**Supplementary information**

# Construction of pH-responsive PLGA(UCNPs/DOX) nanocapsules with upconversion luminescence for drug delivery

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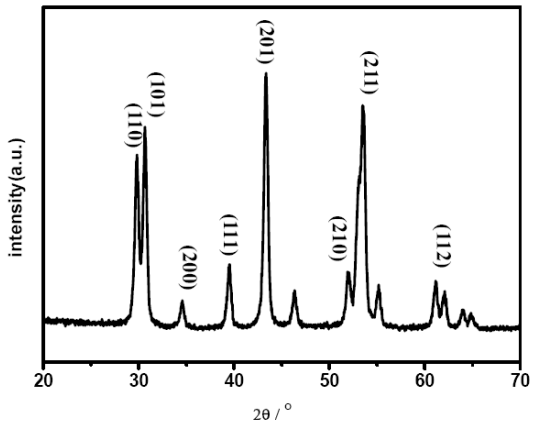


**Figure S1.** The XRD patters of $NaYF_4$:Yb,Er NPs.

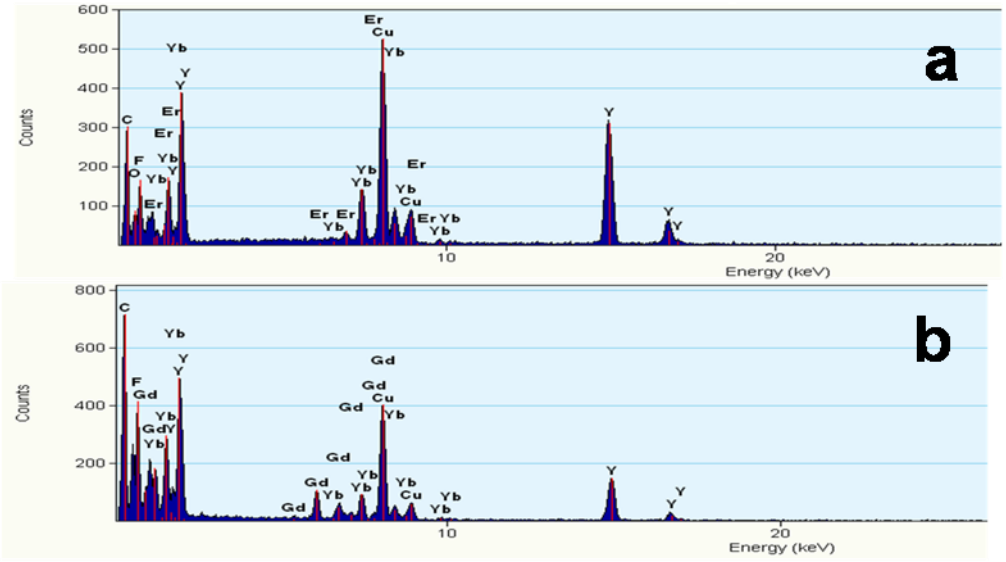


**Figure S2.** The energy dispersive X-ray spectra of $NaYF_4$:Yb,Er NPs (a)and $NaYF_4$:Yb,Er@$NaGdF_4$ NPs(b).

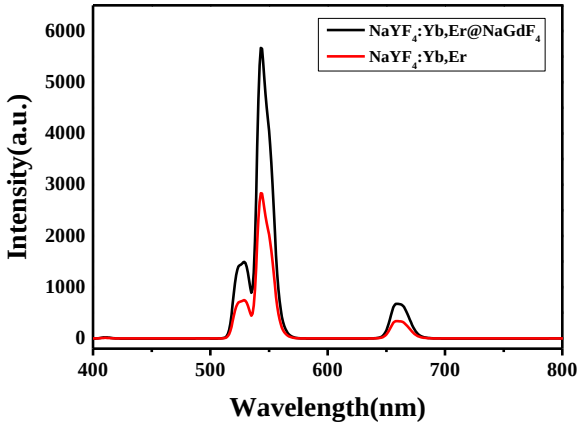


**Figure S3**. The upconversion luminescence spectra of $NaYF_4$:Yb,Er nanocrystals and $NaYF_4$:Yb,Er@ $NaGdF_4$ UCNPs under 980 nm excitation.

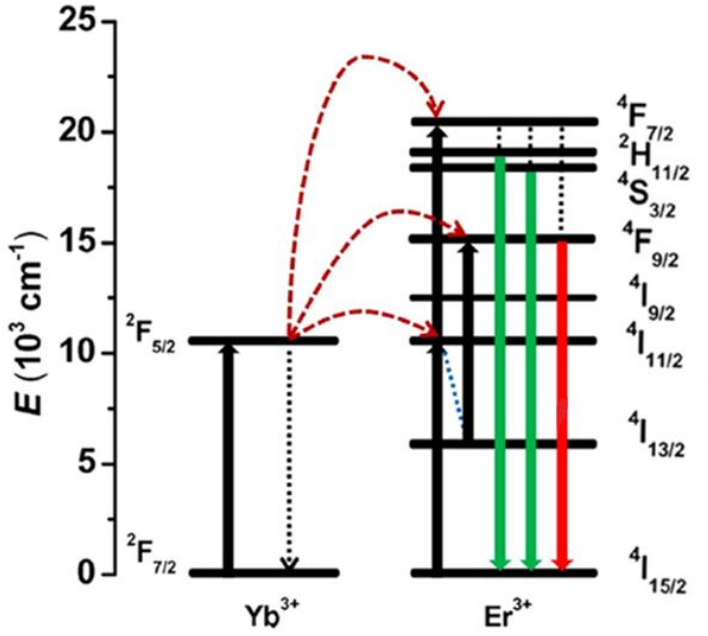


**Figure S4.** Schematic energy levels of $Yb^{3+}$and $Er^{3+}$and the UC luminescence process excited by 980 nm light.

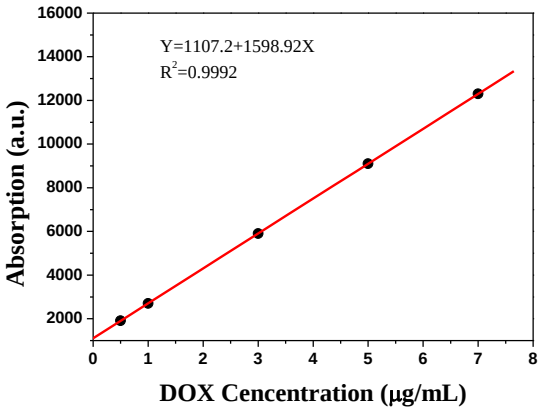


Figure S5. Standard curve of DOX.

**Table S1.** Drug loading efficiency of the drug-carriers with quantity change of DOX.

| Added DOX | Loading efficiency (%) (ⅰ) | Loading efficiency (%) (ⅱ) | Loading efficiency (%) (ⅲ) | Average loading efficiency (%) |
|---|---|---|---|---|
| 300 μg | 1.21% | 1.21% | 1.21% | 1.21% |
| 500 μg | 3.56% | 3.55% | 3.57% | 3.56% |
| 1000 μg | 7.37% | 7.23% | 7.54% | 7.38% |

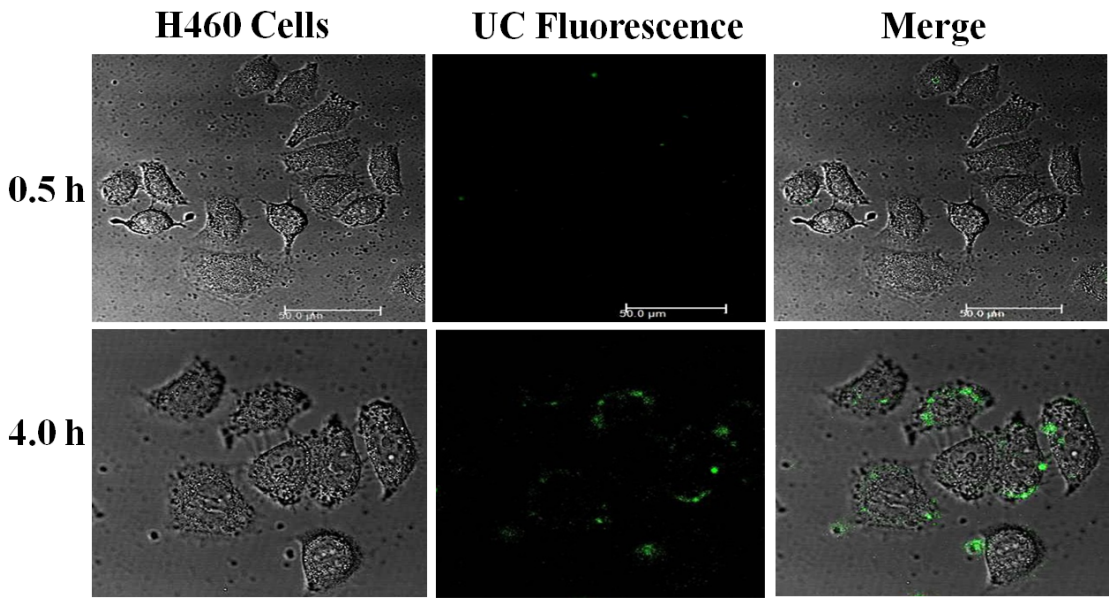


Figure S6. Confocal upconversion fluorescence microscope images of H460 cancer cells under excitation of 980 nm laser after incubation with PLGA(UCNPs/DOX) nanocapsules for 0.5 and 4.0 h, respectively.