Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

Achieving Traceless Ablation of Solid Tumor without Recurrence by Mild Photothermal-Chemotherapy of Dual Stimuli-Responsive Polymer-Drug Conjugate Nanoparticle

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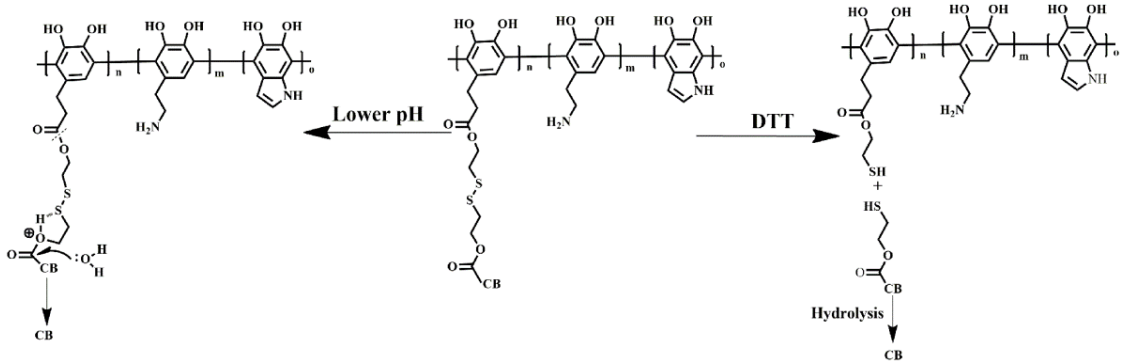

Scheme S1. The postulated mechanism for the pH and GSH cleavable drug release from the polyprodrug type PDCBs in PBS at 37°C.

Table S1. Synthesis and Characterization of the $PDCB_S$ nanoparticles with different CB weight percentages.

Entry[a]	Tris (mg)	DA (mg)	DA-CB (mg)	CB (wt%)	Diameter (nm)	ΔT (°C) 2w/cm^2	ΔT (°C) 1w/cm^2
1[b]	410	12.5	13.8	25	27±1	18.0	ND
2	410	20.0	27.8	30	124±1	30.0	13.9
3	410	12.5	27.8	35	134±5	23.4	ND
4	410	12.5	53.6	40	154±1	24.0	12.8
5	410	2	40	45	131±7	11.4	ND

a: all samples were dispersed in PBS; b: sample 1 was repeated for 3 times.

Table S2. Quantitative analysis of $PDCB_S$.

% Mass Percentage	$PDCB_{30}$	$PDCB_{40}$	DA	DA-DOX
O 1s	15.72	13.71	20.92	11.95
C 1s	69.59	65.45	69.93	63.35
N 1s	3.61	2.86	9.15	2.32
S 2p	4.83	8.84	0	10.61
Cl 2p	6.25	9.14	0	11.77

X = DA, M_{DA} = 153; Y = DA-CB, $M_{DA\text{-}CB}$ = 603; 20.92 X + 11.95Y = 15.72, X+Y=1 ($PDCB_{30}$); 20.92X + 11.95Y = 20.92, X+Y=1 ($PDCB_{40}$). Based on the above equation, the weight (Y×303/603) percentage of CB within $PDCB_S$ can be calculated accordingly.

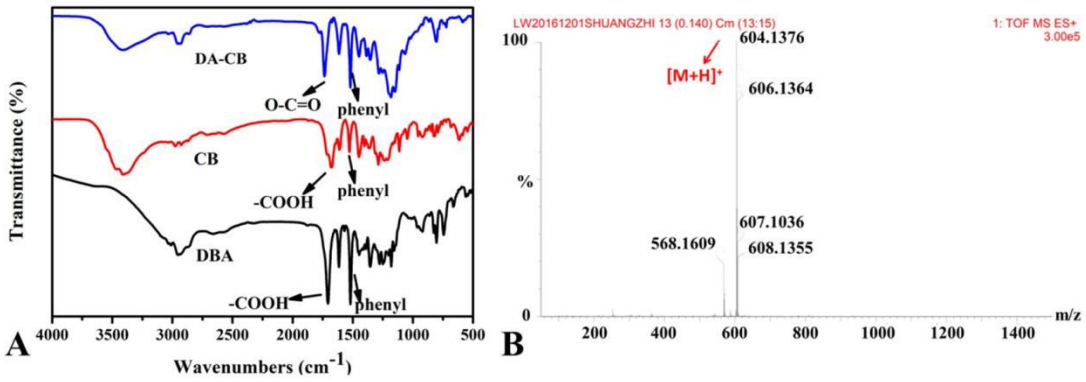

Figure S1. FT-IR spectroscopy (A) and TOF-MS (B) of the DA-CB prodrug.

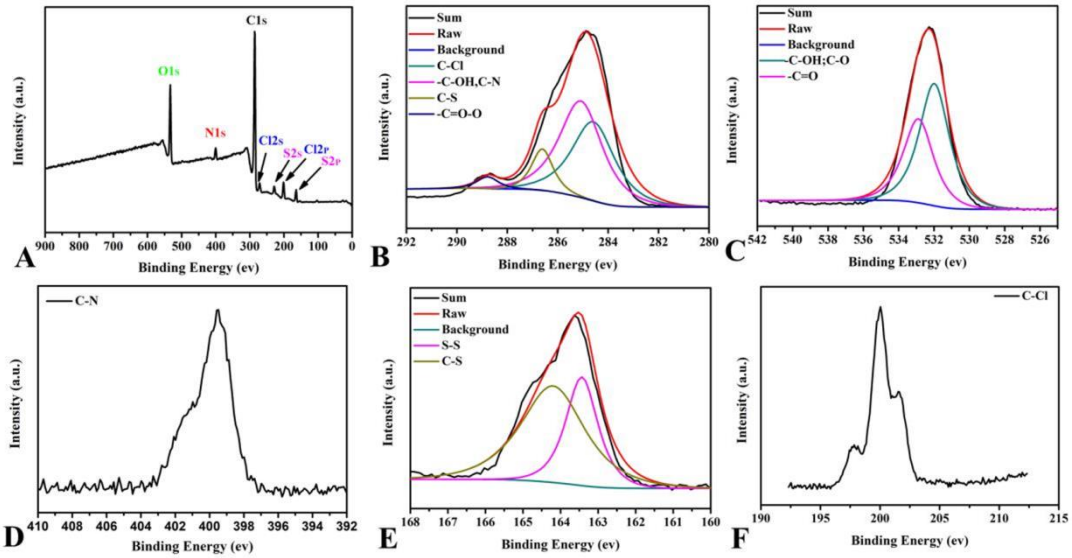

Figure S2. XPS spectrum (A), and all related spectra of C1s, O1s, N1s, S2s, S2p, Cl2s and Cl2p of $PDCB_{30}$.

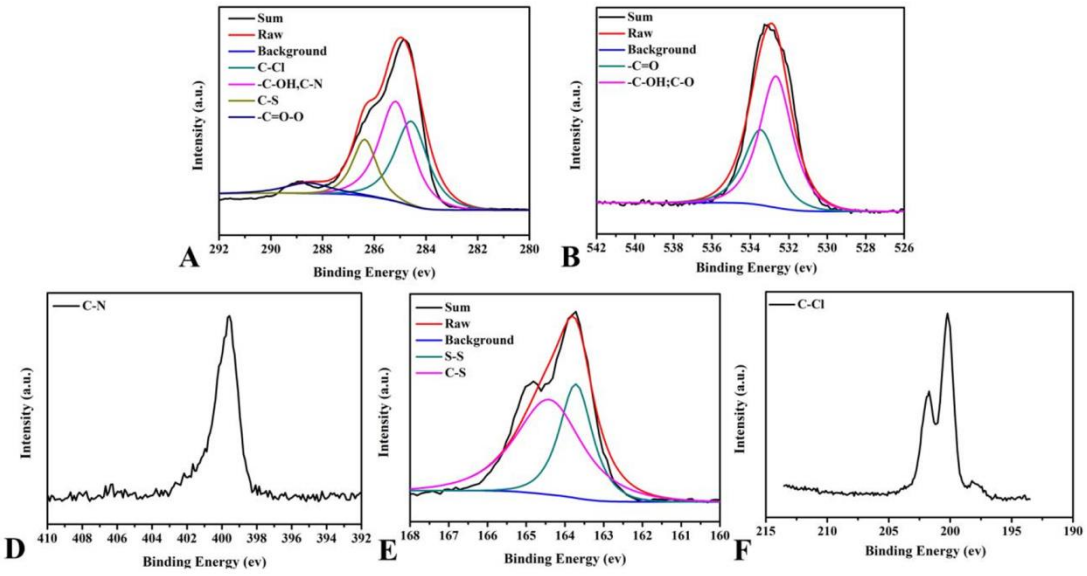

Figure S3. XPS spectra for all C1s, O1s, N1s, S2s, S2p, Cl2s and Cl2p of $PDCB_{40}$.

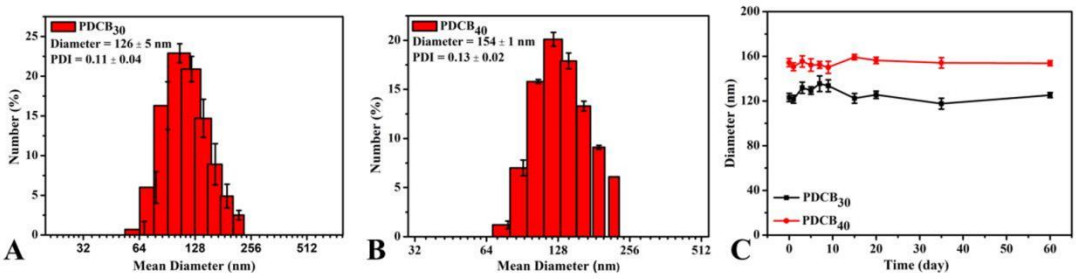

Figure S4. The average size of PDCBs determined by DLS at 25 ºC (A, B) and the dependence of the nanoparticle size on incubation time in PBS at 4ºC (C) for $PDCB_S$. Data are presented as means ± SD (n = 5)

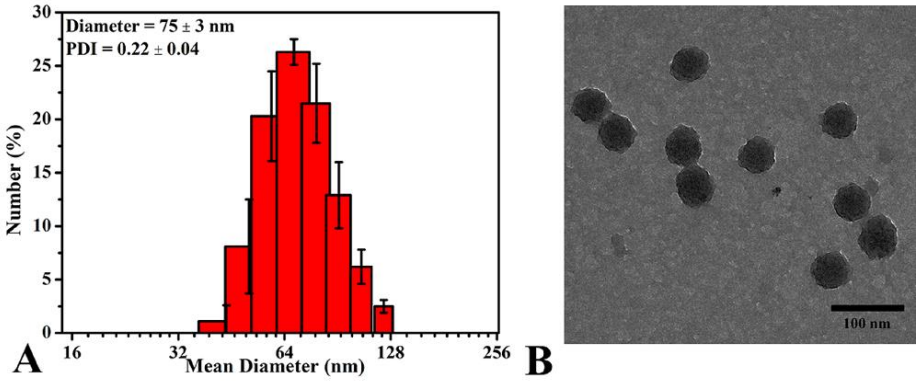

Figure S5. The average size of PDA determined by DLS at 25 ºC (A) and the morphology by TEM (B). Data are presented as means ± SD (n = 5).

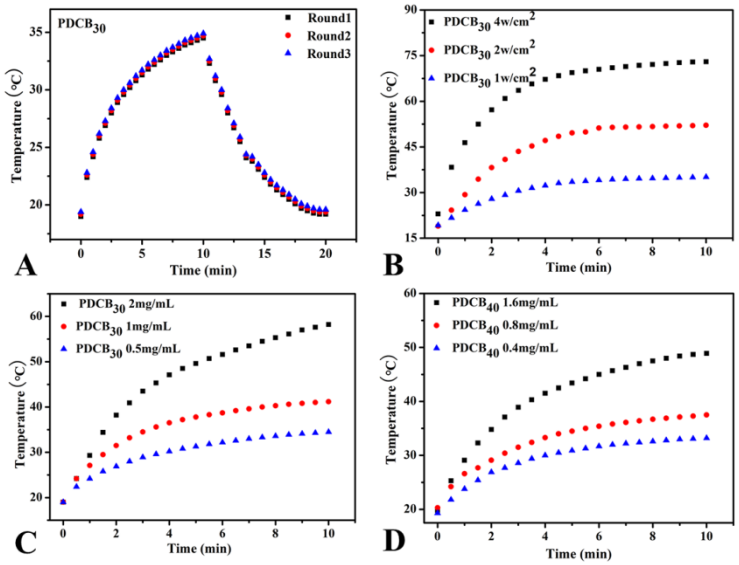

Figure S6. The temperature change curves of the $PDCB_{30}$ solution (0.5 mg/mL) during repeated laser on/off cycles(A); Heating curves of the $PDCB_{30}$ nanoparticle solution (0.5 mg/mL) as a function of irradiation time upon the NIR irradiation (808 nm, 1 W/cm^2, 10 min) with different power intensities ($PDCB_{30}$, B) or at different concentrations (C, D).

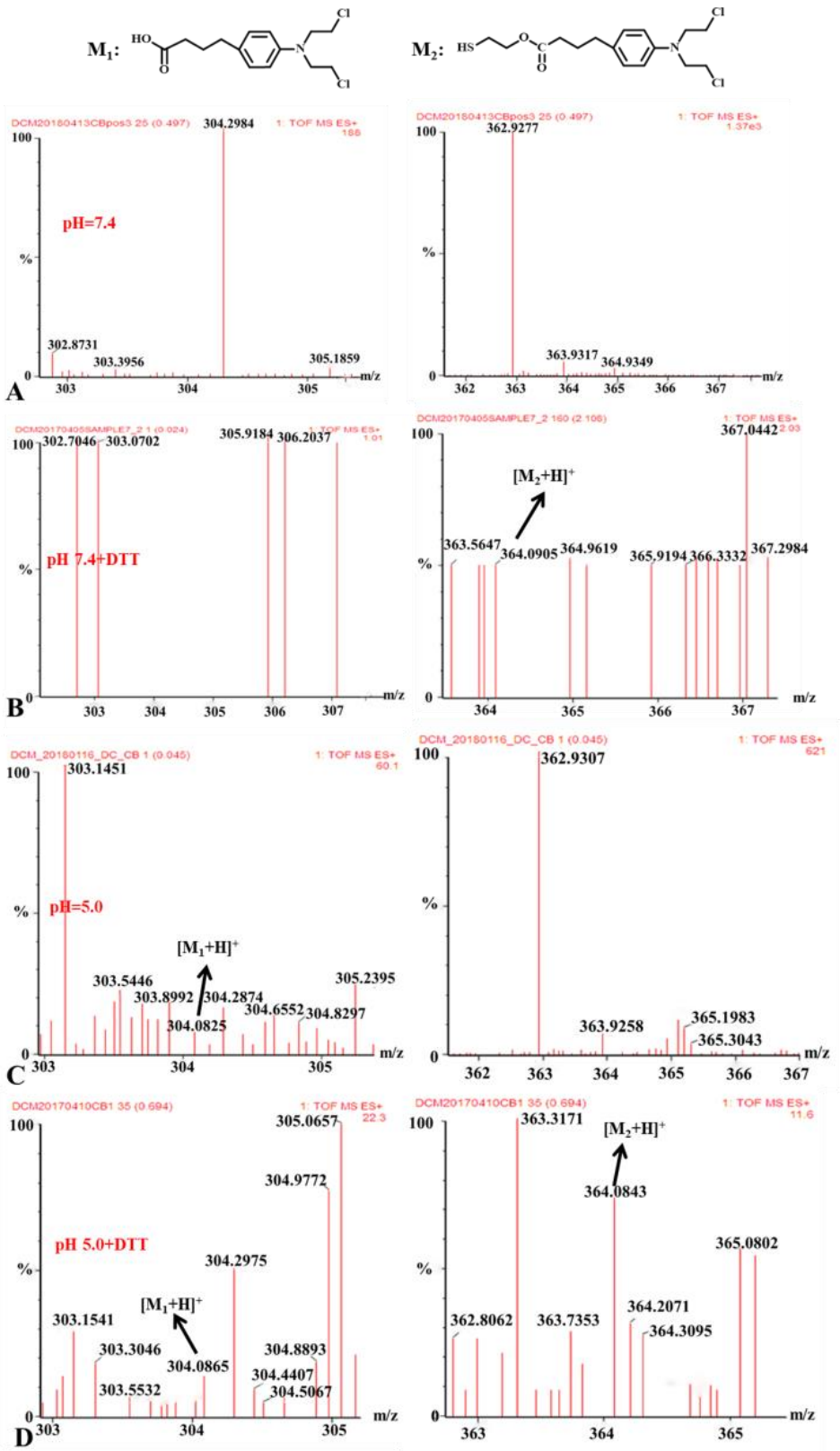

Figure S7. The TOF-MS spectra of the released drug from $PDCB_{40}$ at pH 7.4 (A), pH 7.4 + 10 mM DTT (B), pH 5.0 (C), and pH 5.0 + 10 mM DTT (D).

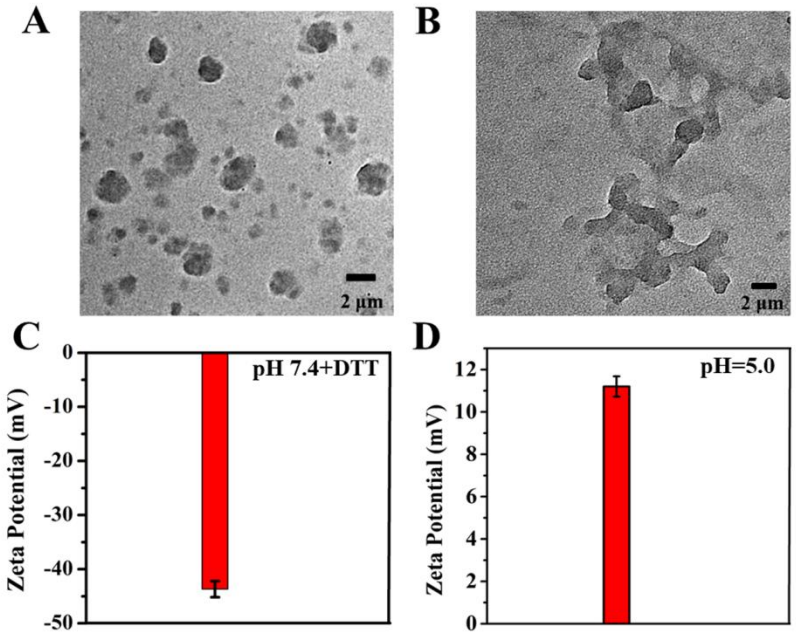

Figure S8. TEM (A, B) and zeta potential (C, D) results for $PDCB_{40}$ incubated at 37 ^{o}C and at pH 7.4 + 10 mM DTT or pH 5.0. Data are presented as means ± SD (n = 5).

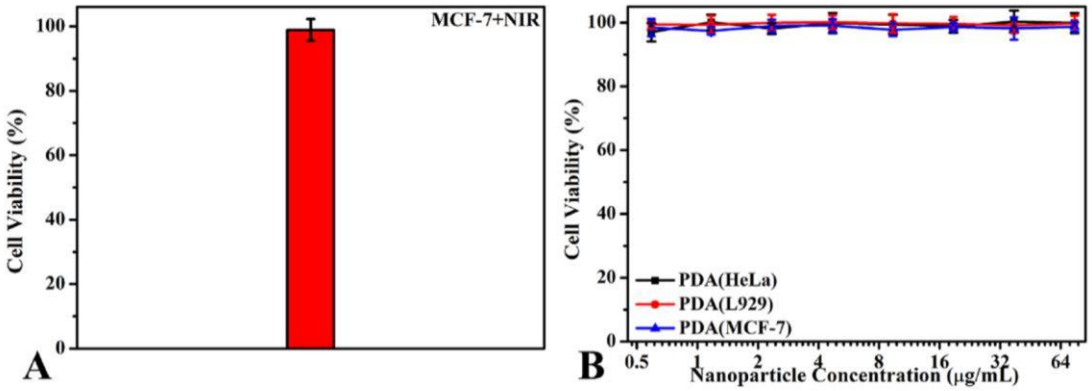

Figure S9. The cytotoxicity of NIR (A) and PDA incubated with HeLa, MCF-7 and/or L929 for 48 h (B). All cell viabilities were tested in six replicates (n = 6).

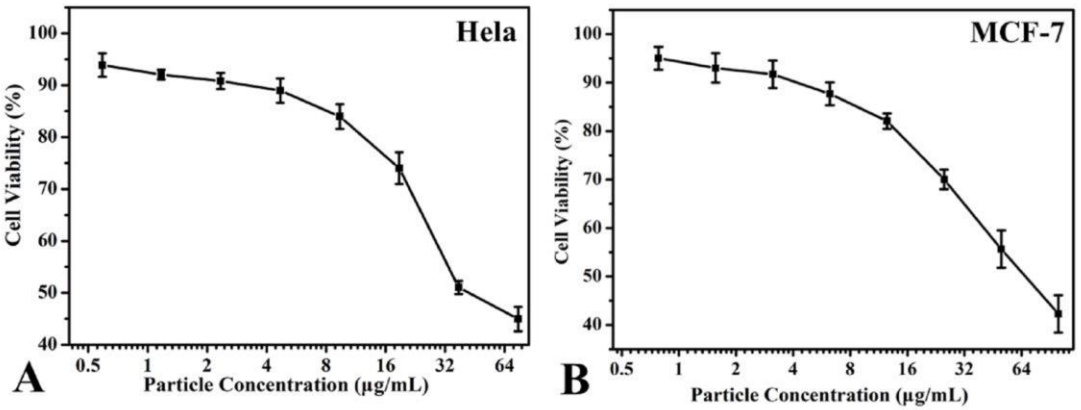

Figure S10. Photothermal cytotoxicity of PDA incubated with HeLa (A) or MCF-7 (B) for 4 h, upon the mild NIR irradiation (808 nm, 1 W/cm^2, 10 min), and then for another 12 h (n = 6).

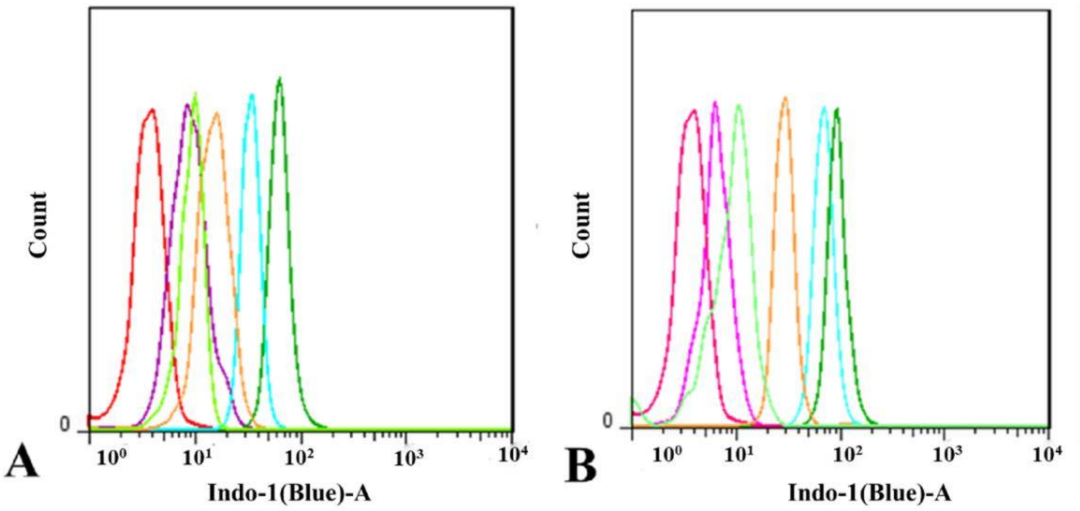

Figure S11. Flow cytometry histograms of MCF-7 incubated with CB before (A) and after (B) the mild NIR irradiation for different times (808 nm, 1 W/cm^2, 10 min; red, control; purple, 15 min; green, 0.5 h; orange, 1 h; blue, 2h; olive, 4 h).

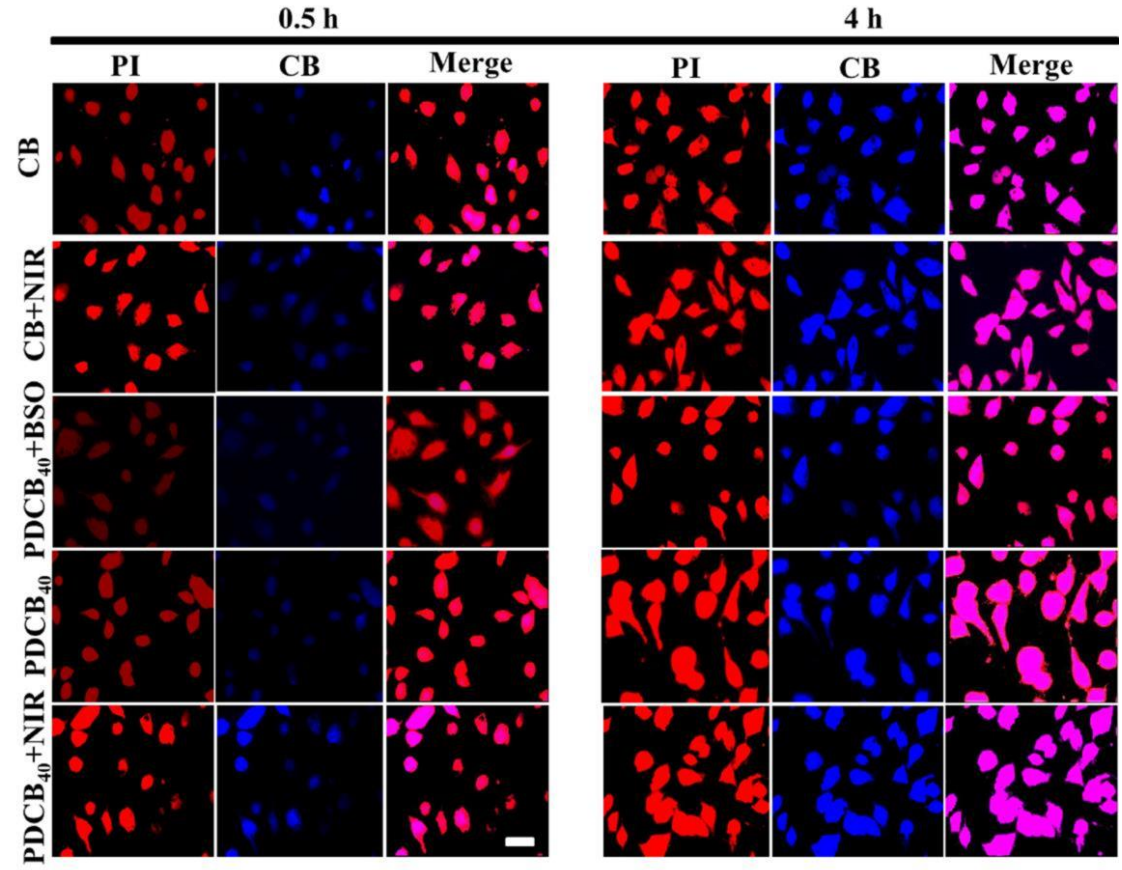

Figure S12. Fluorescence microscopy images of the MCF-7 cells incubated with free CB and the $PDCB_{40}$ with or without NIR (808 nm, 1 W/cm^2, 10 min) or with BSO (0.1 mM) at 0.5 h and 4 h. Cell nuclei are stained with PI. The scale bar represents 20 μm.

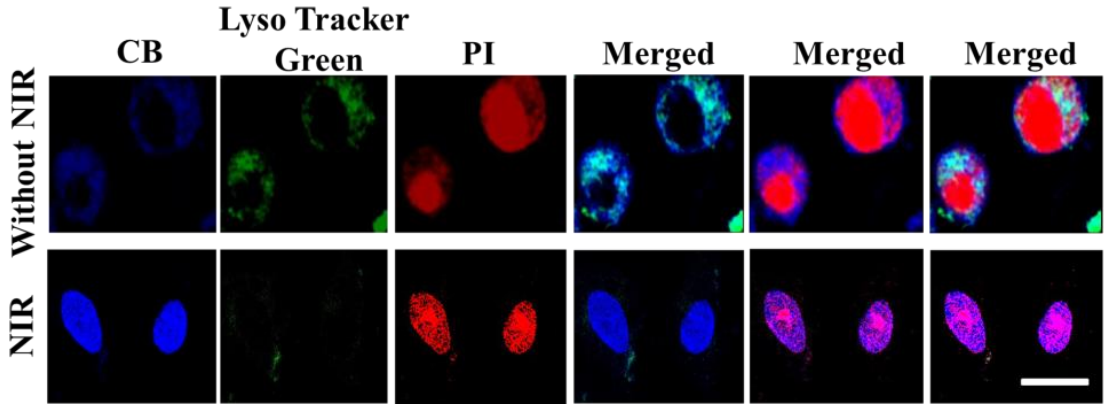

Figure S13. CLSM photographs for the intracellular distribution of $PDCB_{40}$ incubated with MCF-7 for 2 h with/without the NIR irradiation (808 nm, 1 W/cm^2, 10 min; Lysotracker for endolysosomes staining, PI for nuclei staining), and the scale bar represents 25 μm.

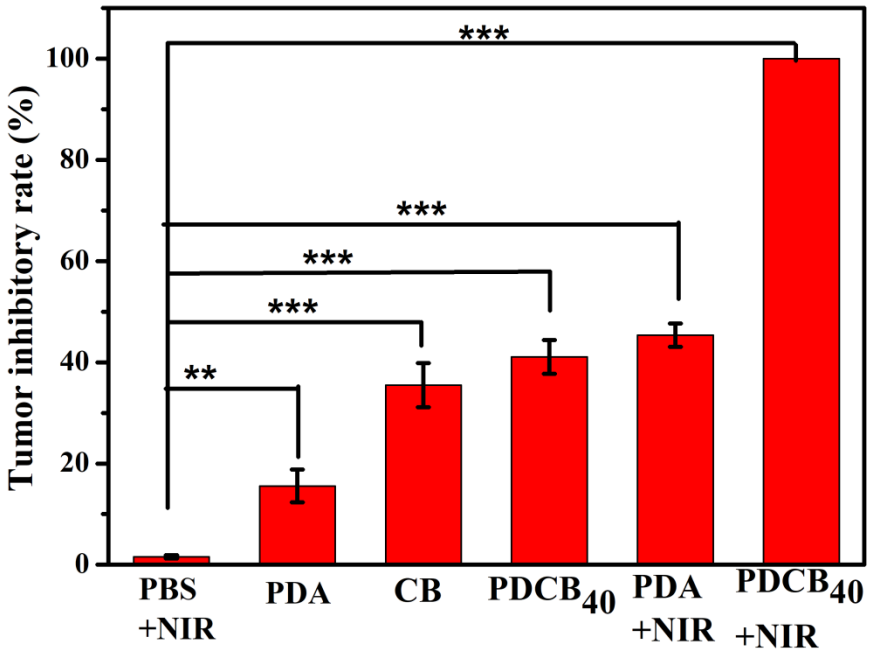

Figure S14. Tumor inhibitory rates of the MCF-7 tumors after various treatments compared to the PBS group. The data are shown as mean ± SD (n = 4); (**) indicates $P < 0.005$, (***) indicates $P < 0.001$.

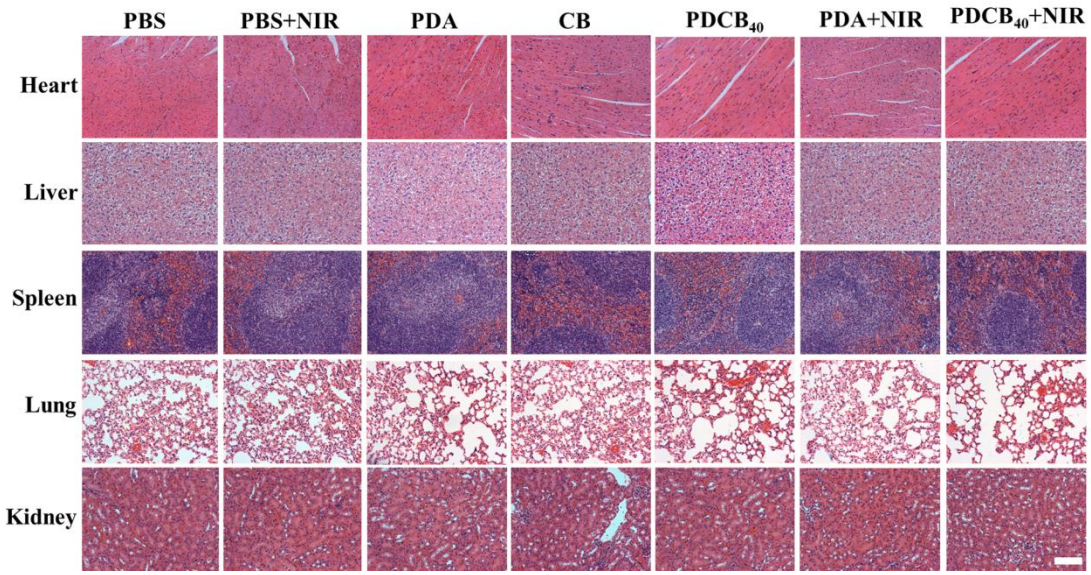

Figure S15. HE staining images of the tissue sections from the main organs including liver, kidneys, spleen, lung, and heart from the mice with various treatments, and the scale bar represents 150 μm.