Supplementary Material

Supramolecular nanomaterials based on hollow mesoporous drug carriers and macrocycle-capped CuS nanogates for synergistic chemo-photothermal therapy

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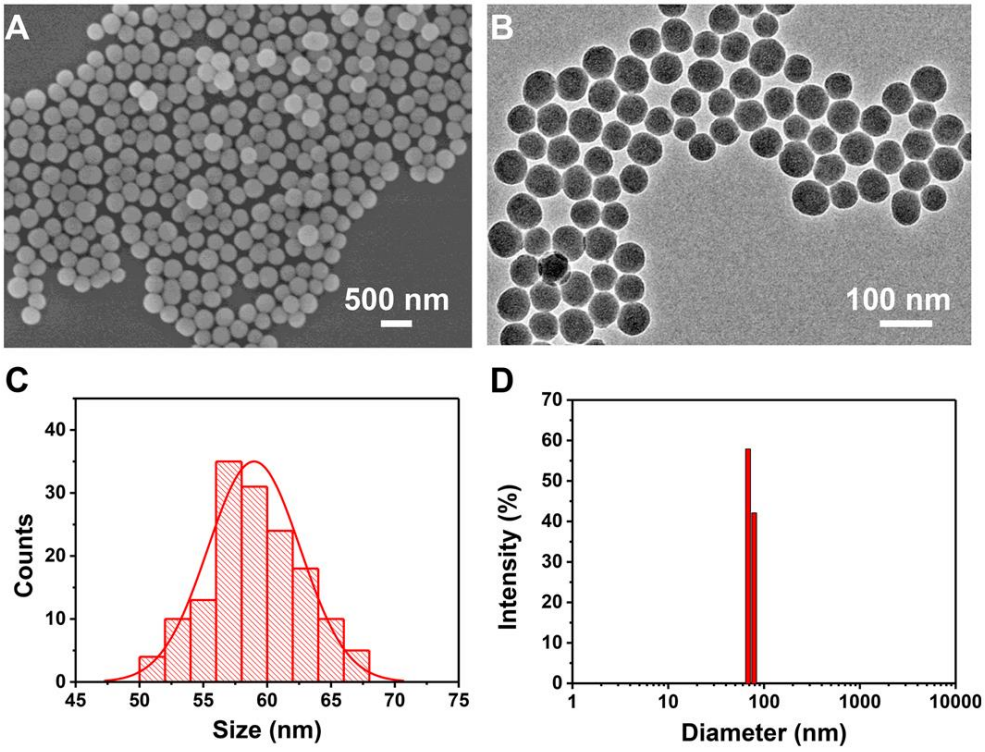

Figure S1. Characterizations of $sSiO_2$ NPs. (A) SEM image of $sSiO_2$ NPs. (B) TEM image of $sSiO_2$ NPs. (C) Size distribution histograms of $sSiO_2$ NPs based on 150 particles of TEM image. (D) Hydrodynamic diameter distribution of $sSiO_2$ NPs by dynamic light scattering.

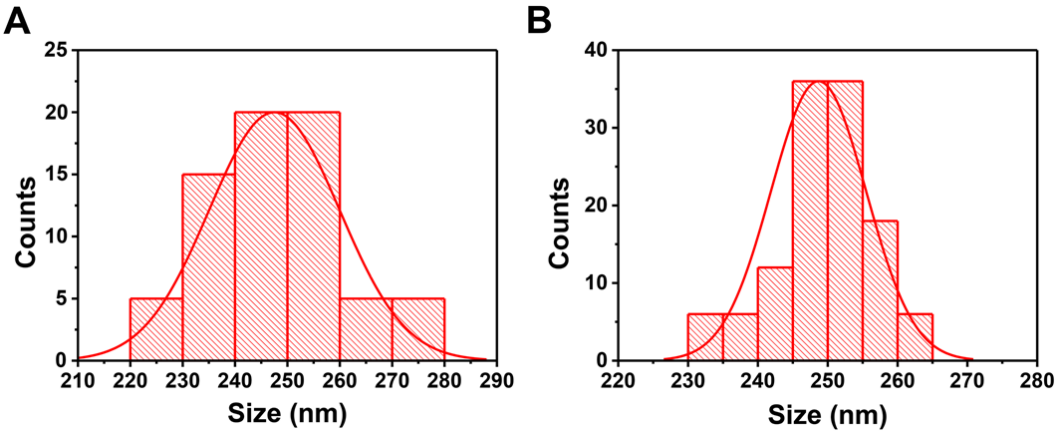

Figure S2. Size distribution histograms of HMSN-Py NPs based on 100 particles of SEM image (A) and 120 particles of TEM image (B).

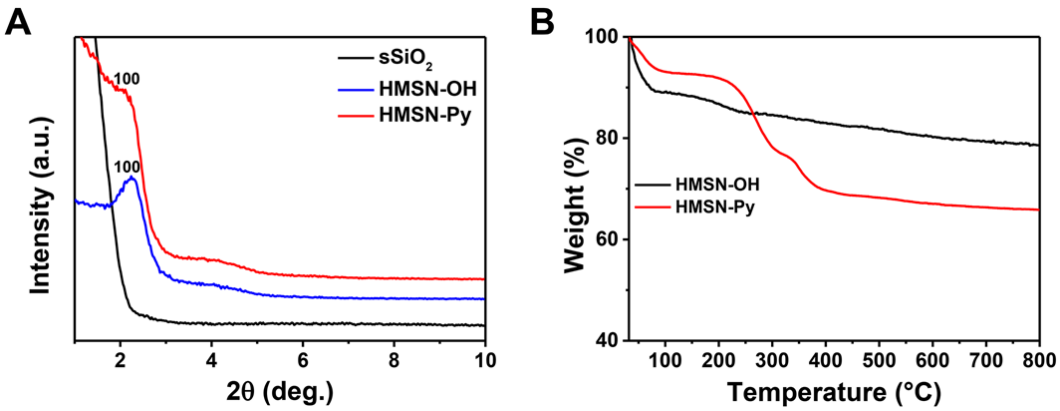

Figure S3. (A) Powder X-ray diffraction (PXRD) spectra of $sSiO_2$, HMSN-OH and HMSN-Py. (B) TGA curves of HMSN-OH and HMSN-Py.

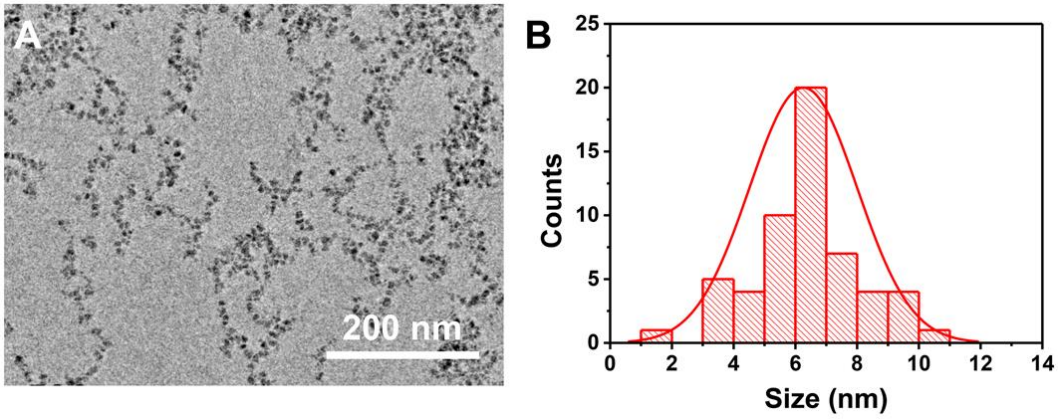

Figure S4. (A) TEM image of CP5-CuS. (B) Size distribution histograms of ultrasmall CP5-CuS based on 56 particles of TEM image.

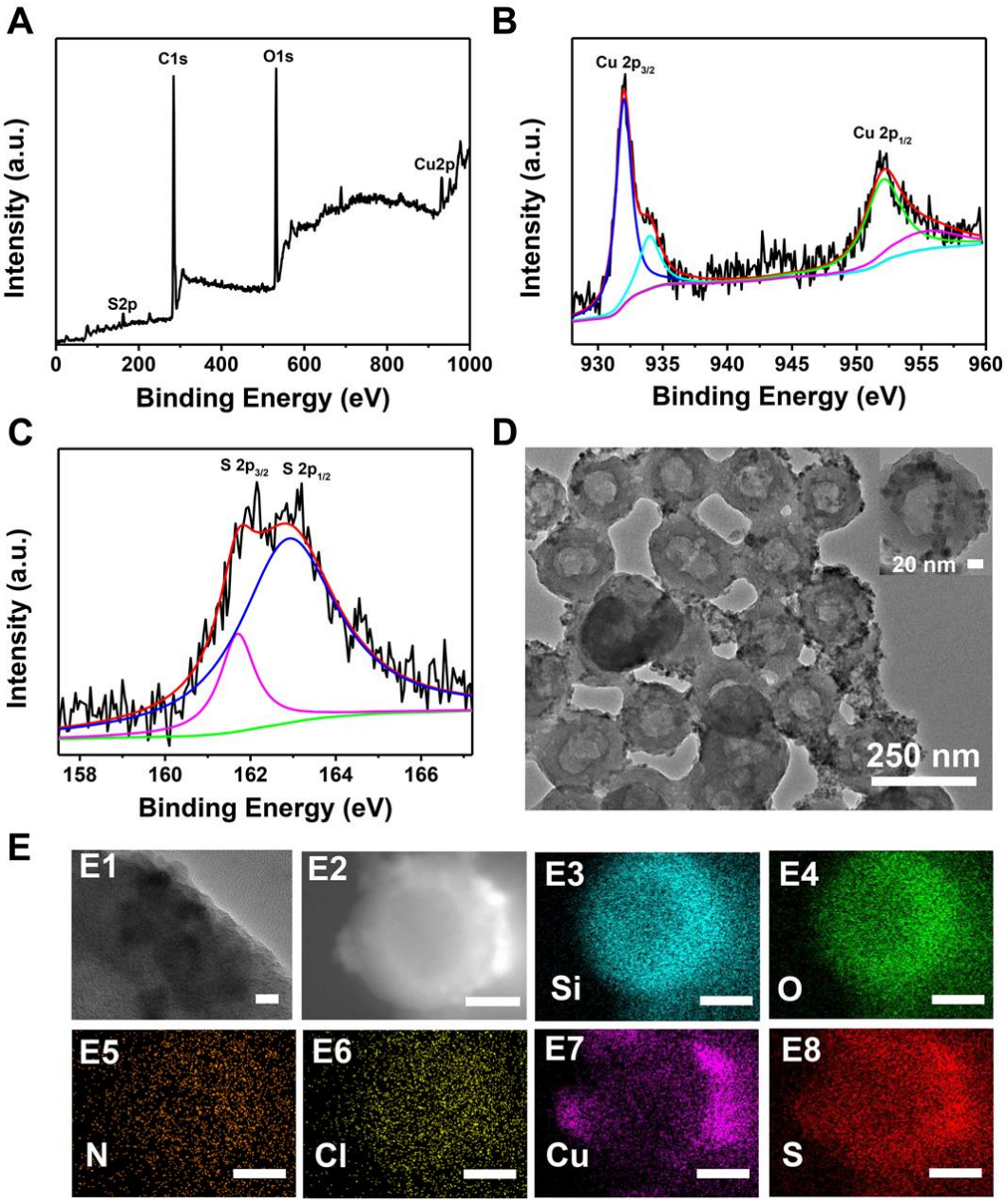

Figure S5. (A) X-ray photoelectron spectra (XPS) of CP5-CuS. XPS spectra of (B) Cu and (C) S in CP5-CuS. (D) TEM image of CuS@HMSN-Py. (E) (E1) High-resolution TEM image of local FaPCH NPs. Scale bar: 10 nm. (E2-E8) Elemental mapping images of FaPCH NPs. Scale bar: 50 nm.

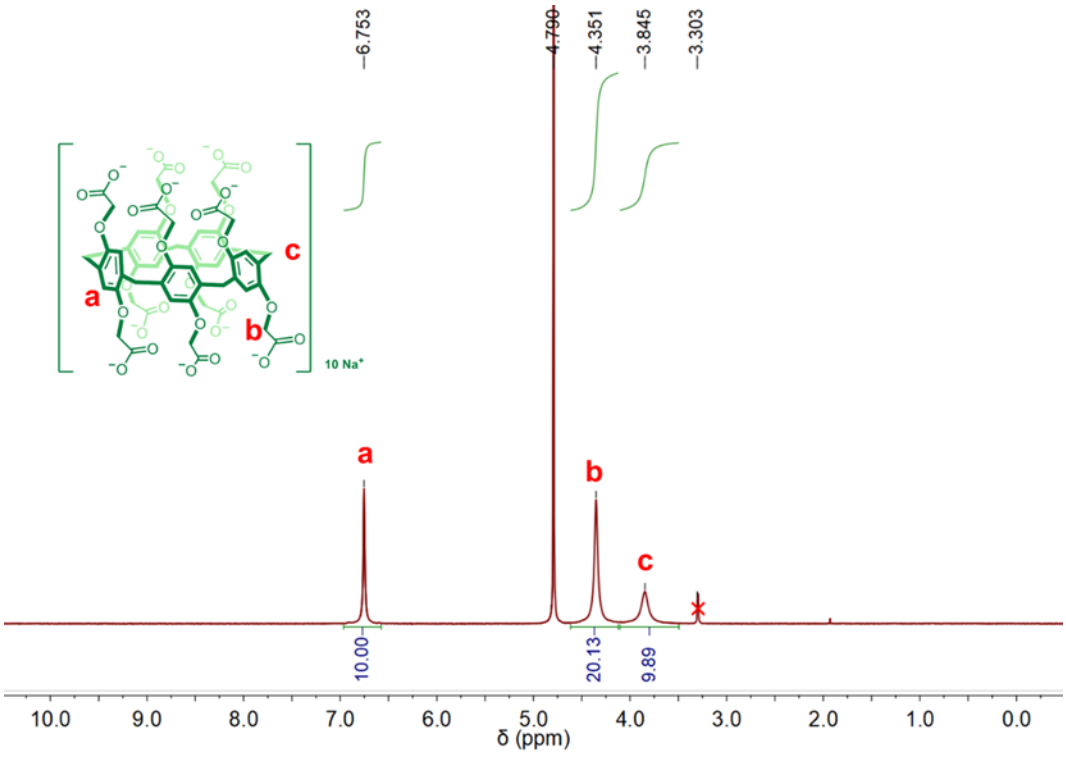

Figure S6. ^{1}H NMR spectrum (500 MHz, 298 K) of CP5 in D_2O. δ 6.75 (s, 10H), 4.35 (s, 20H), 3.85 (s, 10H).

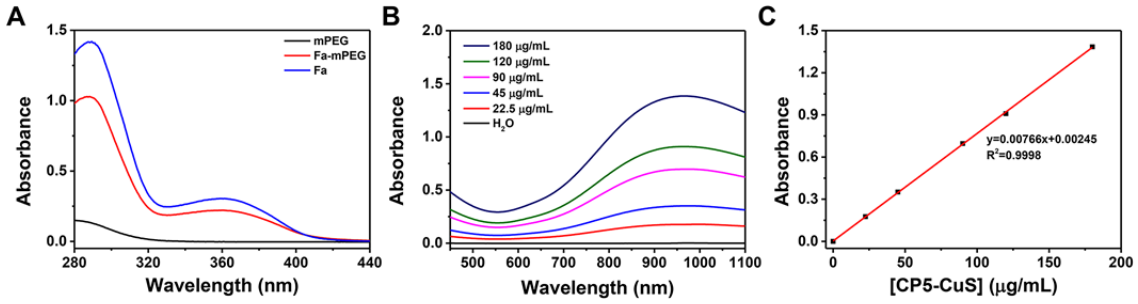

Figure S7. (A) UV-vis absorption spectra of mPEG (black), Fa-mPEG (red) and Fa (blue). (B) UV-vis-NIR absorption spectra of CP5-CuS at different concentrations. (C) The standard curve of CP5-CuS solution at 976 nm.

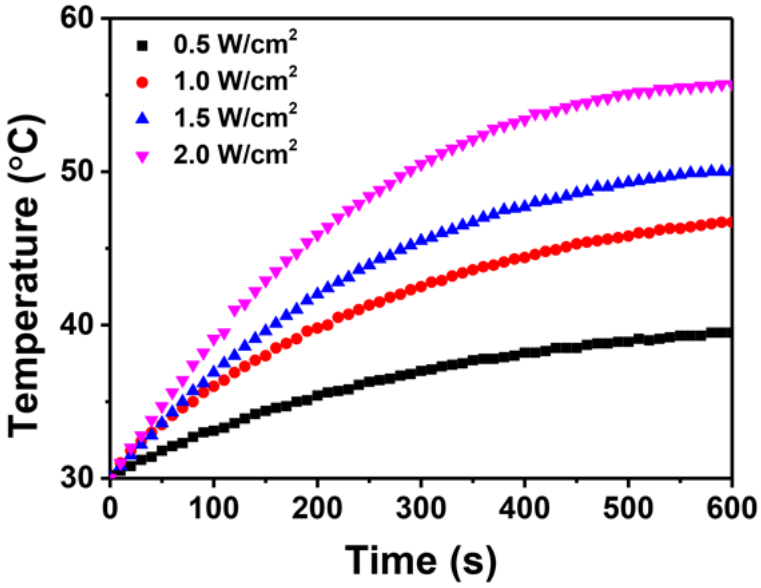

Figure S8. Temperature changes of FaPCH NPs dispersions (800 μg/mL) under 808 nm laser irradiation with different power density of 0.5 W/cm^2, 1 W/cm^2, 1.5 W/cm^2 and 2 W/cm^2 for 10 min.

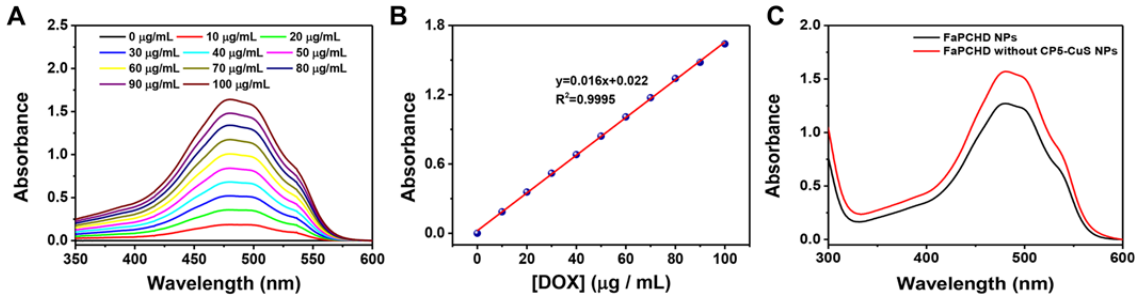

Figure S9. (A) UV-vis absorption spectra of DOX at different concentrations. (B) The standard curve of DOX solution at 480 nm. (C) UV-vis spectra of the supernatant after centrifugation of FaPCHD NPs and FaPCHD without CP5-CuS NPs.

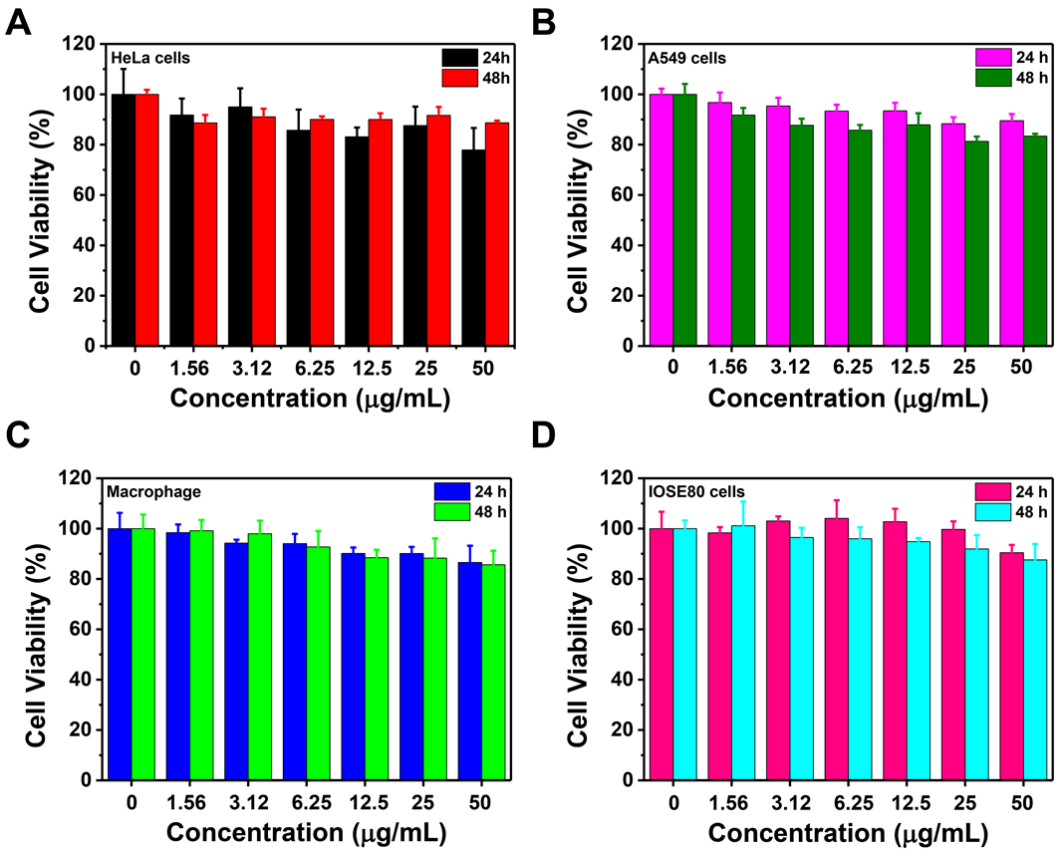

Figure S10. Cell viabilities of (A) HeLa cells, (B) A549 cells, (C) macrophage and (D) IOSE80 cells incubated with various FaPCH NPs for 24 h and 48 h.

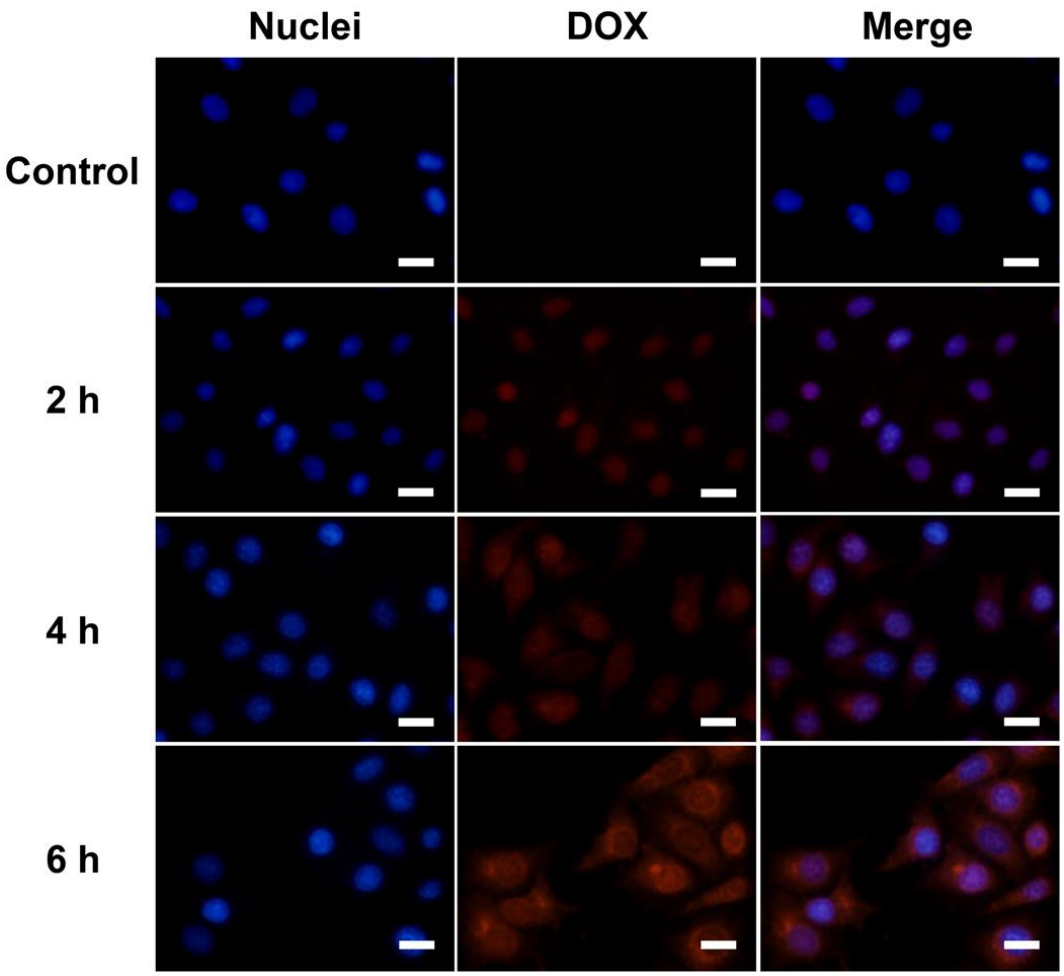

Figure S11. Fluorescence images of A549 cells incubated with FaPCHD NPs for 0 h, 2 h, 4 h and 6 h. The cell nuclei were stained as blue by Hoechst 33342, the red was the fluorescence of DOX. Scale bar: 20 μm.

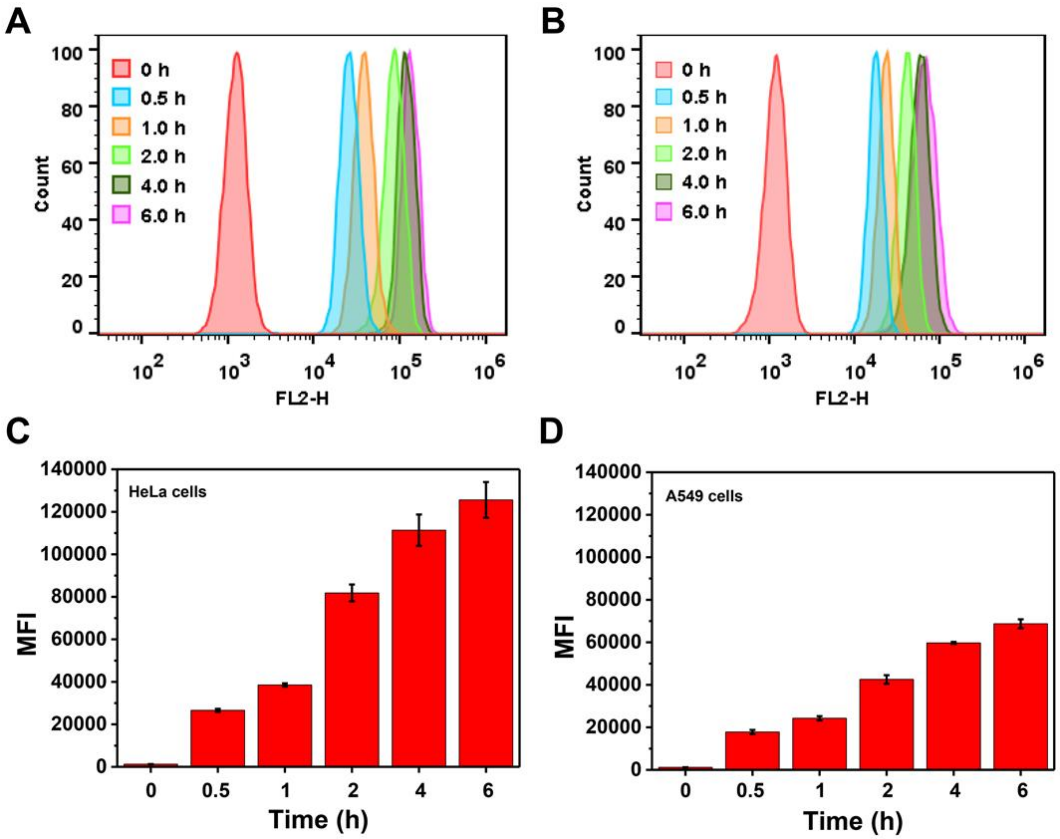

Figure S12. Flow cytometry analysis of (A) HeLa cells and (B) A549 cells incubated with FaPCHD NPs for 0 h, 0.5 h, 1 h, 2 h, 4 h and 6 h. Mean fluorescence intensity of (C) HeLa cells and (D) A549 cells incubated with FaPCHD NPs for various times (0 h, 0.5 h, 1 h, 2 h, 4 h and 6 h).

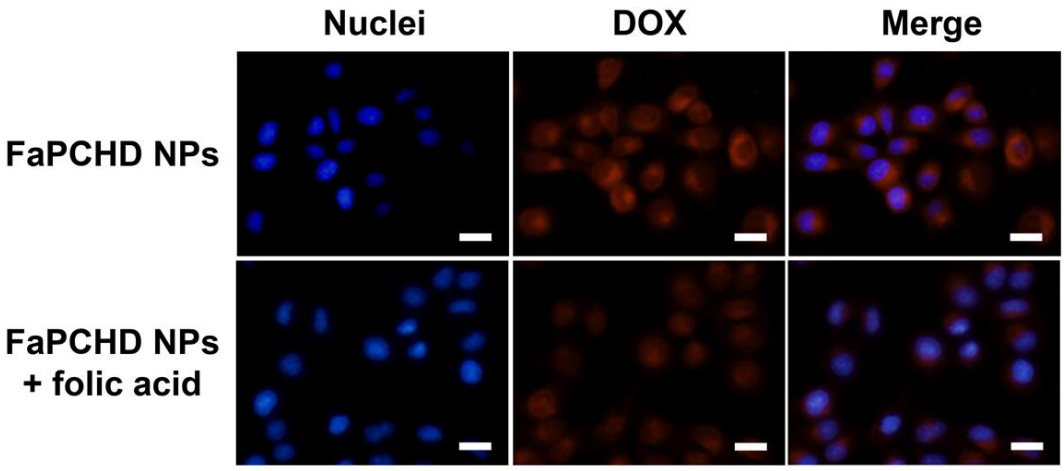

Figure S13. Fluorescence images of HeLa cells incubated with FaPCHD NPs and FaPCHD NPs after pretreatment with free folic acid and FaPCHD NPs for 1 h. The cell nuclei were stained as blue by Hoechst 33342, the red was the fluorescence of DOX. Scale bar: 20 μm.