

## SUPPORTING INFORMATION

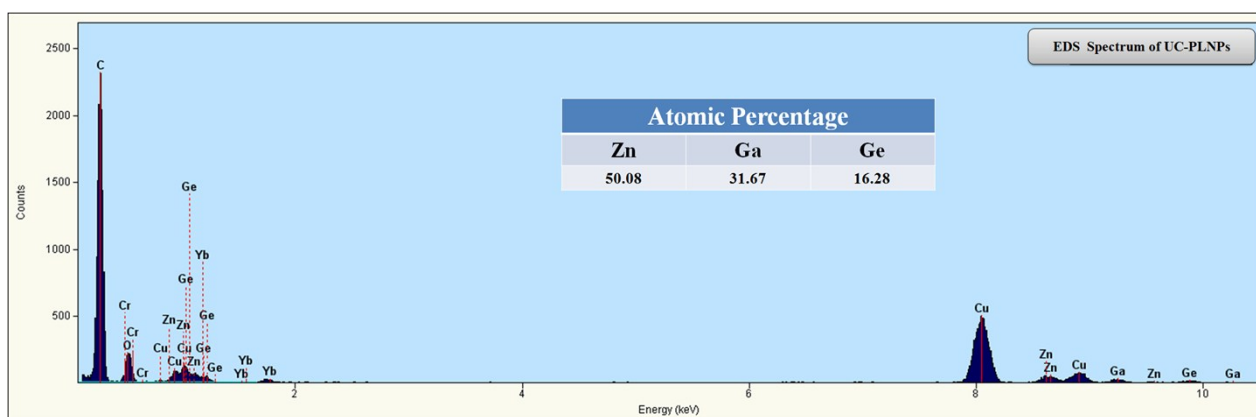
### 980 nm Laser-Activated Upconverted Persistent Probe for NIR-to-NIR Rechargeable *In Vivo* Bioimaging

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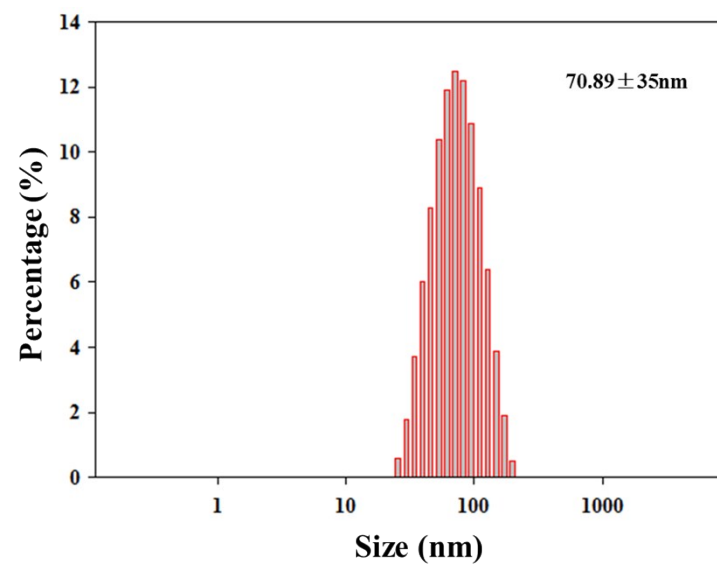
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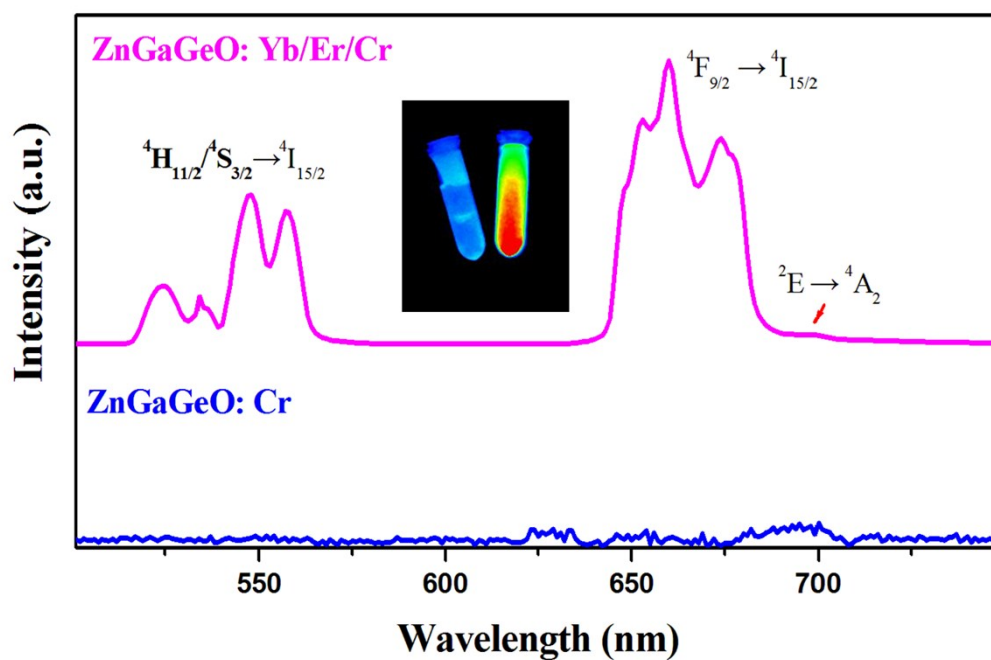
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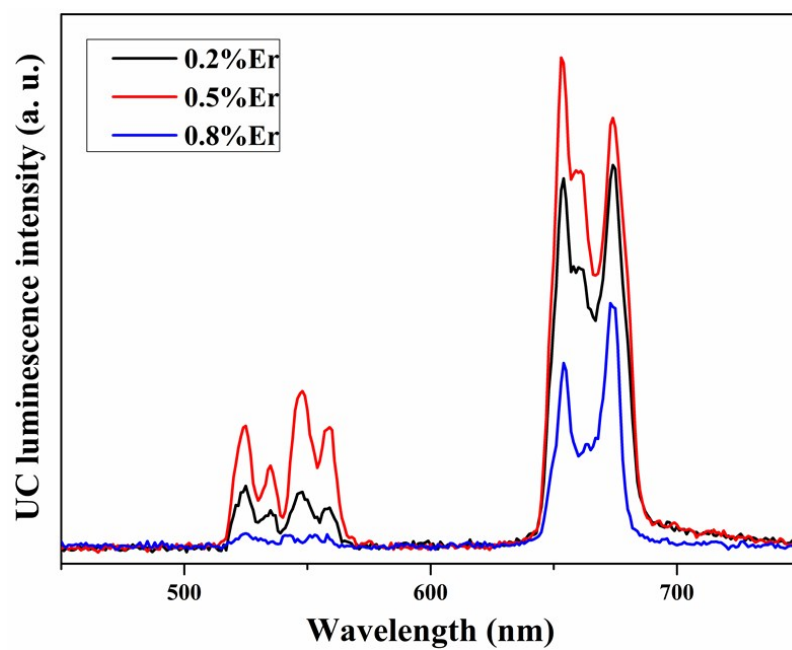
**Figure S1.** EDS pattern of the as-prepared  $\text{Zn}_3\text{Ga}_2\text{GeO}_8$ : Yb/Er/Cr UC-PLNPs.



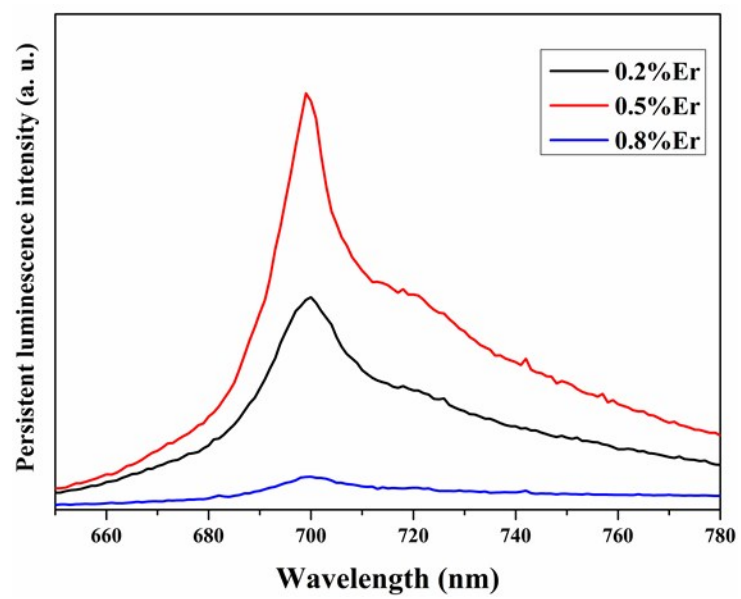
**Figure S2.** Size distribution of UC-PLNPs determined by DLS.



**Figure S3.** UC spectra of Zn<sub>3</sub>Ga<sub>2</sub>GeO<sub>8</sub>: Yb/Er/Cr and Zn<sub>3</sub>Ga<sub>2</sub>GeO<sub>8</sub>: Cr samples under excitation of 980 nm laser. The inset presents the UC emitting photograph of the two samples (left: Zn<sub>3</sub>Ga<sub>2</sub>GeO<sub>8</sub>: Cr, right: Zn<sub>3</sub>Ga<sub>2</sub>GeO<sub>8</sub>: Yb/Er/Cr) taken by a modified multi-modal imaging system (Bruker In Vivo FX Pro) under the excitation of 980 nm laser.



**Figure S4.** UC emission spectra of  $\text{Zn}_3\text{Ga}_2\text{GeO}_8: \text{Yb/Er/Cr}$  at different  $\text{Er}^{3+}$  concentrations (0.2%, 0.5% and 0.8%) at room temperature under the 980 nm laser excitation.



**Figure S5.** Persistent luminescence spectra of Zn<sub>3</sub>Ga<sub>2</sub>GeO<sub>8</sub>: Yb/Er/Cr at different Er<sup>3+</sup> concentrations (0.2%, 0.5% and 0.8%).

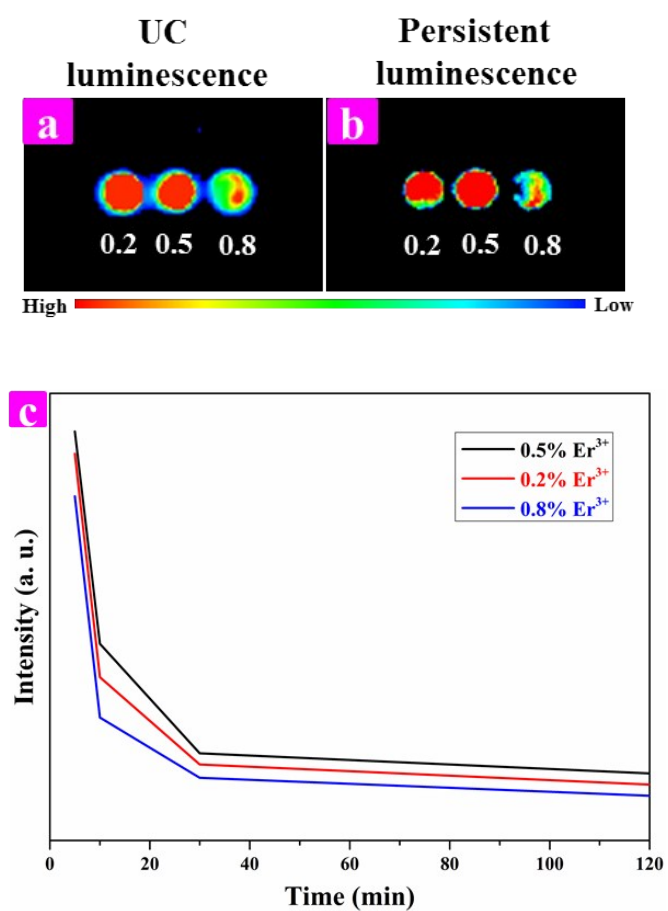
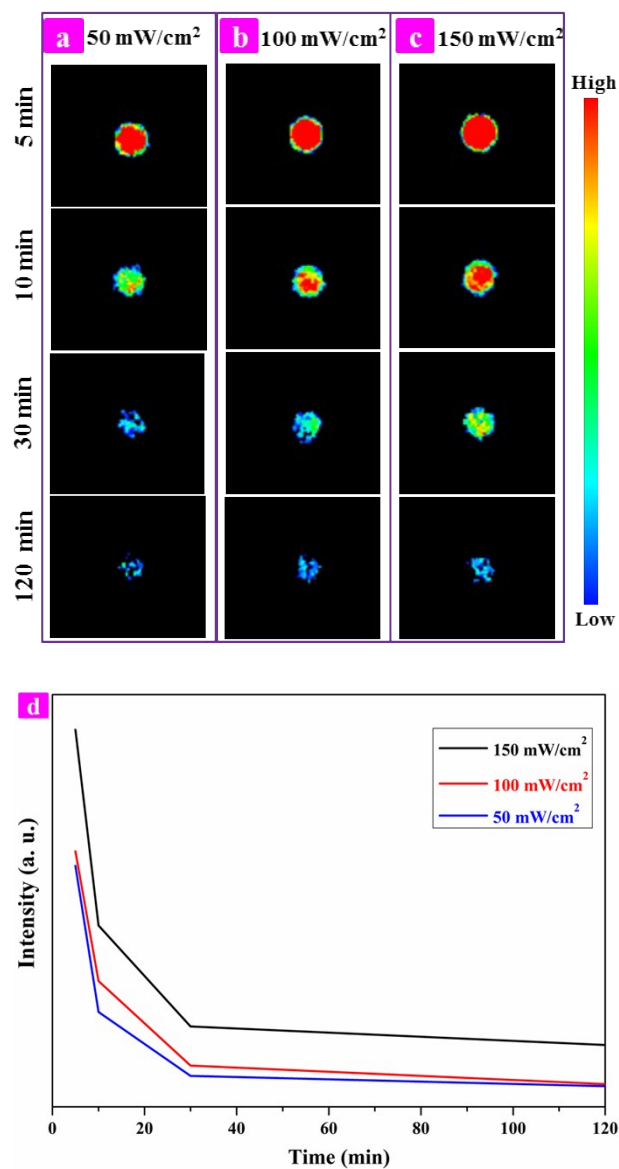
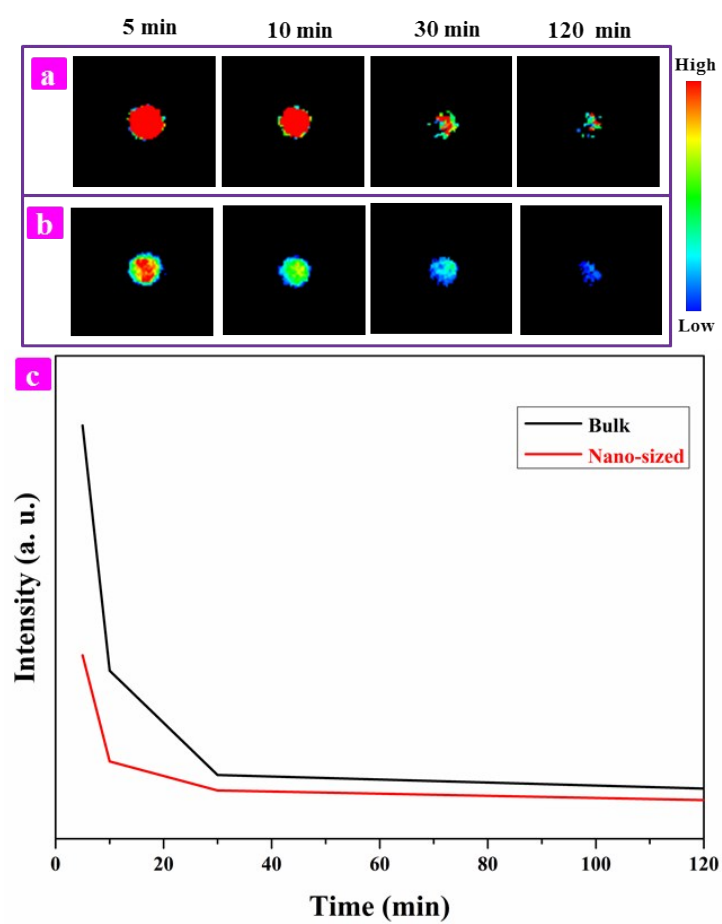


Figure S6. In vitro phantom UC luminescence imaging (a) and NIR persistent luminescence imaging (b) of UC-PLNPs doped with different  $\text{Er}^{3+}$  concentrations by a 980 nm laser excitation with power density of 150 mW/cm<sup>2</sup>, (c) decay curves of persistent luminescence intensity.

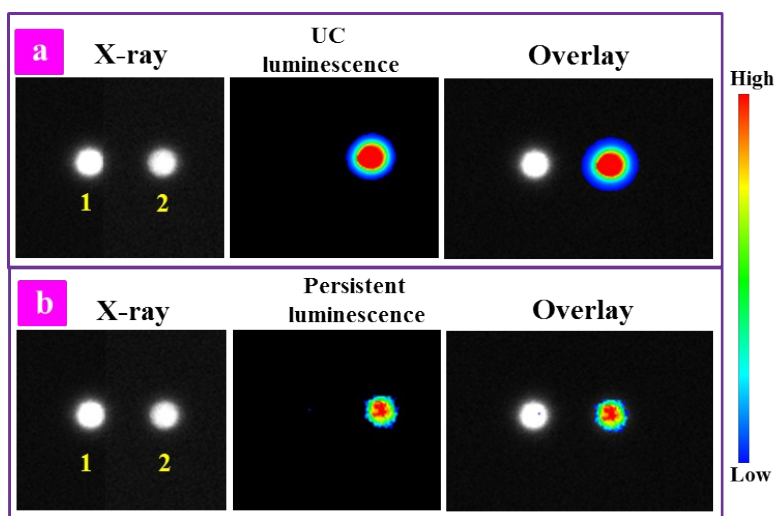


**Figure S7.** *In vitro* phantom UC persistent imaging of UC-PLNPs charged with different 980 nm power densities: (a) 50 mW/cm<sup>2</sup>, (b) 100 mW/cm<sup>2</sup>, (c) 150 mW/cm<sup>2</sup>, (d) decay curves of persistent luminescence intensity.

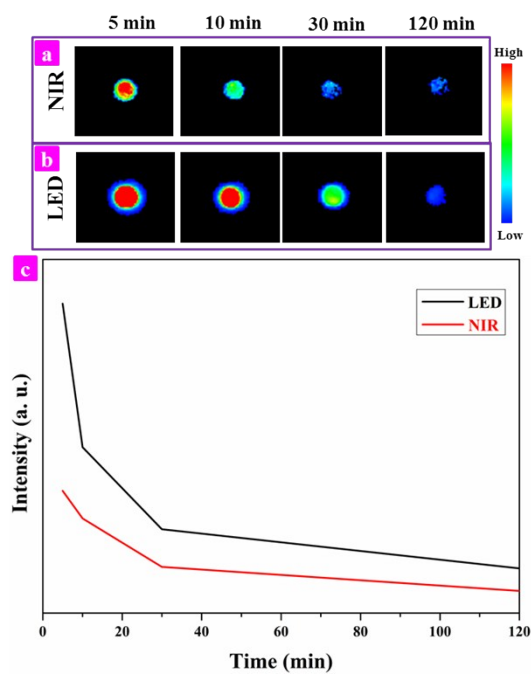




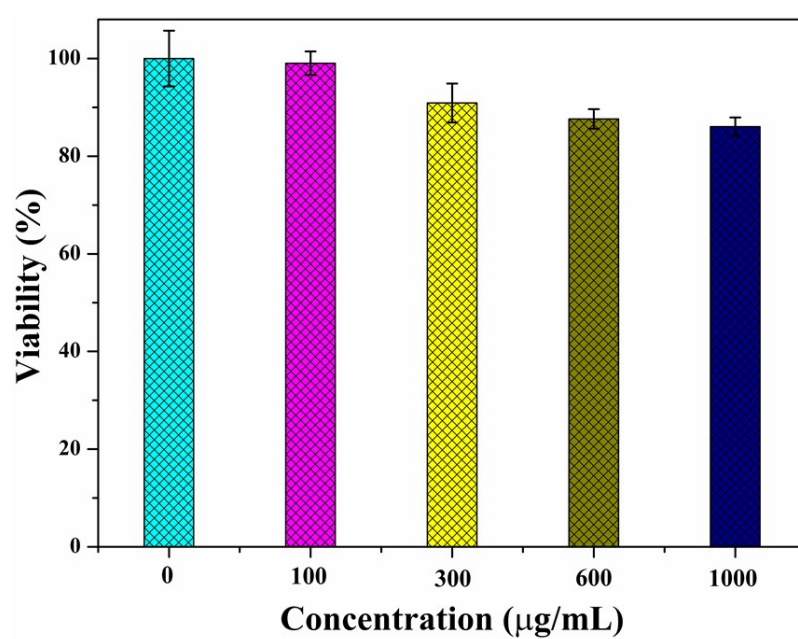
**Figure S8.** *In vitro* persistent imaging of UC-PLNPs (a) bulk, (b) nano-sized nanoparticles after 980 nm (150 mW/cm<sup>2</sup>) excitation, (c) decay curves of persistent luminescence intensity.



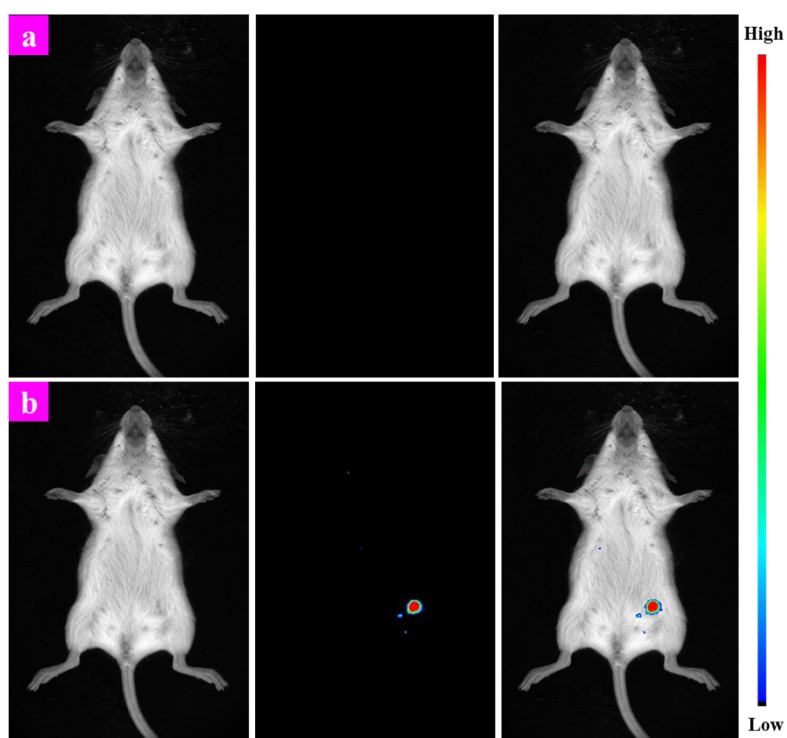
**Figure S9.** *In vitro* (a) UC luminescence, (b) persistent luminescence imaging of UC-PLNPs under the 980 nm laser excitation at power density of 150 mW/cm<sup>2</sup>, 1 and 2 present Zn<sub>3</sub>Ga<sub>2</sub>GeO<sub>8</sub>: Cr and Zn<sub>3</sub>Ga<sub>2</sub>GeO<sub>8</sub>: Yb/Er/Cr samples.



**Figure S10.** *In vitro* persistent imaging of UC-PLNPs activated by (a) NIR (980 nm laser, 150 mW/cm<sup>2</sup>) , (b) LED, (c) decay curves of persistent luminescence intensity.

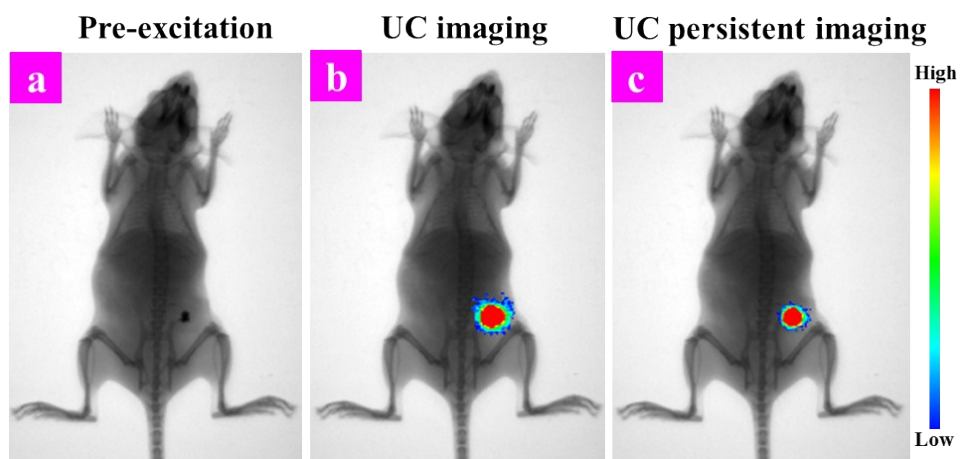


**Figure S11.** Effect of different concentrations of UC-PLNPs on the viability of Hek293 cells measured by MTT assay.



**Figure S12.** *In vivo* UC optical bioimaging: (a) without and (b) with subcutaneous injection of the designed UC-PLNPs.

The left panel: White light images; the middle panel: UC images, by detection of 550 nm green UC luminescence; the right panel: overlay images.



**Figure S13.** *In vivo* optical bioimaging of a mouse subcutaneously injected with UC-PLNPs under 980 nm (150 mW/cm<sup>2</sup>) excitation: (a) pre-excitation, (b) UC imaging and (c) UC persistent imaging.