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Multifunctional up-converting nanocomposites with multimodal imaging and photosensitization at near-infrared excitation

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Supporting information

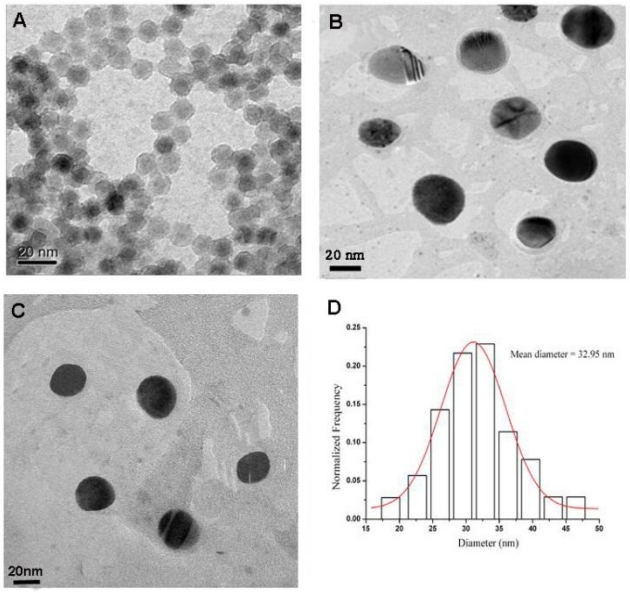

Figure S1. TEM image of (A) UCNP nanocrystals, (B) UCNP@(DHMA/FITC)@SiO_2-FA nanocomposites, (C) UCNP@DHMA@SiO_2-FA nanocomposites and (D) large-scale TEM image of UCNP@(DHMA/FITC)@SiO_2-FA nanocomposites.

As is shown in Figure S2, it can be seen that the fluorescence intensity of ABDA mixed with UCNP@(DHMA/FITC)@SiO_2-FA and UCNP@DHMA@SiO_2-FA is almost the same after the same exposure time. So it is concluded that the efficacy of singlet oxygen generation of UCNP@(DHMA/FITC)@SiO_2-FA and UCNP@DHMA@SiO_2-FA is nearly the same, which ensures that UCNP@(DHMA/FITC)@SiO_2-FA and UCNP@DHMA@SiO_2-FA have much the same effect on cell apoptosis.

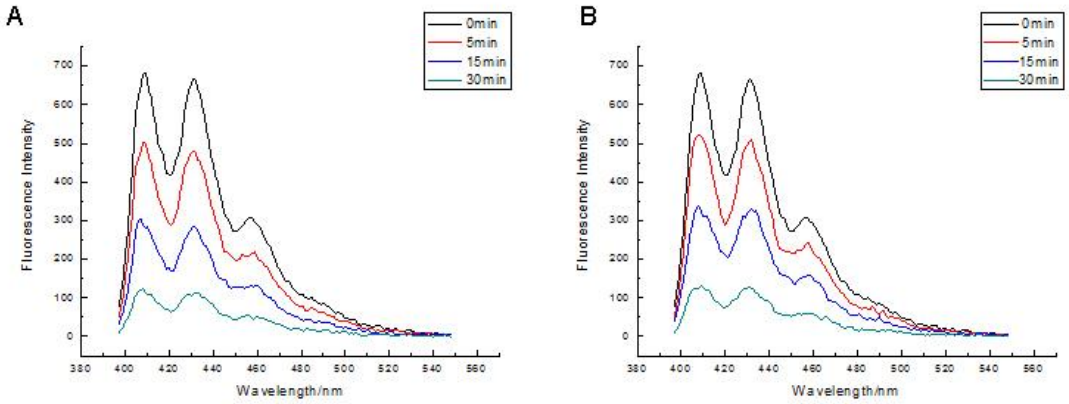

Figure S2. Fluorescence spectra of ABDA mixed with (A) UCNP@(DHMA/FITC)@SiO_2-FA; (B) UCNP@DHMA@SiO_2-FA. Under the condition of exposure to NIR laser for 0, 5, 15, and 30 min, excited at 380 nm.

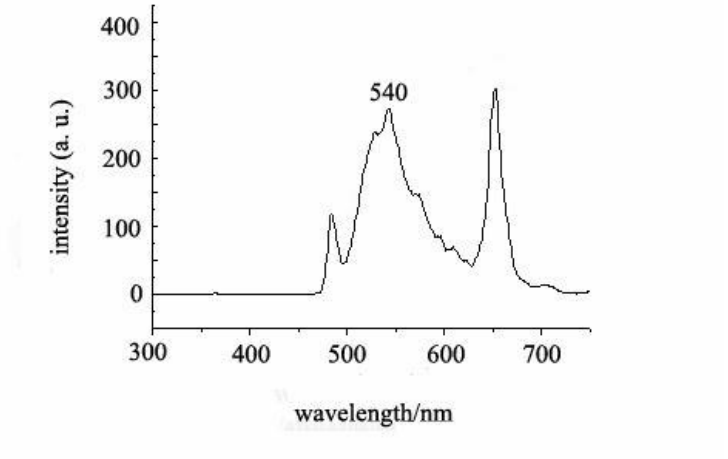

Figure S3. Two Photo fluorescence spectrum of UCNP@(DHMA/FITC)@SiO2-FA in PBS (pH, 7.4), under the excitation of 980 nm..

Figure S3 is the two-photo fluorescence spectrum of UCNP@(DHMA/FITC)@SiO_2-FA, under the excitation of 980 nm. There are three emission peaks (470 nm, 540 nm, 650 nm) in the spectrum. 470 nm and 650 nm are supposed to be the emission bands of Tm^{3+} from UCNPs; and 540 nm is the emission peak of FITC, corresponding to green light seen with the naked eyes. The emission mechanism of FITC is that the UCNPs emit strong blue and red light under the irradiation of 980nm; and then FITC can be excited by the blue light, emitting

green light. DHMA can be excited by the blue light and transfers energy to tissue oxygen, yielding cytotoxic reactive oxygen species (ROS) such as singlet oxygen ($^1O_2$).