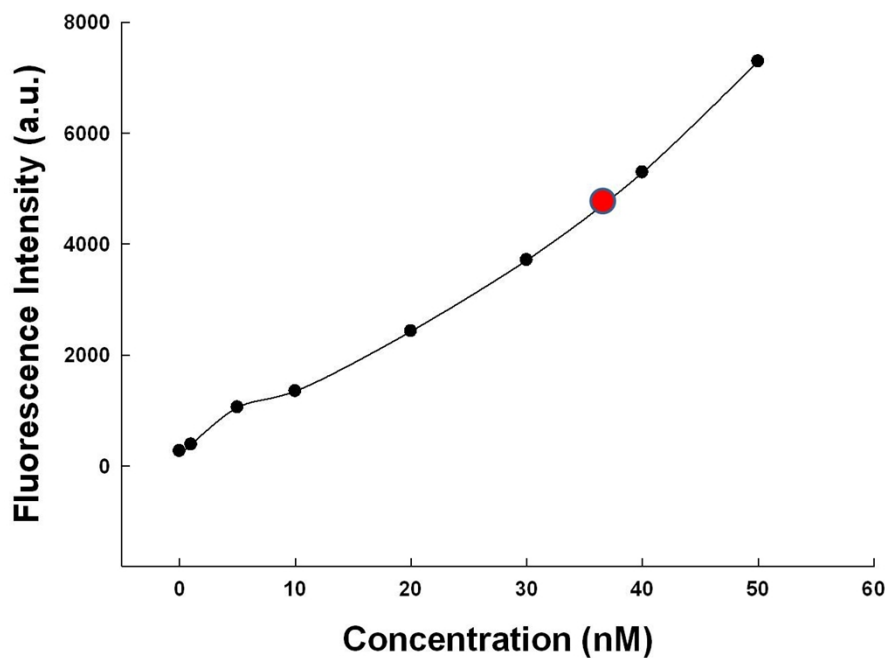


Figure S2. Standard linear calibration curves of DNA flares (Red dot indicates the number of flares measured for the AND gate).

Quantitation of DNA duplexes on AuNPs: Briefly, 2 μ L 2 M mercaptoethanol were added to a 200 μ L 3 nM nanoflare solution, and after incubating for 24 h at room temperature, the released DNA flares were separated *via* centrifugation. Finally, aliquots of the supernatant were diluted 5-fold with TAE buffer, and the fluorescence was measured. Based on the standard linear calibration curve in Figure S2, about 60 green flares per AuNP were calculated for the two-input AND gate.

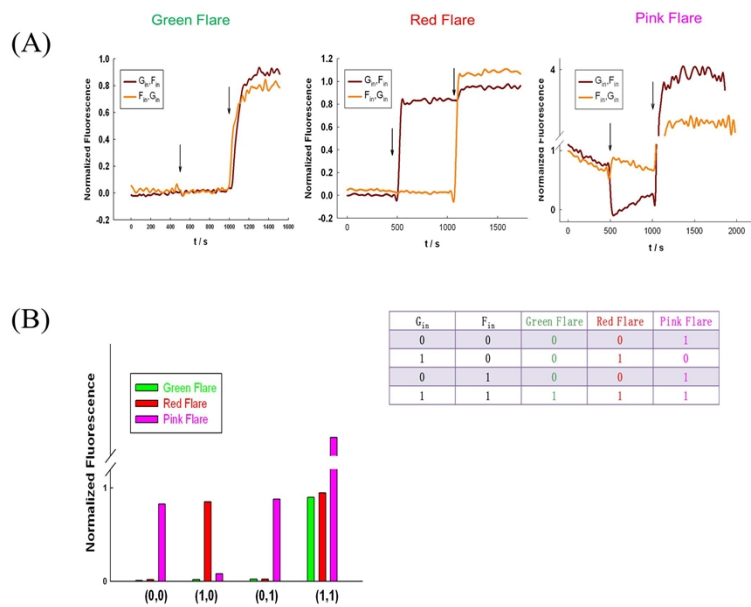


Figure S3. (A) Time-dependent fluorescence changes of corresponding channel. (B) Bar diagram and truth table of the multiple logic system 1.

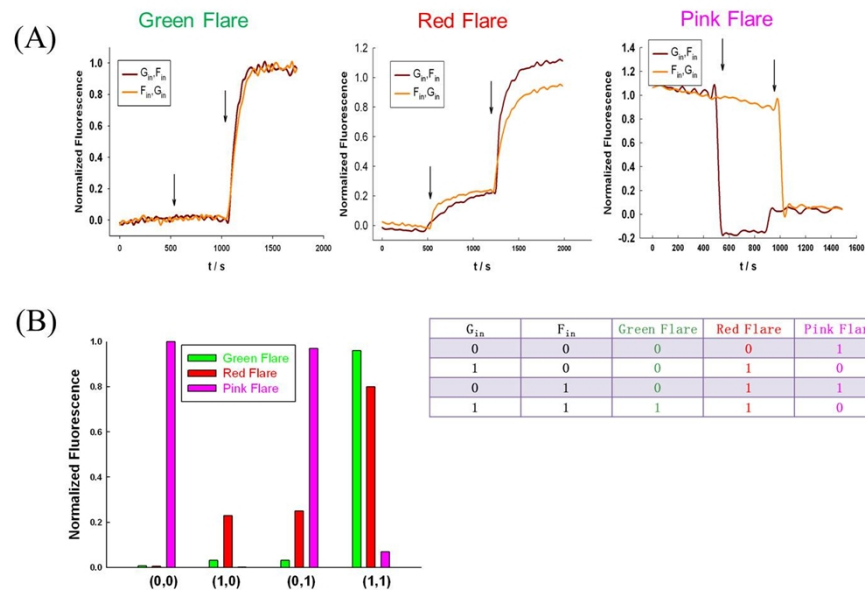


Figure S4. (A) Time-dependent fluorescence changes of the corresponding channel. (B) Bar diagram and truth table of the multiple logic system 2.

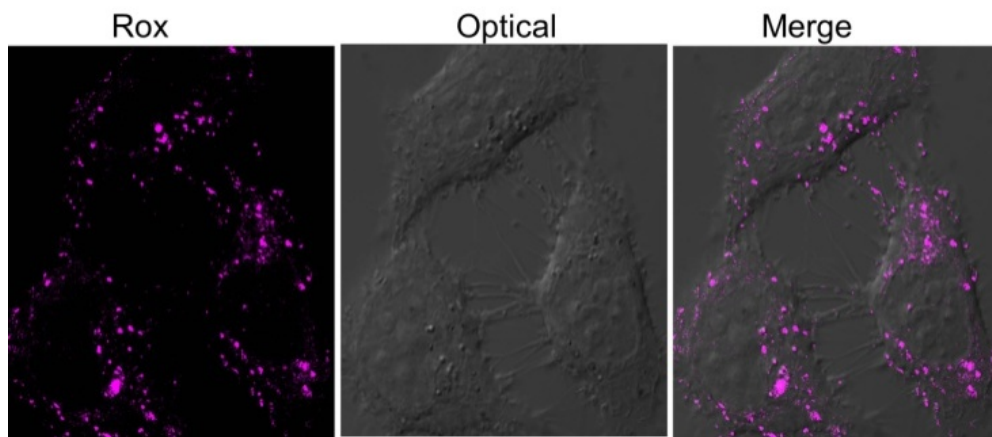


Figure S5. Confocal fluorescence images of the nanoflare for the multiple logic system 1 in HeLa cells.