Electronic Supplementary Information (ESI) for:

Activatable Smart Nanoprobe for Sensitive Endogenous MMP2 Detection and Fluorescence Imaging Guided Phototherapies

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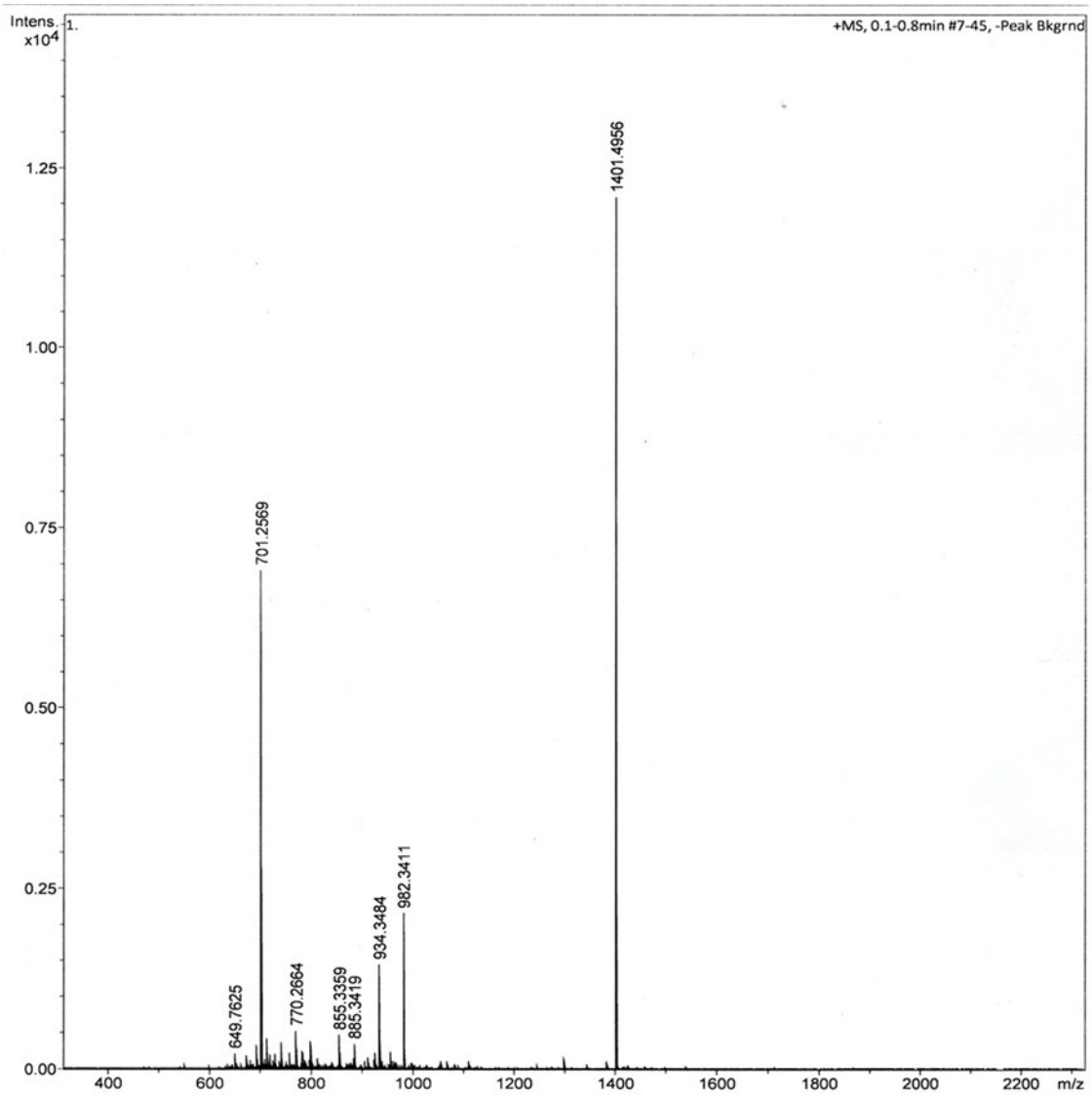

Fig. S1 ESI-MS characterization of CGPLGVRGK-PPa.

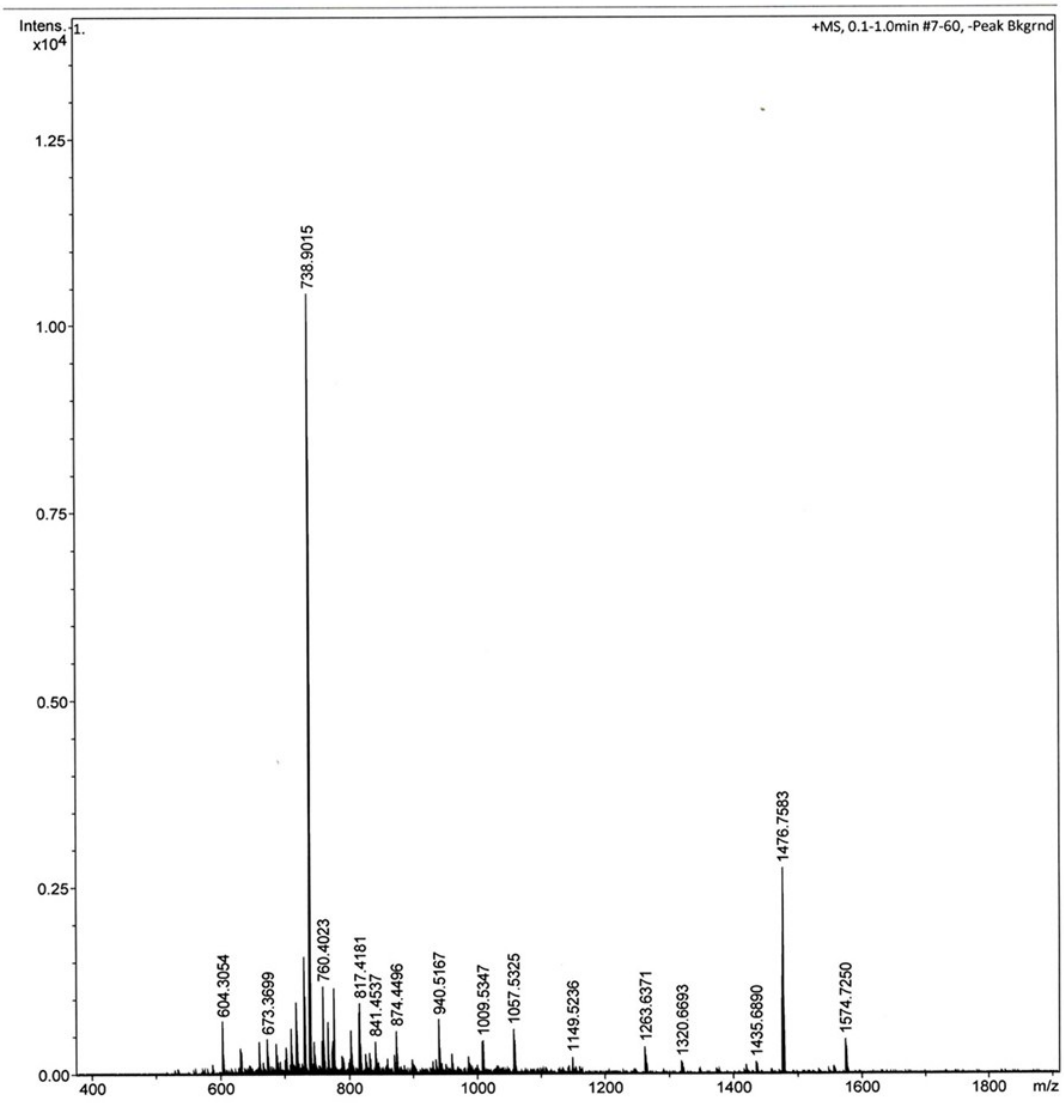

Fig. S2 ESI-MS characterization of CGDEVDHGK-PPa.

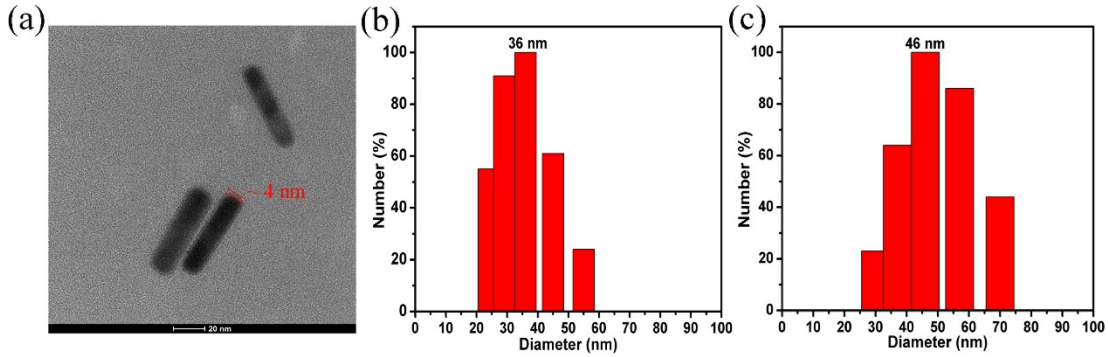

Fig. S3 (a) TEM image of AuNRs-CGPLGVRGK-PPa. (b) DLS of AuNRs. (c) DLS of AuNRs-CGPLGVRGK-PPa.

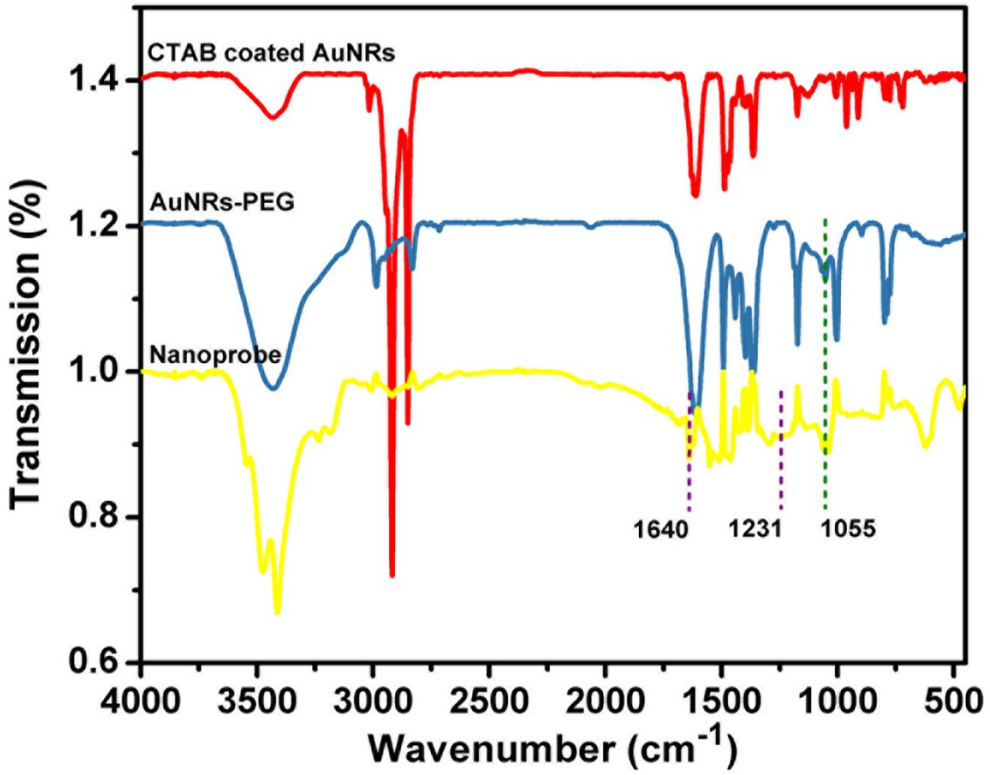

Fig. S4 FTIR spectra of CTAB coated AuNRs, AuNRs-PEG, and the nanoprobe.

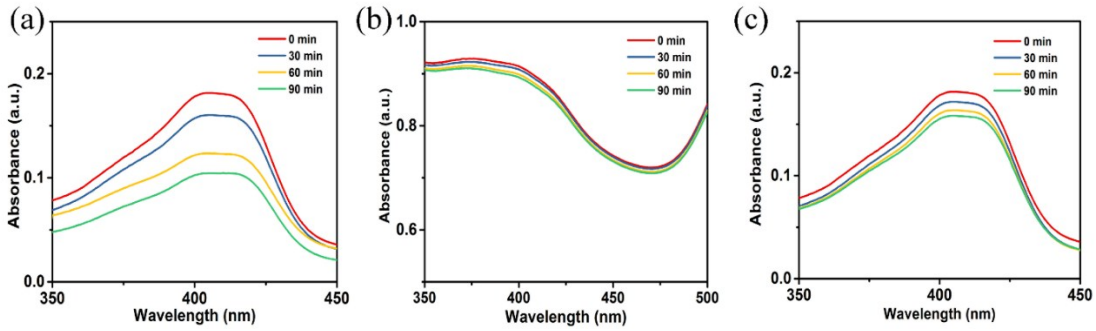

Fig. S5 Absorption spectra of CGPLGVRGK-PPa (5 μg/mL PPa) (a), the nanoprobe containing 5 μg/mL PPa (b) exposed to sunlight for different time intervals, and the nanoprobe exposed to sunlight, followed by treatment with 1nM MMP2 (c).

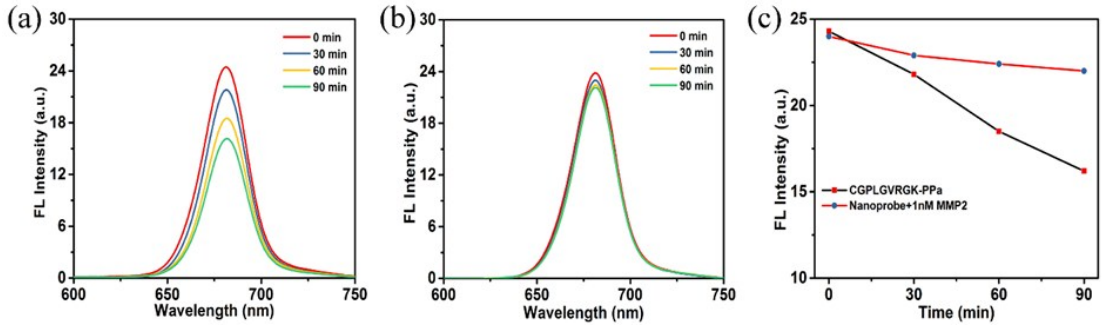

Fig. S6 Fluorescence emission spectra (λ_{ex} = 420 nm) of CGPLGVRGK-PPa (a), the nanoprobe exposed to sunlight for different time intervals, followed by treatment with 1 nM MMP2 (b), fluorescence intensity decay of (a) and (b) at 682 nm (c).

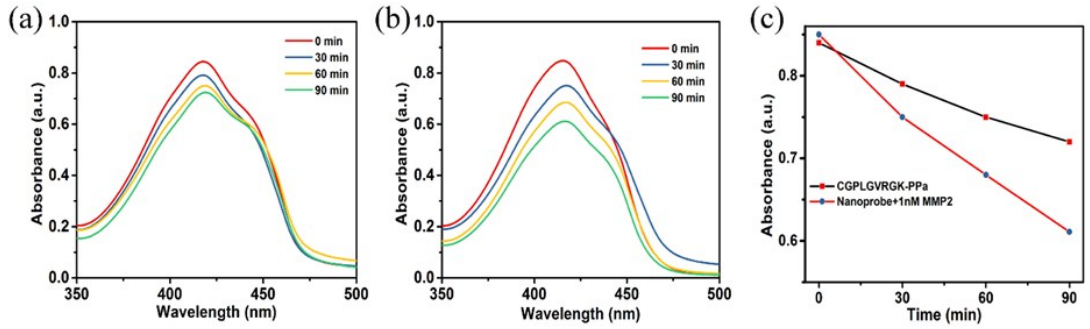

Fig. S7 Absorption spectra of DPBF at 417 nm in solution containing the free CGPLGVRGK-PPa exposed to sunlight for different time intervals (a), the nanoprobe exposed to sunlight for different time intervals, followed by treatment with 1 nM MMP2 (b)，and the absorbance decay of DPBF at 417 nm of (a) and (b) under the irradiation for different time intervals (0, 30, 60, 90 s) (c).

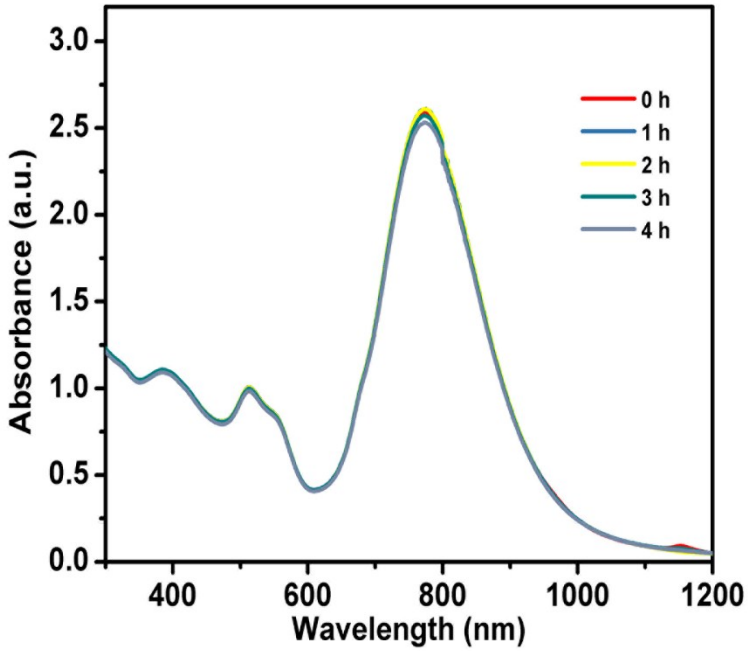

Fig. S8 Absorption spectra of the nanoprobe in cell medium for 0, 1, 2, 3, and 4 h.

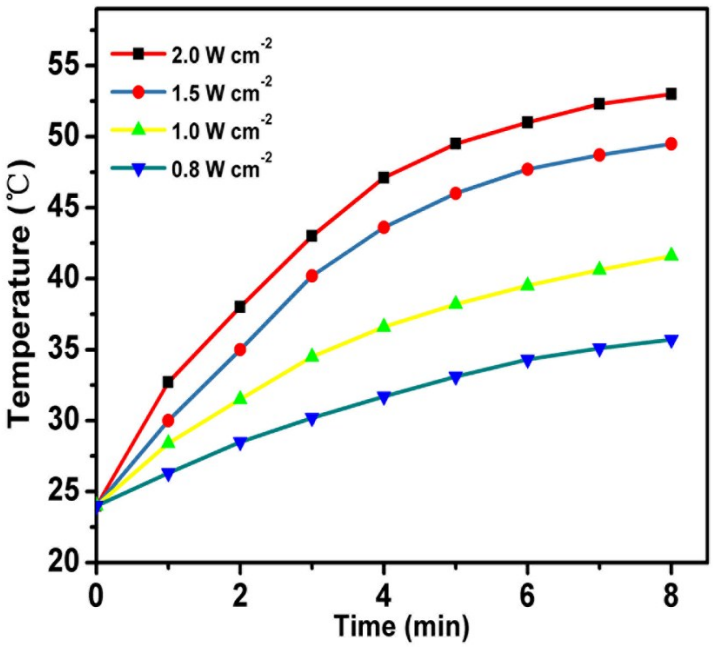

Fig. S9 Photothermal (PT) conversion characterizations of the nanoprobe solution (the concentration of AuNRs is 0.15 nM) under various power densities of 808 nm laser irradiation for 8 min.

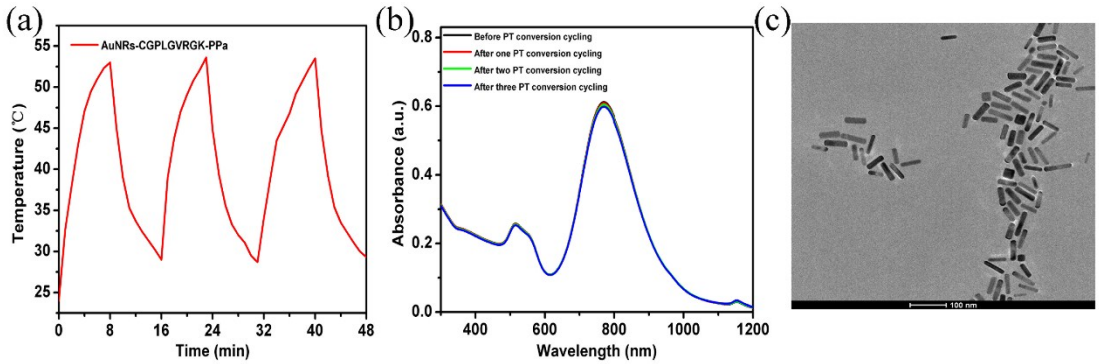

Fig. S10 (a) Temperature curves of the AuNRs solution (0.15 nM of AuNRs) monitored with thermal imager during three rounds of 808 nm laser-induced heating and cooling cycles. (b) The absorption spectra of AuNRs before and after photothermal conversion cycling. (c) TEM image of AuNRs after three photothermal conversion cycling.

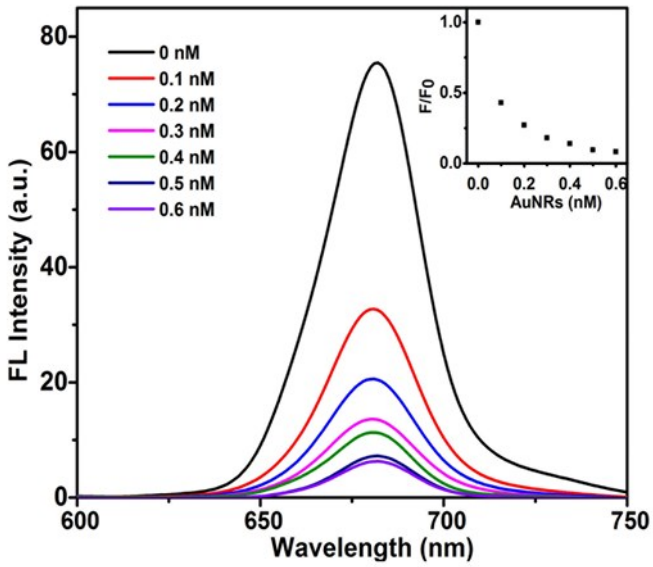

Fig. S11 Fluorescence emission spectra (λ_{ex} = 420 nm) of CGPLGVRGK-PPa (40 μM) reacted with different concentration of AuNRs (0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6 nM). Insert: the variation of the fluorescence intensity ratios (F/F_0) at 682 nm versus the concentration of AuNRs from 0 to 0.6 nM. F_0 is initial fluorescence intensity of CGPLGVRGK-PPa at 682 nm, and F is the fluorescence intensity of CGPLGVRGK-PPa at 682 nm after reaction with AuNRs.

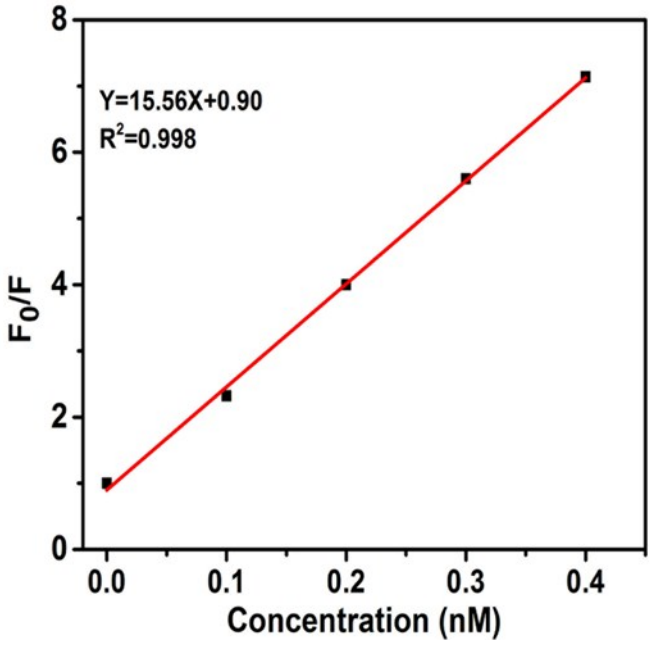

Fig. S12 Stern-Volmer equation between F_0/F and the concentration of AuNRs.

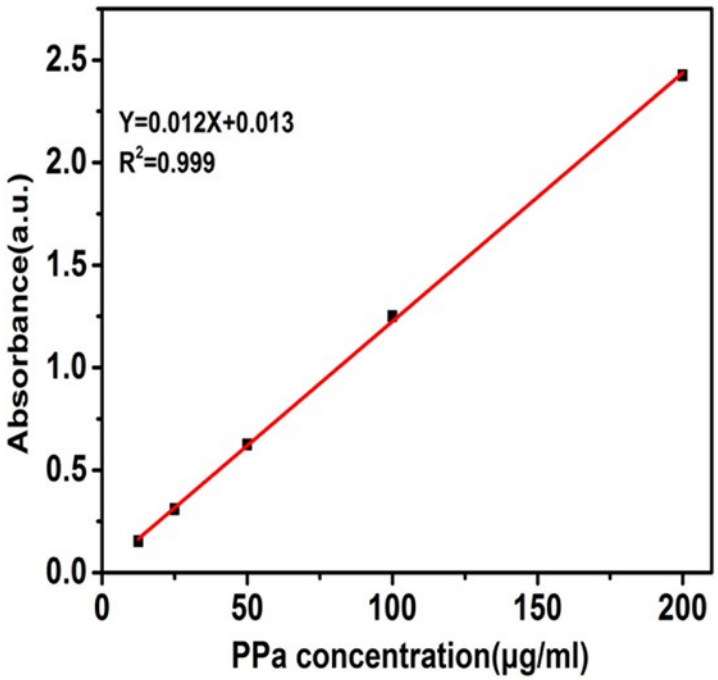

Fig. S13 The linear relationship between the absorbance and the concentration of PPa.

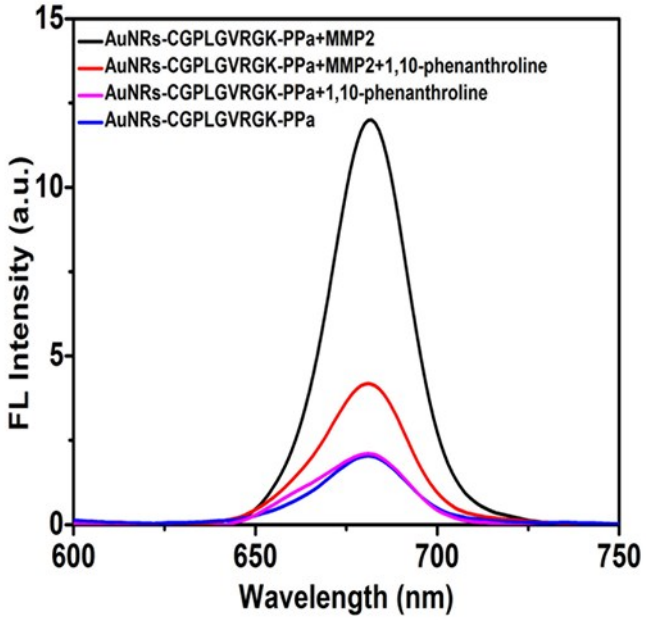

Fig. S14 Fluorescence emission spectra of the nanoprobe, the nanoprobe + MMP2 (0.5 nM), the nanoprobe + MMP2 (0.5 nM) + 1,10-phenanthroline (10 μM), and the nanoprobe + 1,10-phenanthroline (10 μM).

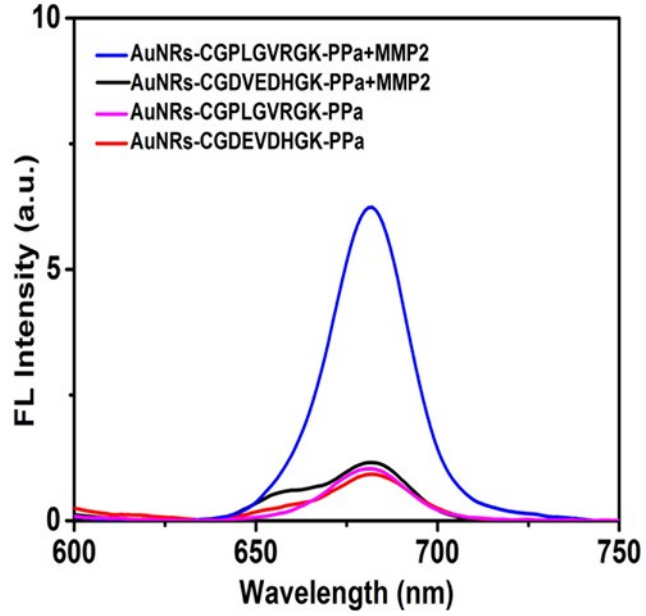

Fig. S15 Fluorescence emission spectra of the nanoprobe, the nanoprobe +MMP2 (0.1 nM), AuNRs-CGDEVDHGK-PPa, and AuNRs–CGDEVDHGK-PPa +MMP2 (0.1 nM).

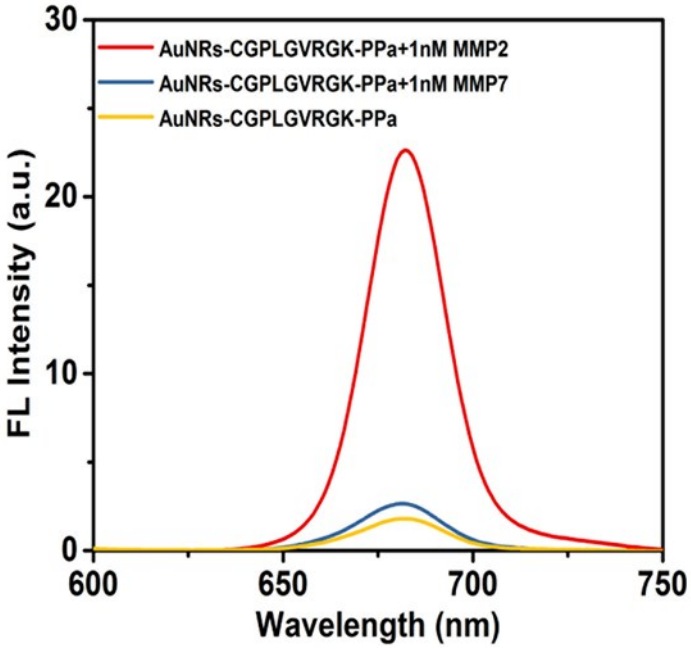

Fig. S16 Fluorescence emission spectra of the nanoprobe, the nanoprobe +MMP2 (1 nM) and the nanoprobe +MMP7 (1 nM).

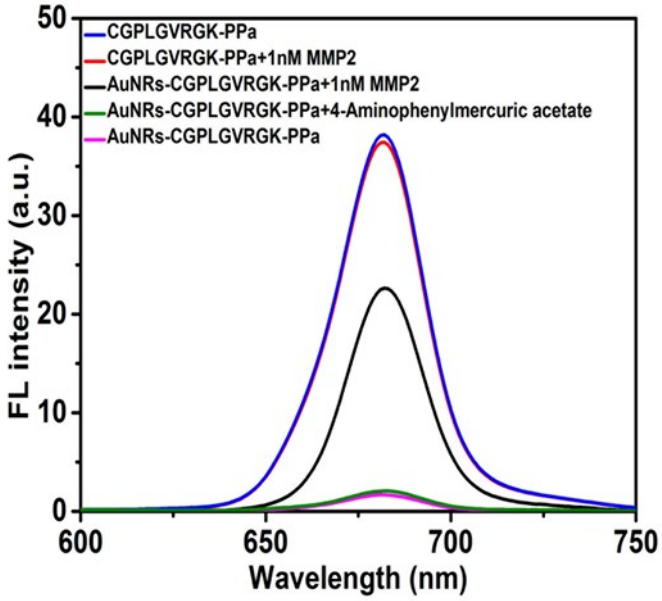

Fig. S17 Fluorescence emission spectra of CGPLGVRGK-PPa, CGPLGVRGK-PPa+MMP2 (1 nM), the nanoprobe, the nanoprobe+MMP2 (1 nM), and the nanoprobe + 4-Aminophenylmercuric acetate (2.5 mM).

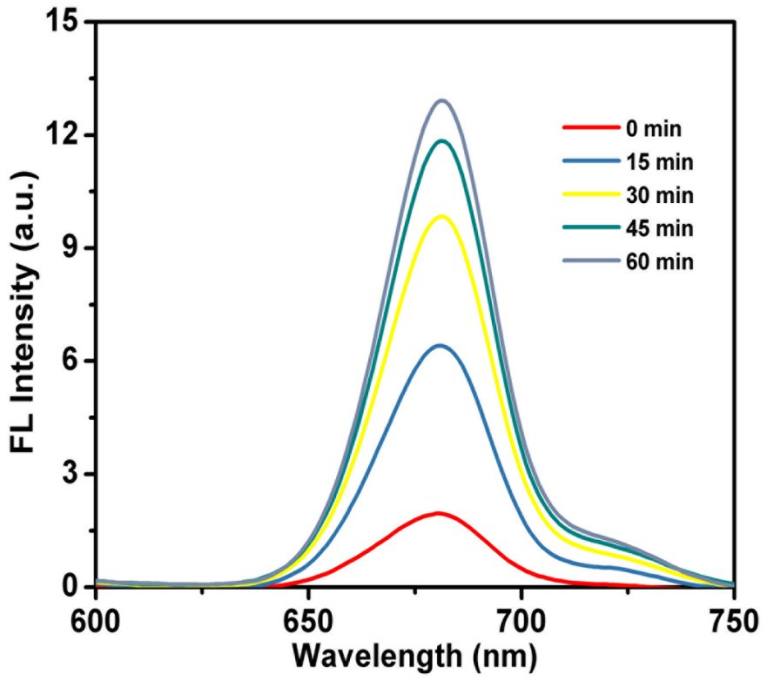

Fig. S18 Fluorescence emission spectra of the nanoprobe treated with different activity of MMP2, which was obtained by adjusting the reaction time with activator.

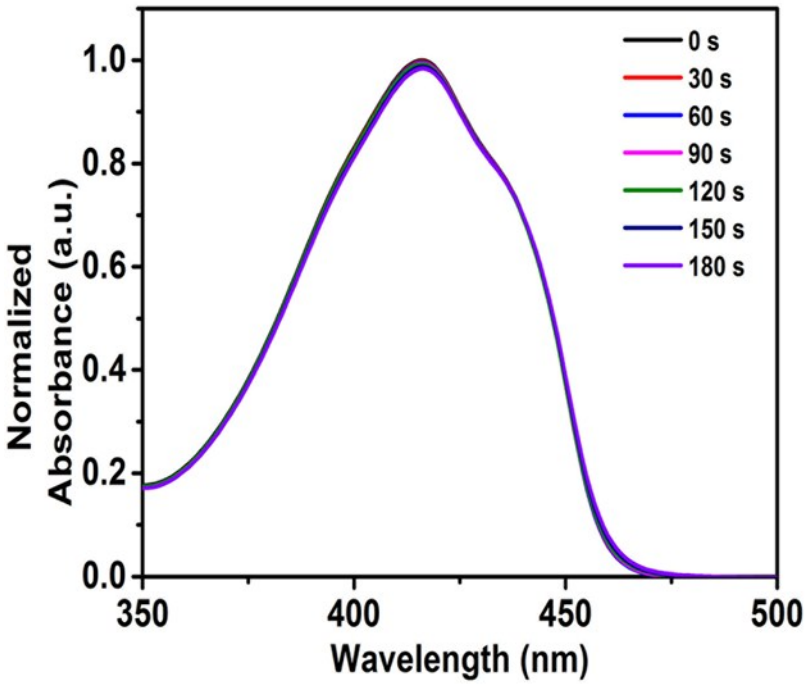

Fig. S19 Absorption spectra of the free DPBF under irradiation with LED light for different time intervals.

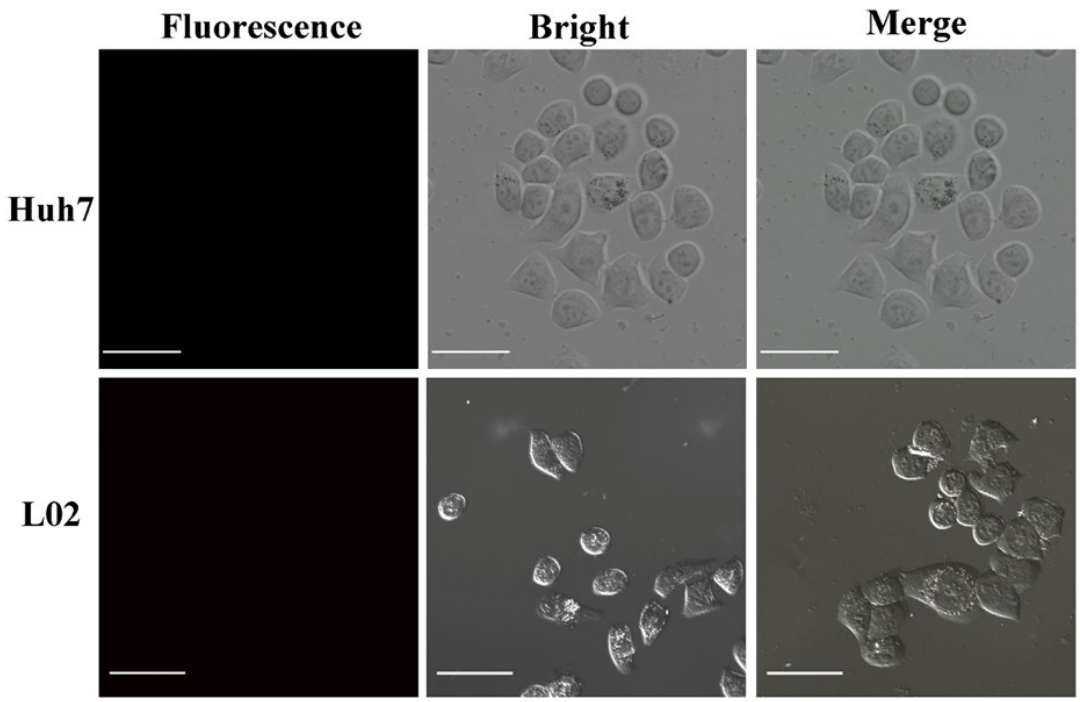

Fig. S20 CLSM images of fluorescence, bright field and merge of Huh7 cells and L02 cells without the nanoprobe treatment; scale bar = 50 μm.

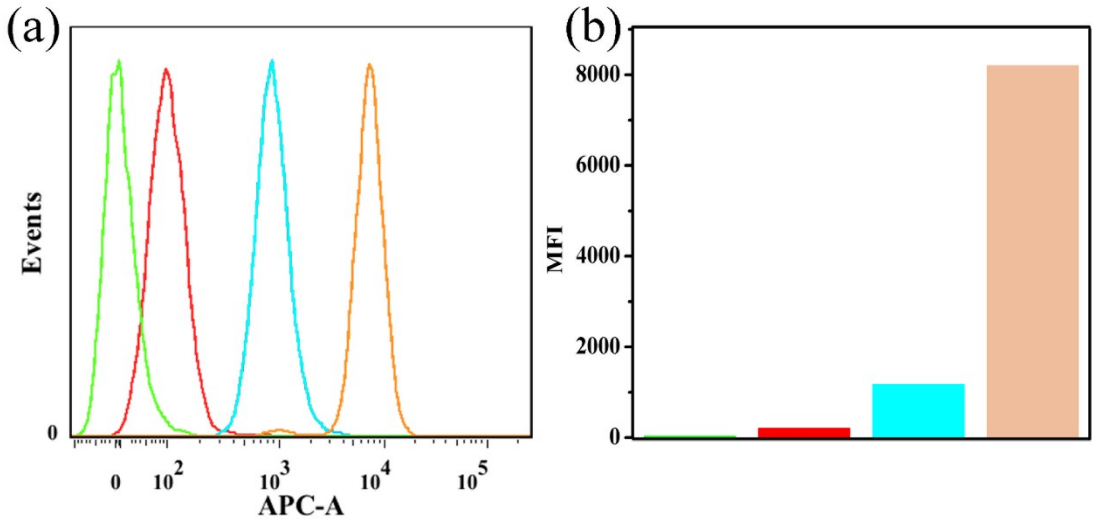

Fig. S21 (a) Flow cytometric analysis of Huh7 cells (green line), L02 cells (red line), L02 cells treated with nanoprobe (blue line) and Huh7 cells treated with nanoprobe (brown line). (b) Mean fluorescence intensity (MFI) of Huh7 cells (green), L02 cells (red), L02 cells treated with nanoprobe (blue) and Huh7 cells treated with nanoprobe (brown).

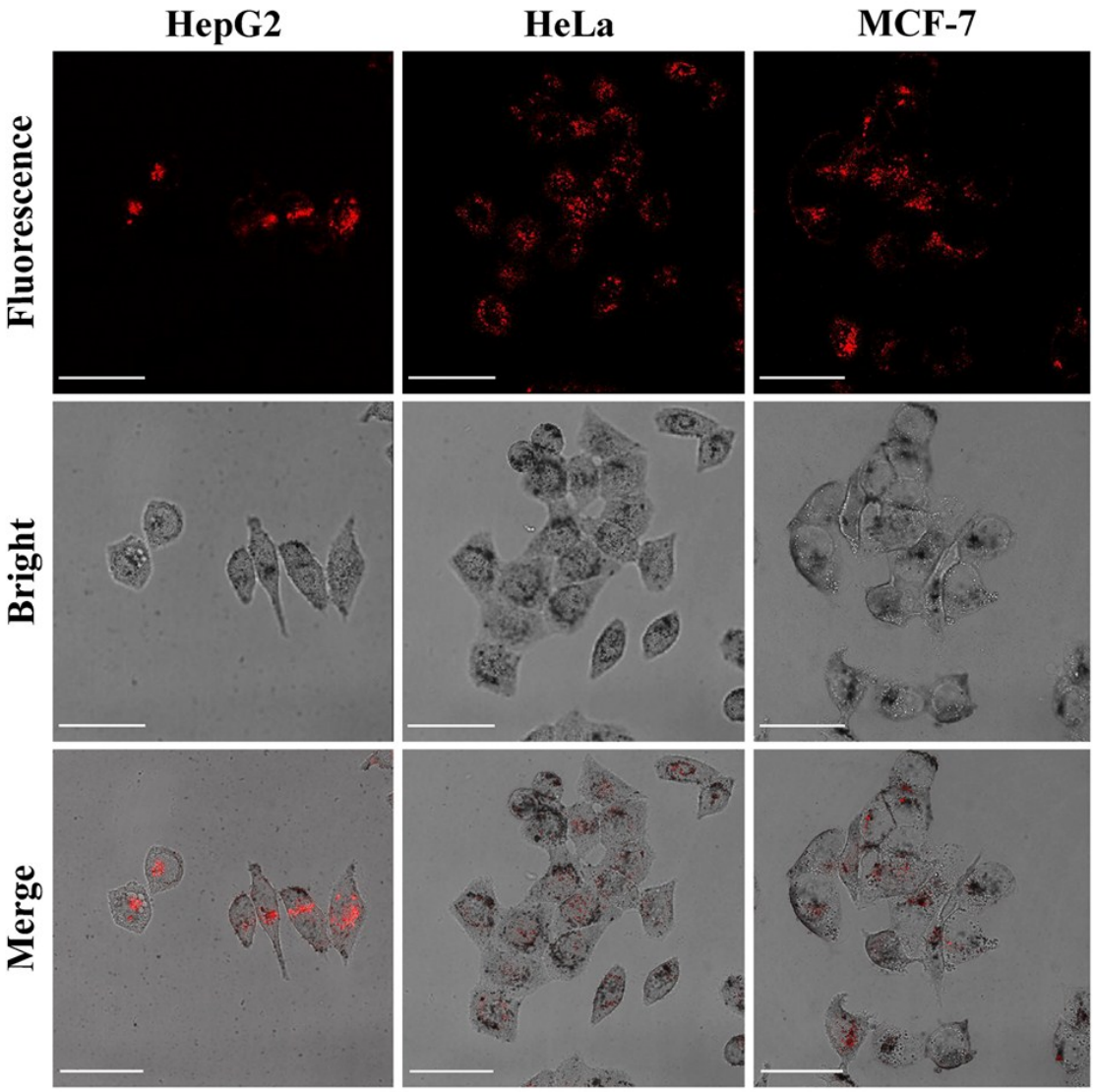

Fig. S22 CLSM images of fluorescence, bright field and merge of HepG2, HeLa and MCF-7 cells treated with the nanoprobe; scale bar = 50 μm.

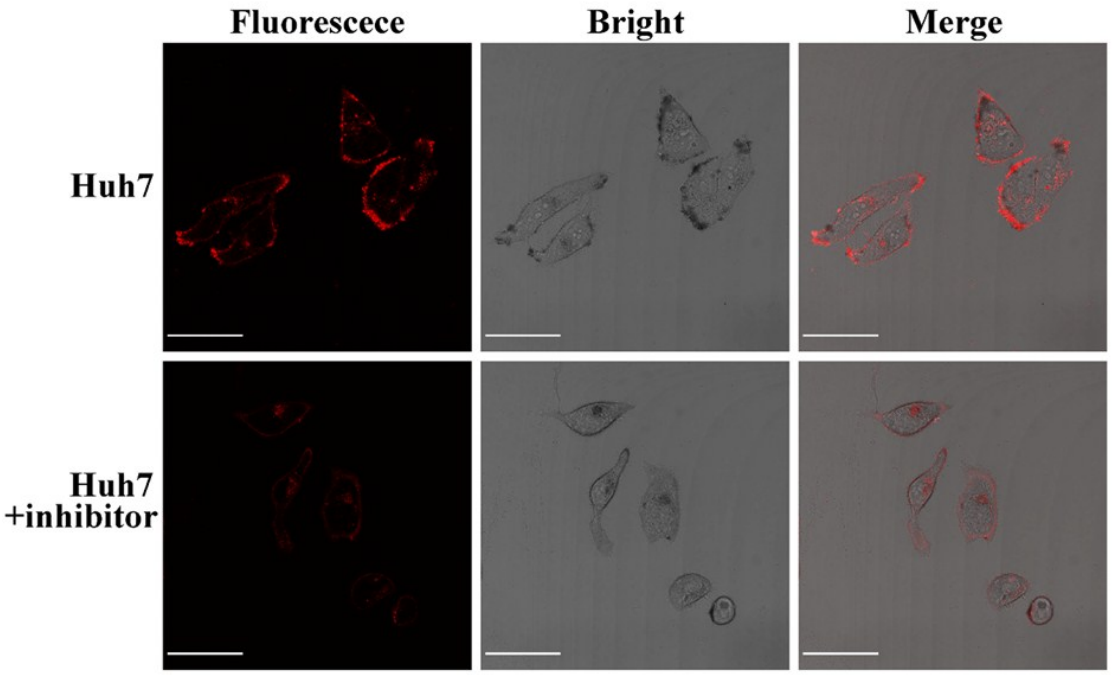

Fig. S23 CLSM images of fluorescence, bright field and merge of Huh7 cells pre-treatment with or without MMP2 inhibitor, followed by addition of the nanoprobe; scale bar = 50 μm.

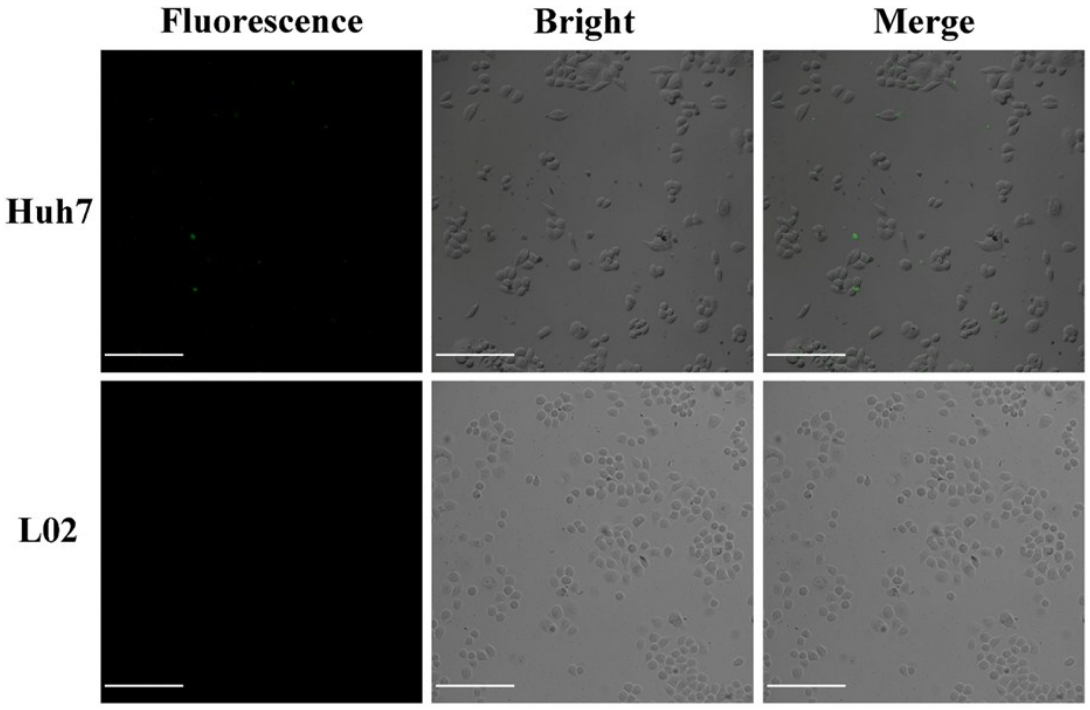

Fig. S24 CLSM images of Huh7 cells and L02 cells incubated with nanoprobe and DCFH-DA in dark. (λex/λem = 488/525 nm); scale bar = 150 μm.

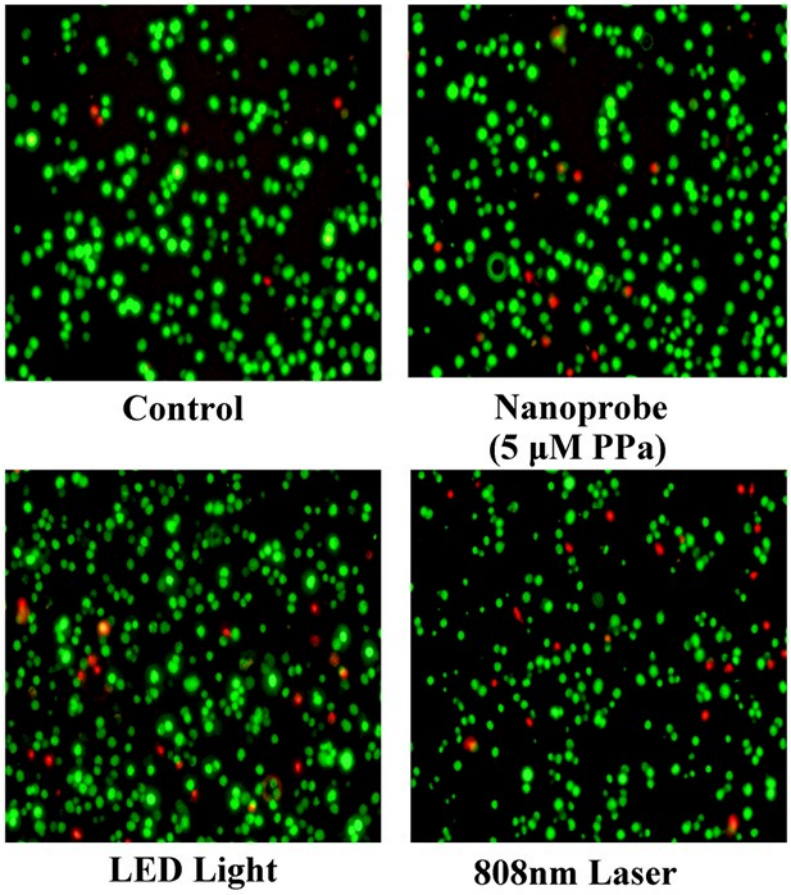

Fig. S25 The fluorescence images of Huh7 cells co-incubated with calcein AM and propidium iodide untreated and treated with the nanoprobe (5 μM PPa), LED light or 808 nm laser.

Table S1. Determination of MMP2 secreted by Huh7 cells

Cell density (cells per mL)	Concentration of MMP2 found (nM)	Standard deviation (n=3)
5.0×10^4	0.15	0.009
5.0×10^5	0.43	0.025
4.5×10^6	1.08	0.021