

Self-Assembled Gold Nanostar-NaYF₄:Yb/Er Clusters for Multimodal Imaging, Photothermal and Photodynamic Therapy

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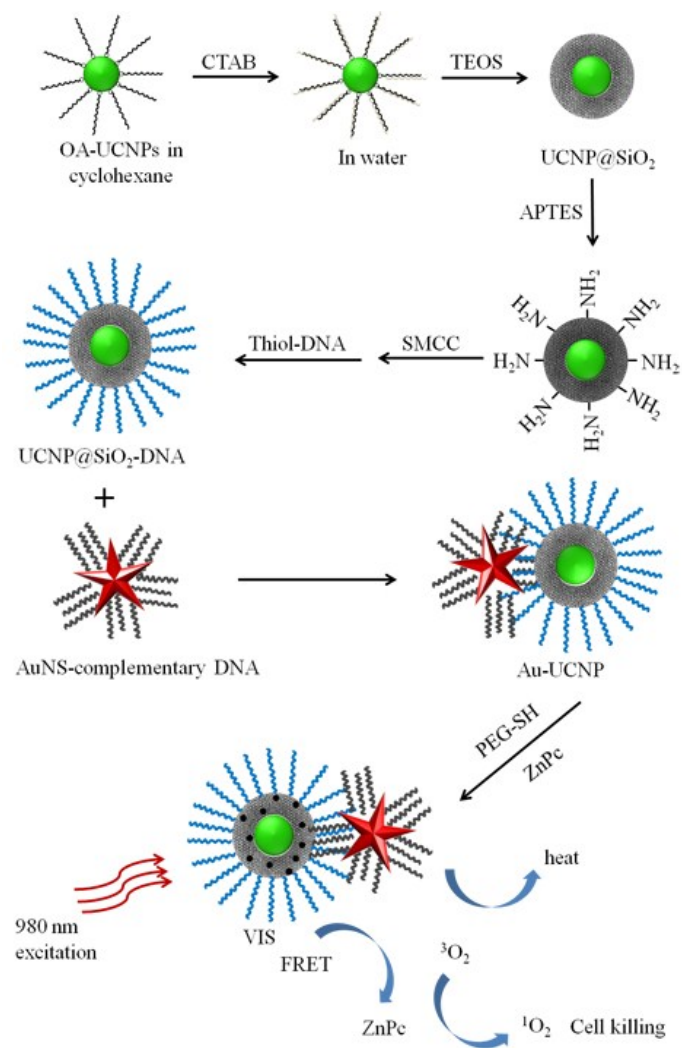


Figure S1. Detail schematic illustration for assembly of DNA-AuNS and UCNP@SiO₂-DNA.

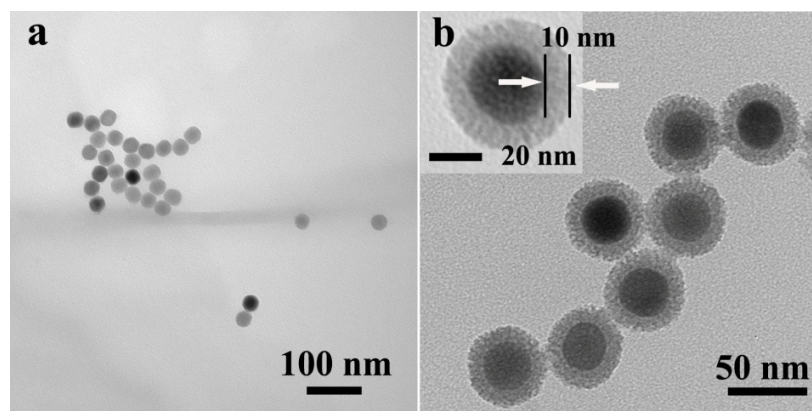


Figure S2. (a) TEM images of CTAB stabilized UCNPs, (b) DNA modified UCNP@SiO₂ particles.

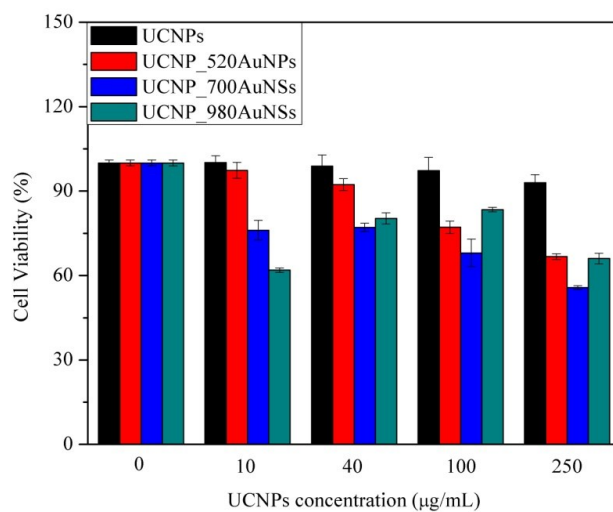


Figure S3. In vitro cell viabilities of MCF-7 cells incubated with Au-UCNP clusters of different concentrations (0, 10, 40, 100 and 250 µg/mL) without HS-PEG modification for 4 h.

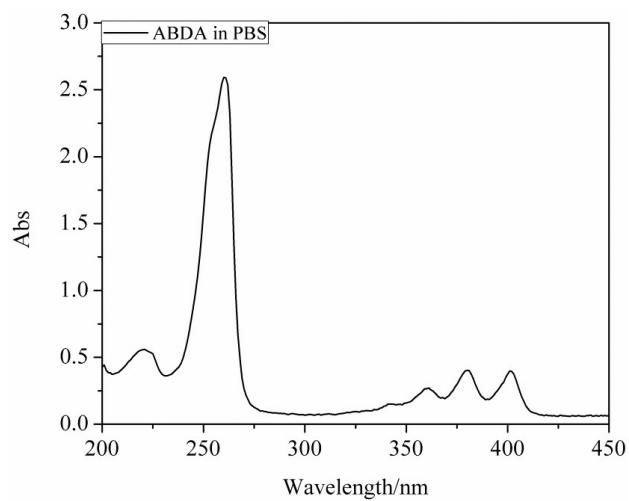


Figure S4. UV-vis spectra of ABDA in PBS solution.

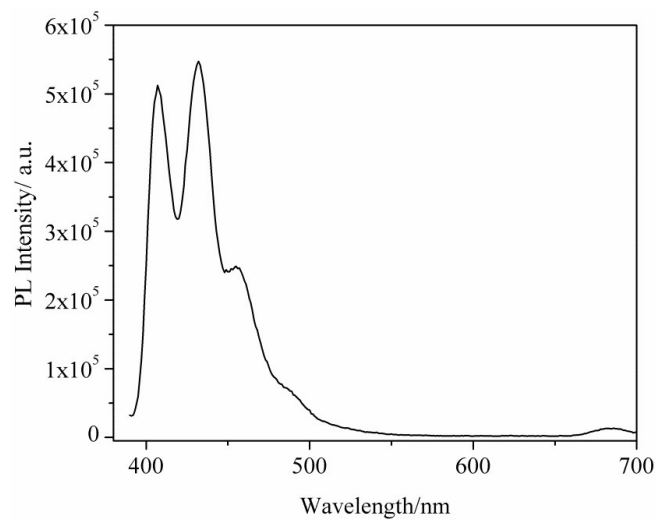


Figure S5. PL spectra of ABDA excitation at 380 nm.

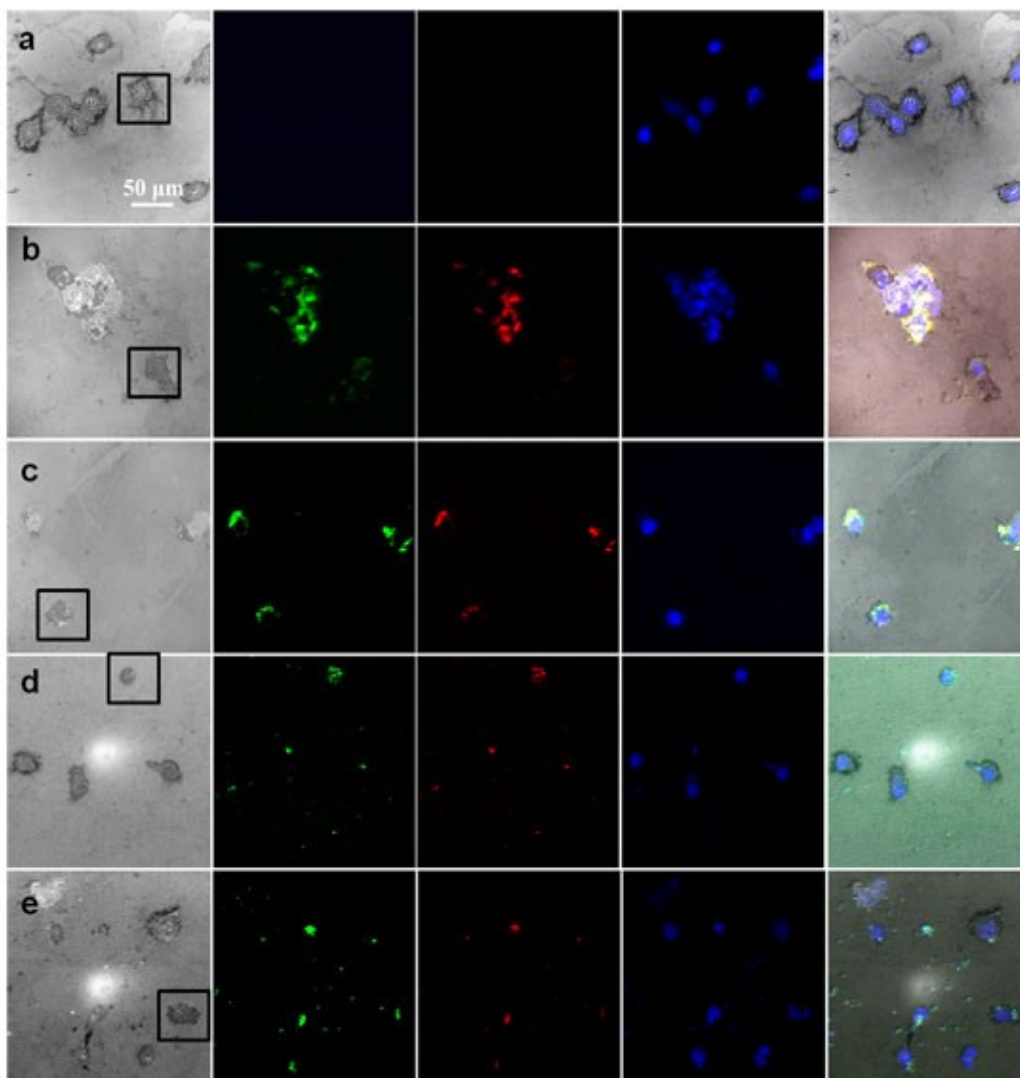


Figure S6. Confocal laser scanning microscopy images of MCF-7 cells irradiated by 980 nm light: (a) control samples (no UCNP or Au-UCNP added) (b) incubated with UCNPs, (c) incubated with AuNP-UCNP clusters (d) incubated with 700AuNS-UCNP clusters and (e) incubated with 980AuNS-UCNP clusters. All of the nanoparticles were added at 250 $\mu\text{g}/\text{mL}$ for 4 h. The green channel images were obtained within the wavelength of 500-550 nm, red channel images were collected within the wavelength of 570-620 nm. The cell nucleus was stained by DAPI (blue fluorescence). The bright field images and corresponding merged images were also shown above. All the images have the same scale bar: 50 μm . The enlarged image of the single cells in the dark line box are shown in Figure 4.

Figure 4	Green (Mean Brightness)	Red (Mean Brightness)
a	0	0
b	10.40 ± 2.76	5.95 ± 1.03
c	10.65 ± 2.72	5.16 ± 0.60
d	10.40 ± 4.37	5.90 ± 2.99
e	7.54 ± 0.65	3.29 ± 0.95

Table S1. Quantified photoluminescence intensity of the cell images shown in Figure 4. Note: the size of the quantified area is the whole single cell. The data in Table S1 is normalized photoluminescence intensity (intensity/area).

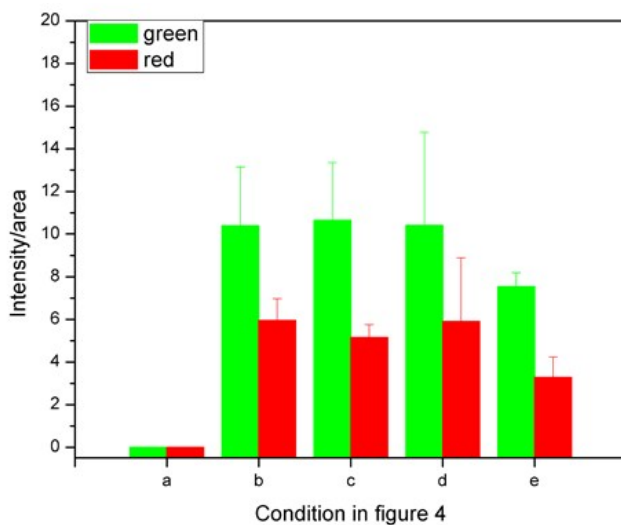


Figure S7. Quantified photoluminescence intensity of the cells in Figure 4. The (b) UCNP and (c,d,e) Au-UCNP incubated cells show similar levels of emission light (both green and red emission).