**Supporting Information**

# UCN@mSiO2@cross-linked lipid with high steric stability as NIR remote controlled-release nanocarrier for photodynamic therapy

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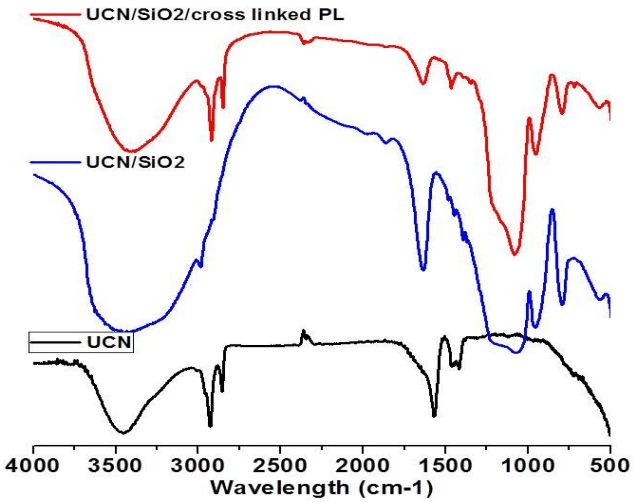


Figure S1: FTIR specctra of UCNs, UCN@mSiO2 nanocarrier and UCN@mSiO2@cross-linked lipid nanocarrier.

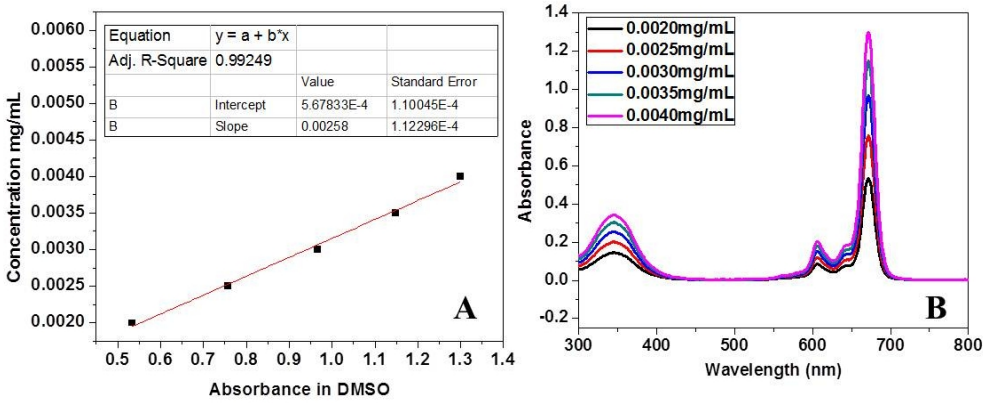


Figure S2: (A) The standard cure of ZnPc about the relationship between absorption value and the concentration. (B) UV-Vis spectra of ZnPc with various concentrations.

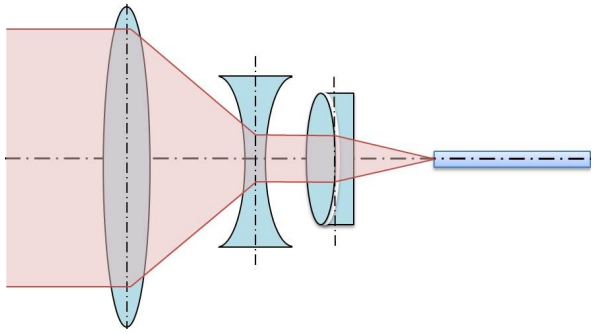

Figure S3: Schematic drawing about how to expand to beam. The optical fiber diameter is 0.2mm, optical fiber emission angle is $11^{O}$ and the output diameter is 50mm.

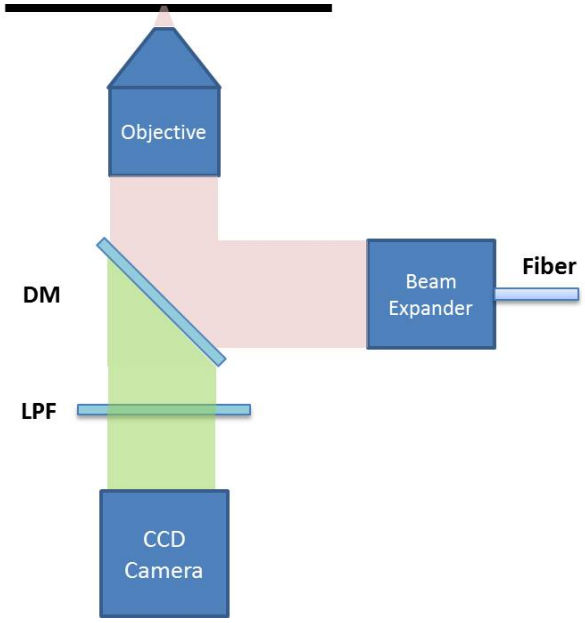


Figure S4: Schematic drawing about light path diagram of NIR on fluorescence microscopy.

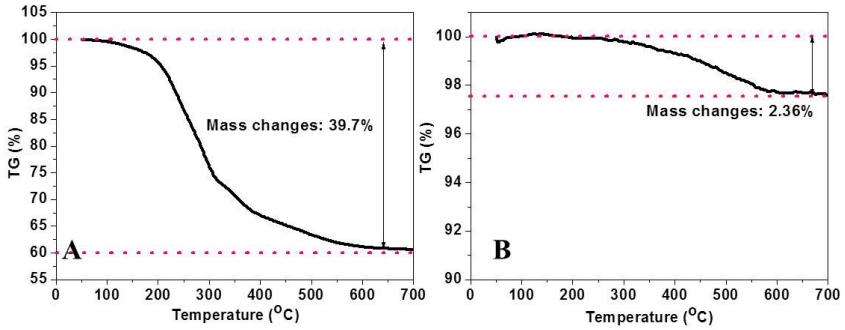


Figure S5: Thermogravimetric curve (TG) of (A) UCN@mSiO2containing CTAB template and (B) UCN@mSiO2 nanoparticles after removing the CTAB template.

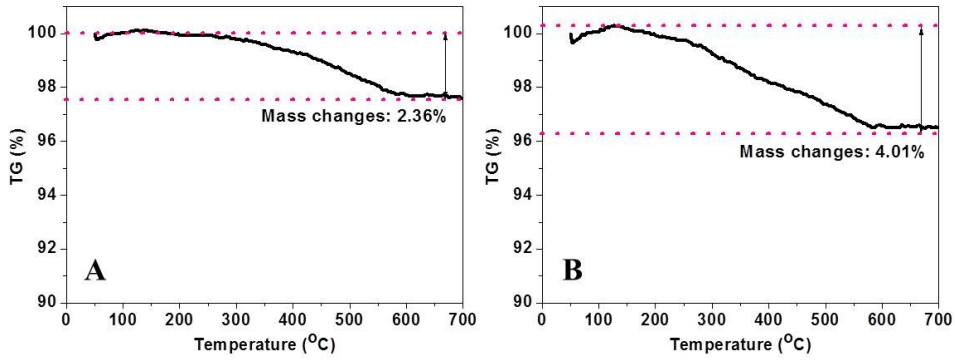


Figure S6: Thermogravimetric curve (TG) of (A) UCN@mSiO2 nanoparticles after removing the CTAB template and (B) UCN@mSiO2@cross-linked PL nanoparticles.

Table S1: The particle size, zeta potential of UCNs, UCN@mSiO2 nanocarrier, (UCN+ZnPc)@mSiO2 nanocarrier and (UCN+ZnPc)@mSiO2@cross-linked lipid nanocarrier.

| | Particle size (nm) | Polydispersity index (PDI) | Zeta potential (mV) |
|---|---|---|---|
| UCNs | 52.3 | 0.219 | -10.0 |
| UCN/porous SiO2 | 152 | 0.076 | -26.1 |
| (UCN+ZnPc)/porous SiO2 | 164.3 | 0.178 | -28.4 |
| (UCN+ZnPc)/porous SiO2 / cross-linked PL | 221 | 0.233 | +23.7 |