Supporting Information

Spatiotemporally Controllable MicroRNA Imaging in Living Cells via NIR-activated Nanoprobe

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SUPPLEMENTARY EXPERIMENTAL SECTION

Synthesis of NaYF:Nd, Yb, Tm@NaYF4 (Core-Shell) UCNPs

0.20 mmol $YbCl_3$, 0.8 mmol YCl_3 and 0.003 mmol $TmCl_3$ were mixed with 16 ml octadecene and 4 ml oleic acid in a 50 ml flask. Afterwards, the solution was heated to 150 ℃ and then cooled down to room temperature. Next, 10 ml of methanol containing 4 mmol of NH_4F and 2.5 mmol of NaOH was added to the flask, followed by stirring for 30 min. The solution was then slowly heated to remove methanol. The resulting mixture was heated to 300 ° C and held for 1.5 h. The solution was cooled to room temperature and the nanocrystals were precipitated from the solution with acetone.

YCl_3 (0.6 mmol), $YbCl_3$ (0.2 mmol), $NdCl_3$ (0.2 mmol), oleic acid (6 ml) and octadecene (15 ml) were mixed in a flask (50 ml). The mixture was heated to 150 ° C and then cooled. The previously synthesized core was then added to the flask, kept at 70 ° C, and a 10 ml methanol containing NH_4F (4 mmol) and of NaOH (2.5 mmol) was added. After stirring for 30 minutes, the methanol was slowly heated and then removed. Subsequently, the solution was heated to 300 ° C for 1.5 h under an argon atmosphere. The solution was cooled again and then the nanocrystals are precipitated from the solution.

Cell culture

HeLa cells, A549 cells and HEK293T cells were cultured in 25 cm^2 cell culture flask containing Dulbecoo's modification of Eagle's medium (DMEM), supplemented with 10% Fetal Bovine Serum (FBS), 1% Gibco GlutaMAX (Thermo Fisher Scientific), 100 μg/mL streptomycin, and 100 U/mL penicillin at 37 ^oC incubator under a humidified atmosphere containing 5% CO_2.

Cell viability test

HeLa cells (2×10^4 cells/well, 100 μL) were seeded in a 96-well plate. After cultured for 24 h, the cells were treated with CHA-UCNPs (8 nM) for 2 h. Then, after being irradiated with 808 nm NIR laser for 20 min (1.6 W cm^{-2}, 1 min irradiation, and 5 min break), cells were cultured for another 20 h, followed by the MTT assay (Transgene Biotech) according to the manufacturer's protocol. The cells exposed to PBS were used as negative control.

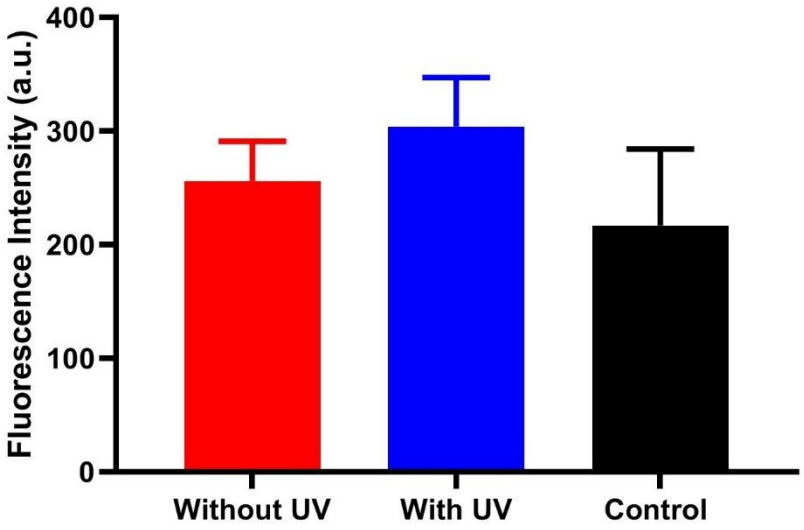

Figure S1. Fluorescence intensity of CHA when miR-21 absent at Em=560 nm with or without UV irradiation. Data are represented as the means ± SD (n = 3). P > 0.05.

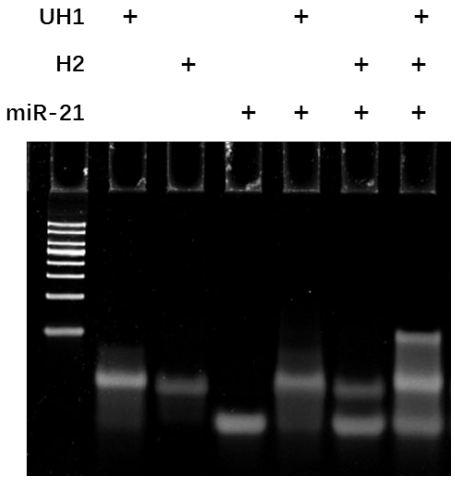

Figure S2. Results of 12% PAGE analysis of the NIR-activated CHA.

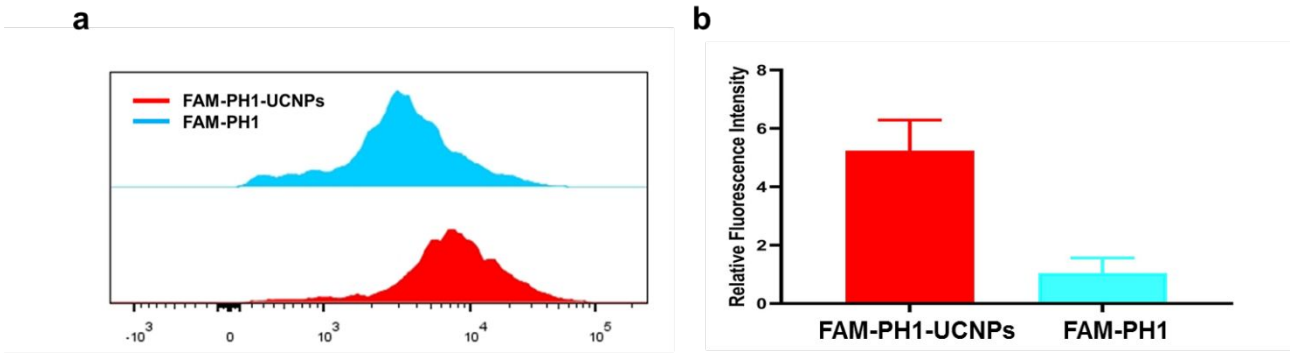

Figure S3. The relative fluorescence intensities of FAM-PH1-UCNPs and FAM-PH1 group. (a) Flow cytometry showing fluorescence intensities of FAM-PH1-UCNPs and FAM-PH1 group. (b) Quantification of the flow cytometric data in (a). Data are represented as means ± SD (n = 3).

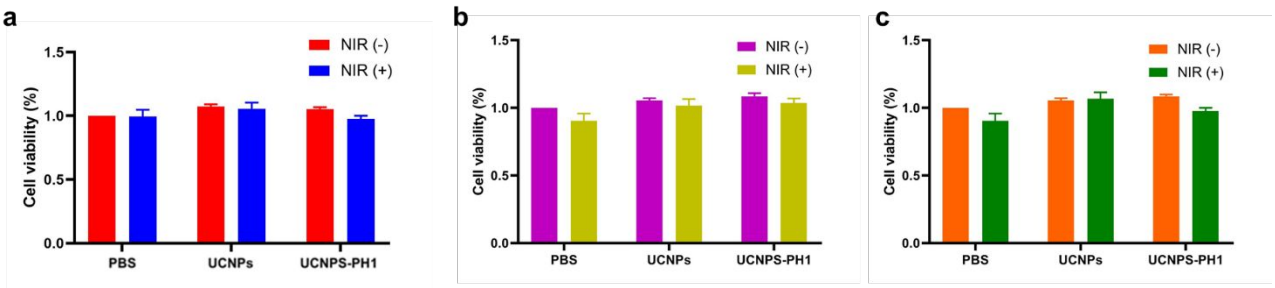

Figure S4. Cell viability of (a) HeLa cells, (b) A549 cells and (c) HEK293T cells treated with PBS, UCNPs and UCNPs-PH1.

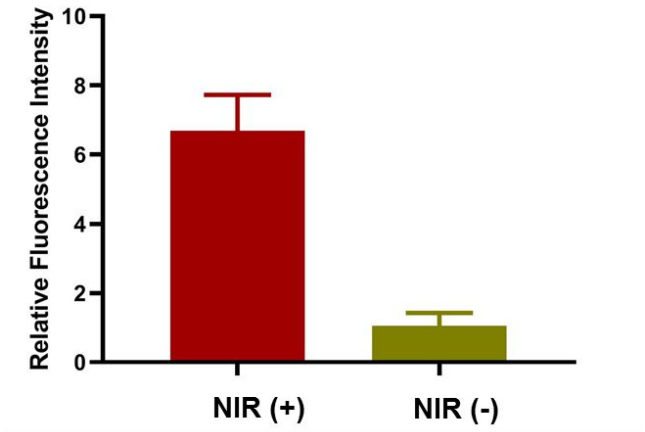

Figure S5. The relative fluorescence intensities when NIR existed or not. (a) Flow cytometry showing fluorescence intensities when NIR existed or not. (b) Quantification of the flow cytometric data in (a). Data are represented as means ± SD (n = 3).

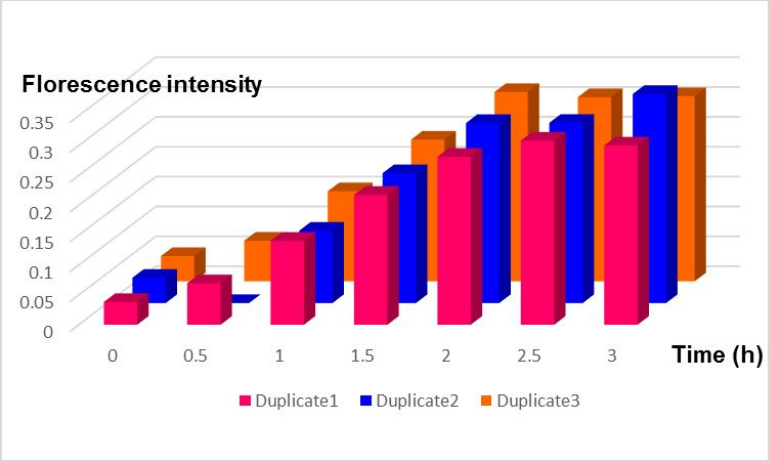

Figure S6. Florescence intensity of the HeLa cells at different incubation time.

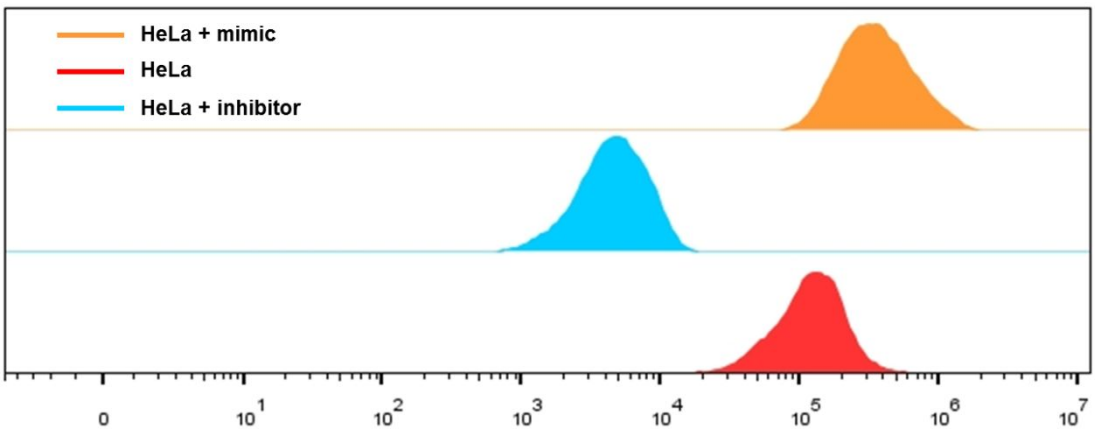

Figure S7. Flow cytometry result of the HeLa + inhibitor, HeLa and HeLa + mimic.

Table S1. Sequences of oligonucleotides used in this work

Name	Sequence (5’-3’)
PH1	CCCCTCAACATCAGTCTGATAAGCTACCATGTGTAGATA GCTTATCAGACT- Pc -GGGG
FAM-PH1	FAM- CCCCTCAACATCAGTCTGATAAGCTACCATGTGTAGATA GCTTATCAGACT- Pc -GGGG
H1	CCCCTCAACATCAGTCTGATAAGCTACCATGTGTAGATA GCTTATCAGACTGGGG
H2	TAAGCTATCTACACATGGTAGCTTATCAGACTCCATGTG TAGA
MiRNA-21	UAGCUUAUCAGACUGAUGUUGA
MiRNA-211	UUCCCUUUGUCAUCCUUCGCCU
MiRNA-155	UUAAUGCUAAUCGUGAUAGGGGU
Let-7a	UGAGGUAGUAGGUUGUAUAGUU
U6-R	GCTAATCTTCTCTGTATCGTTCC
U6-F	GGTCGGGCAGGAAAGAGGGC