Electronic Supporting Information for

Nd^{3+}-sensitized Upconversion Nanophosphor Modified with Cyanine Dye for Ratiometric Upconversion Luminescence Bioimaging of Hypochlorite

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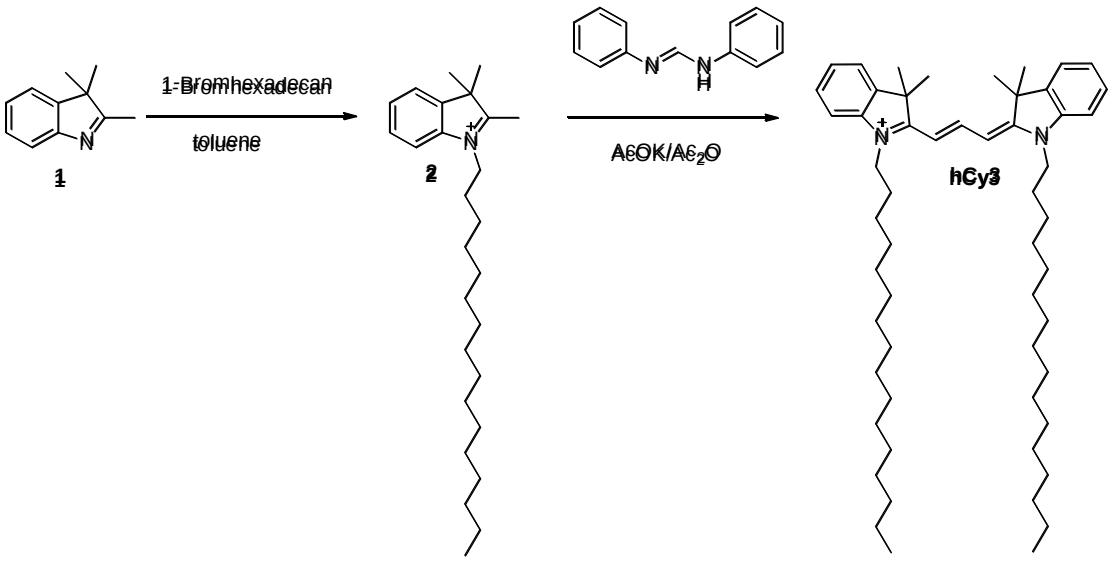
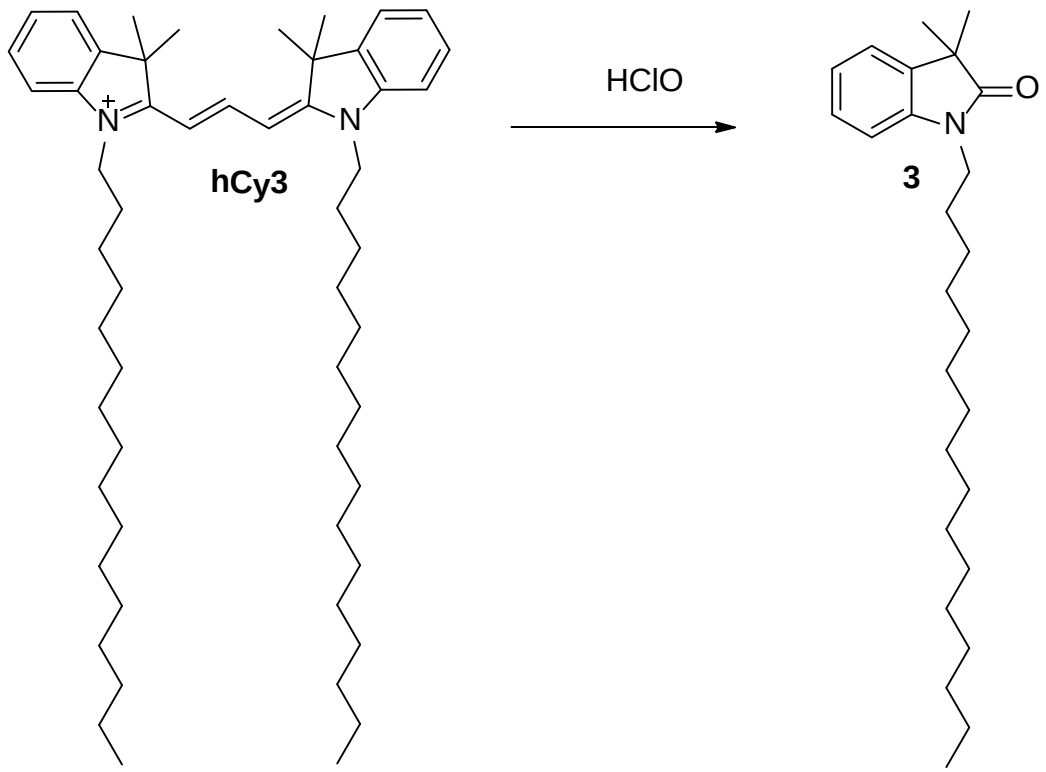


Scheme S1. Synthetic route of hCy3



Scheme S2. The possible mechanism of the reaction between HOCl and hCy3.

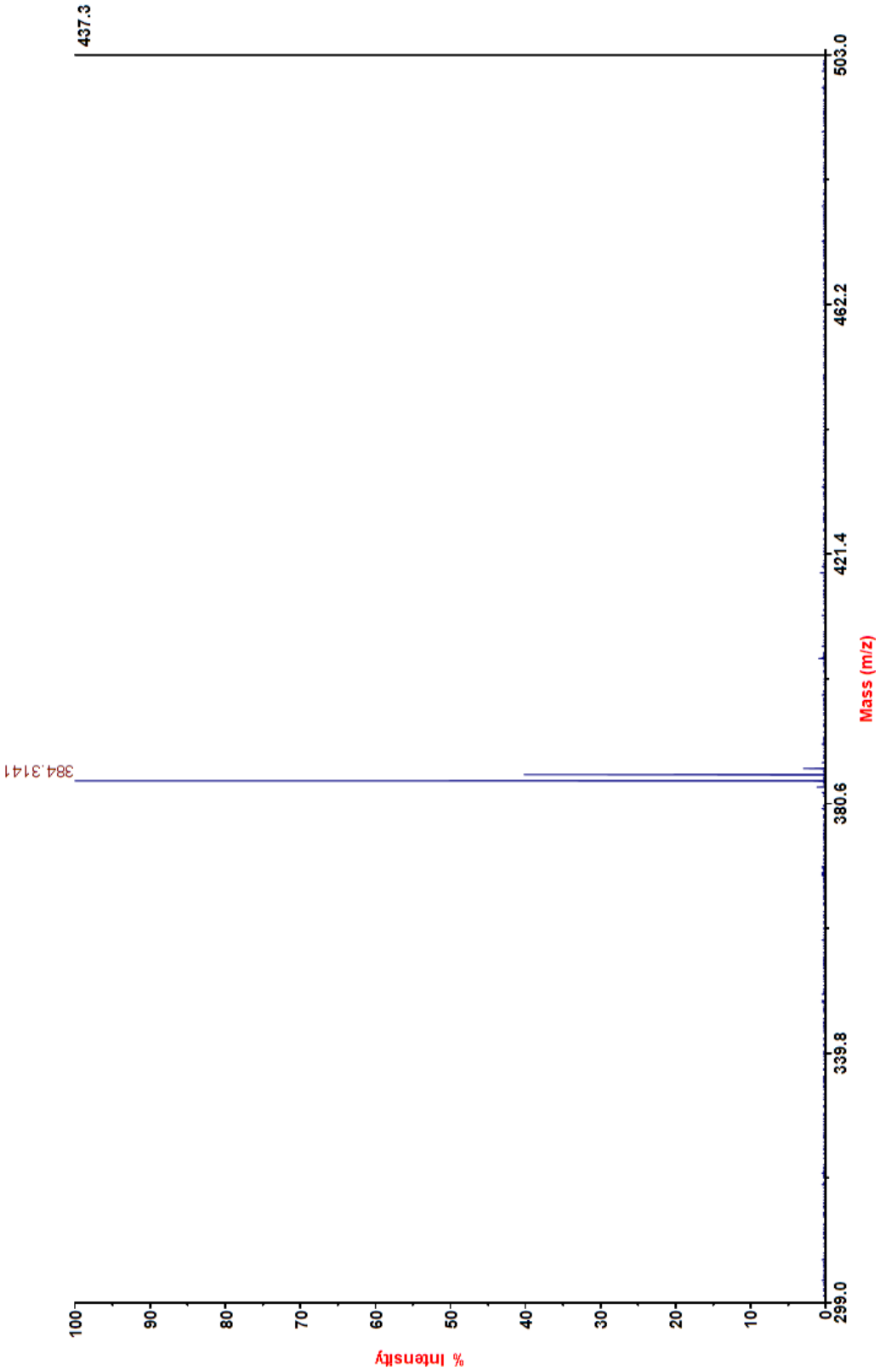


Fig. S1 The MALDI-TOF-MS spectrum of compound **2**.

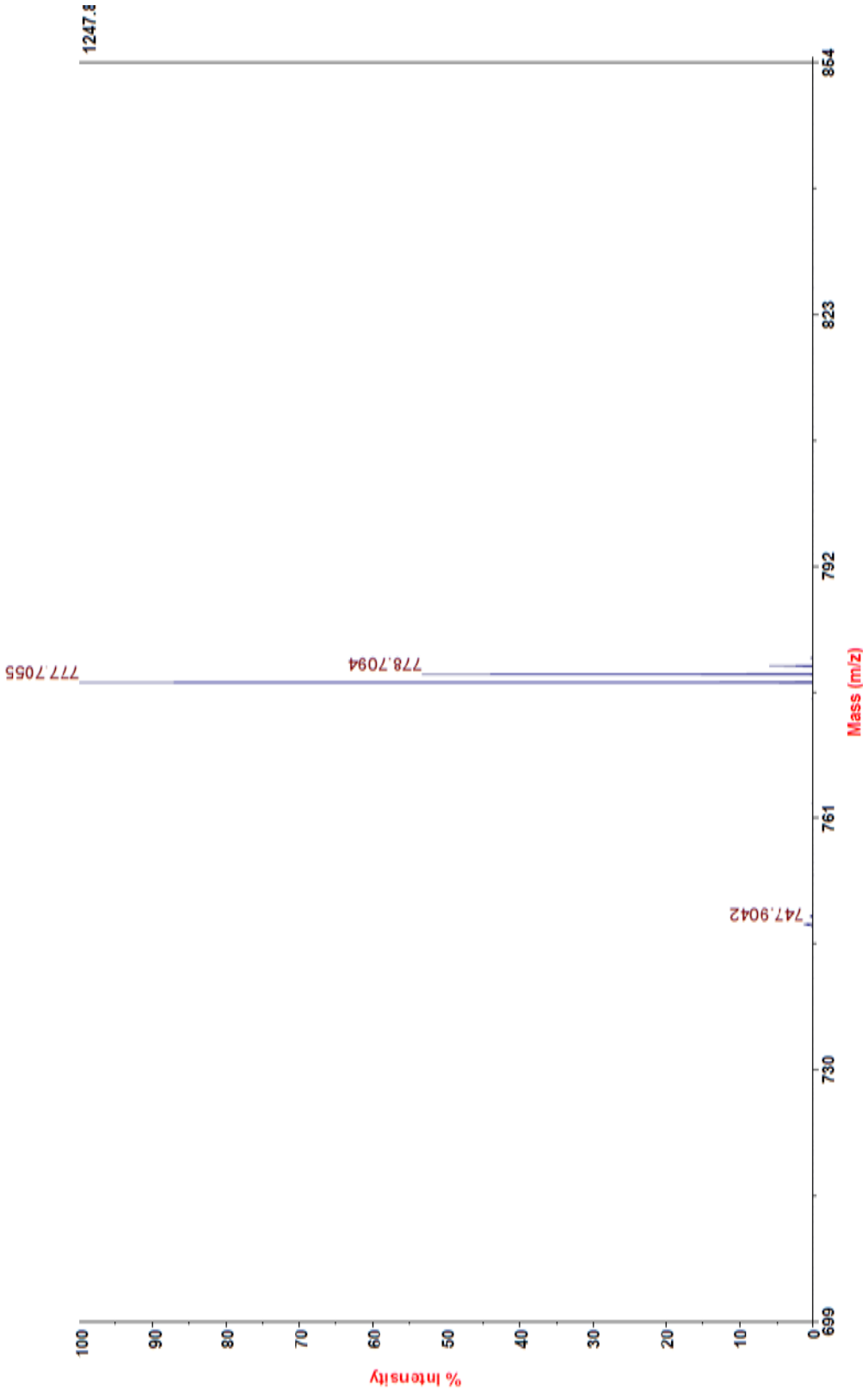


Fig. S2 The MALDI-TOF-MS spectrum of hCy3.

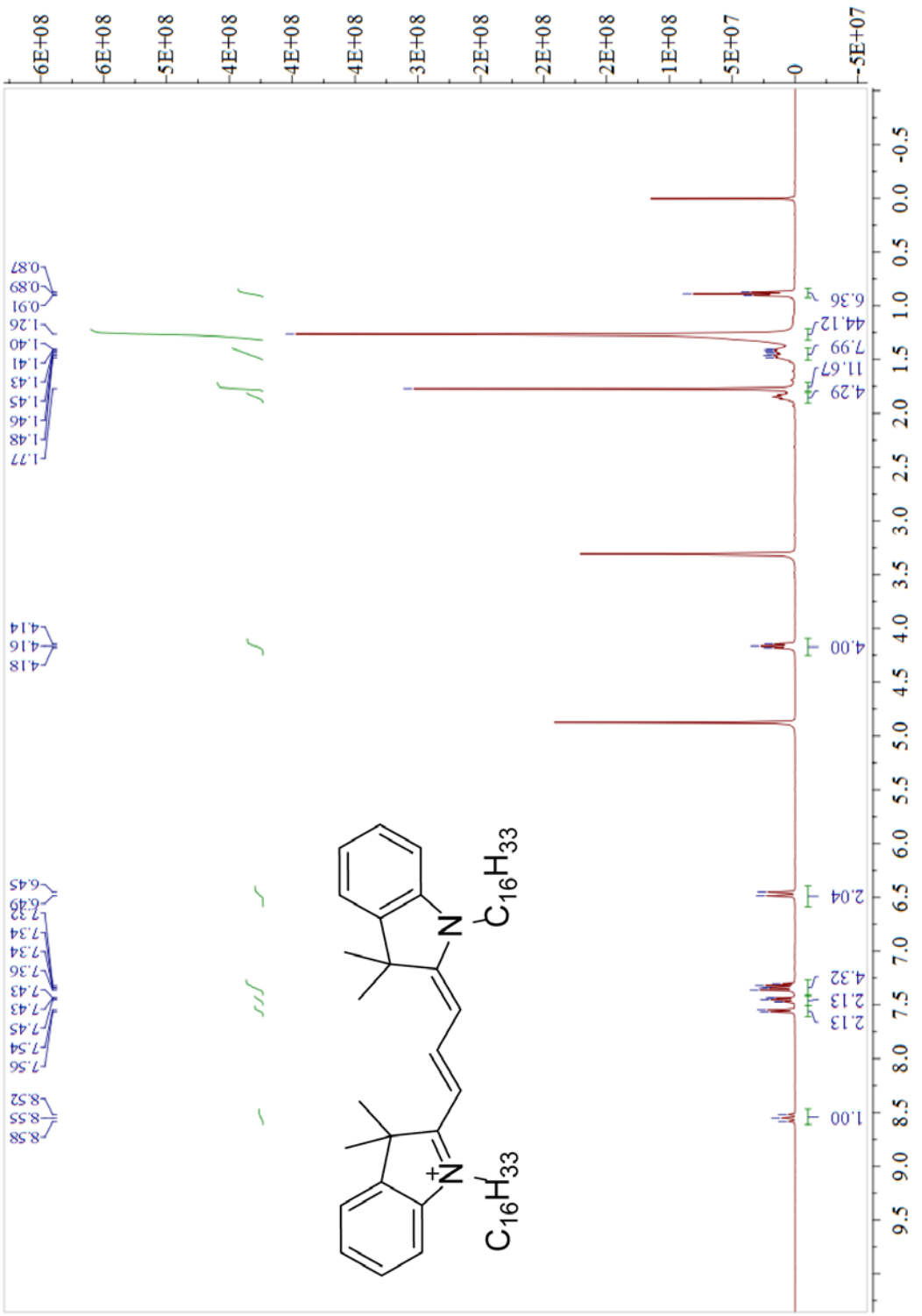


Fig. S3 The ^{1}H NMR spectra of hCy3 in the MeOD.

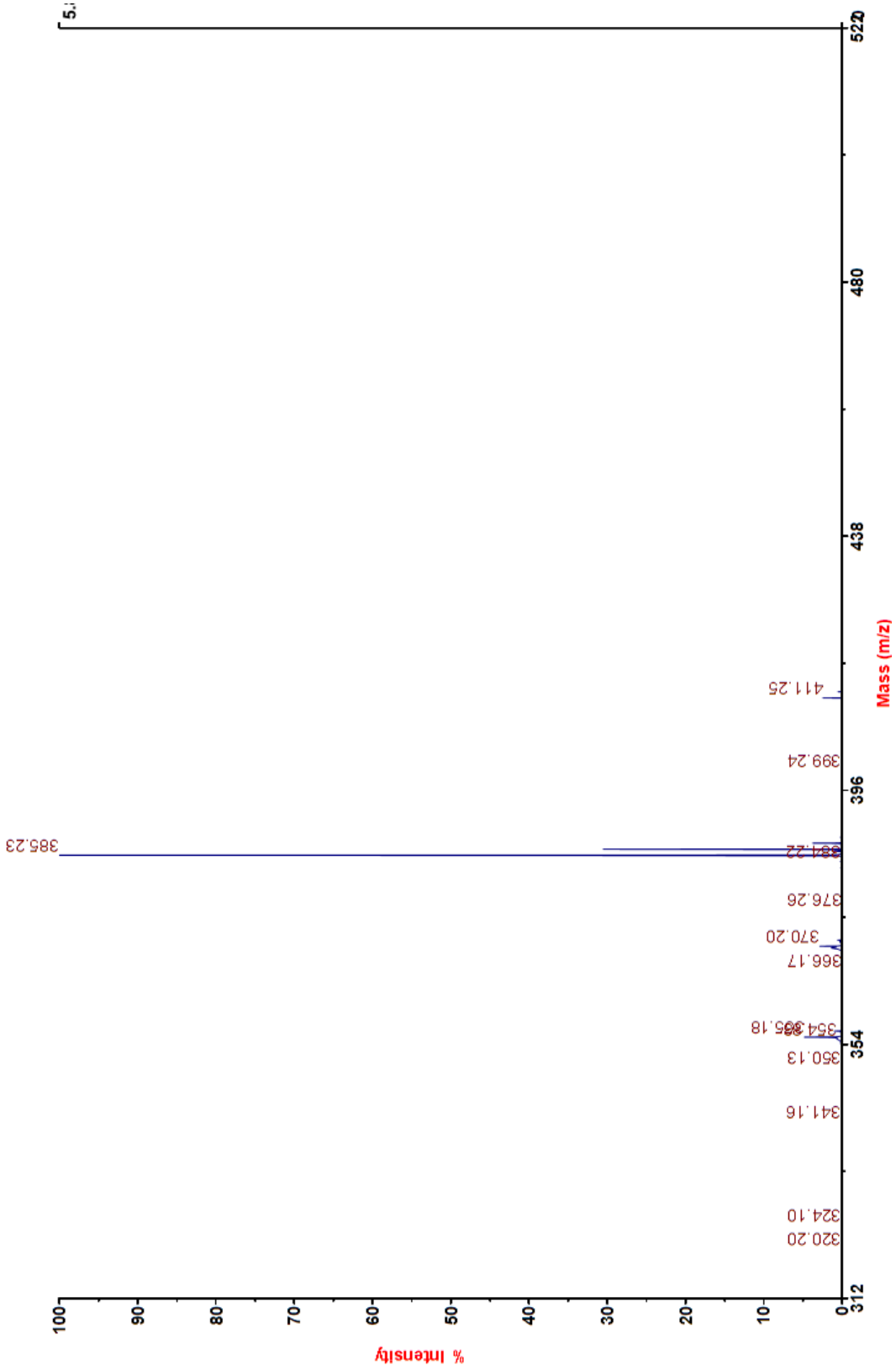


Fig. S4 The MALDI-TOF-MS spectrum of compound **2.**

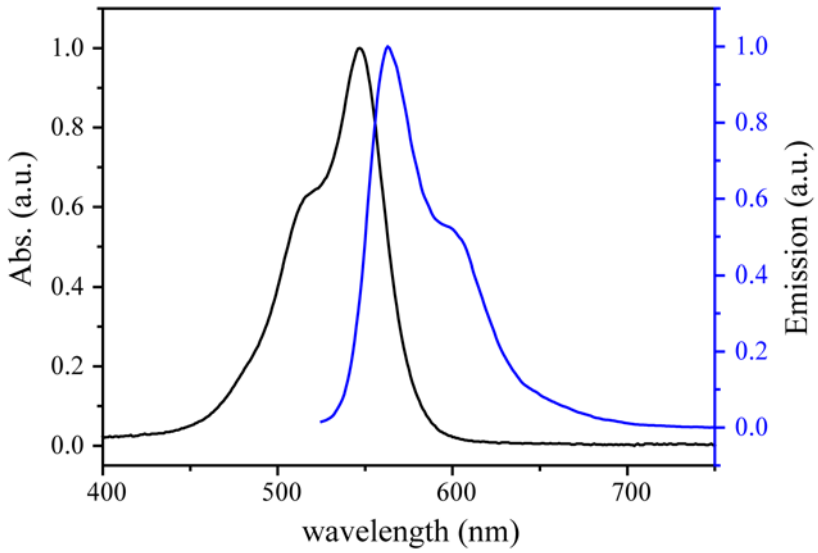


Fig. S5 The absorption and fluorescence emission spectra of 5μM hCy3.

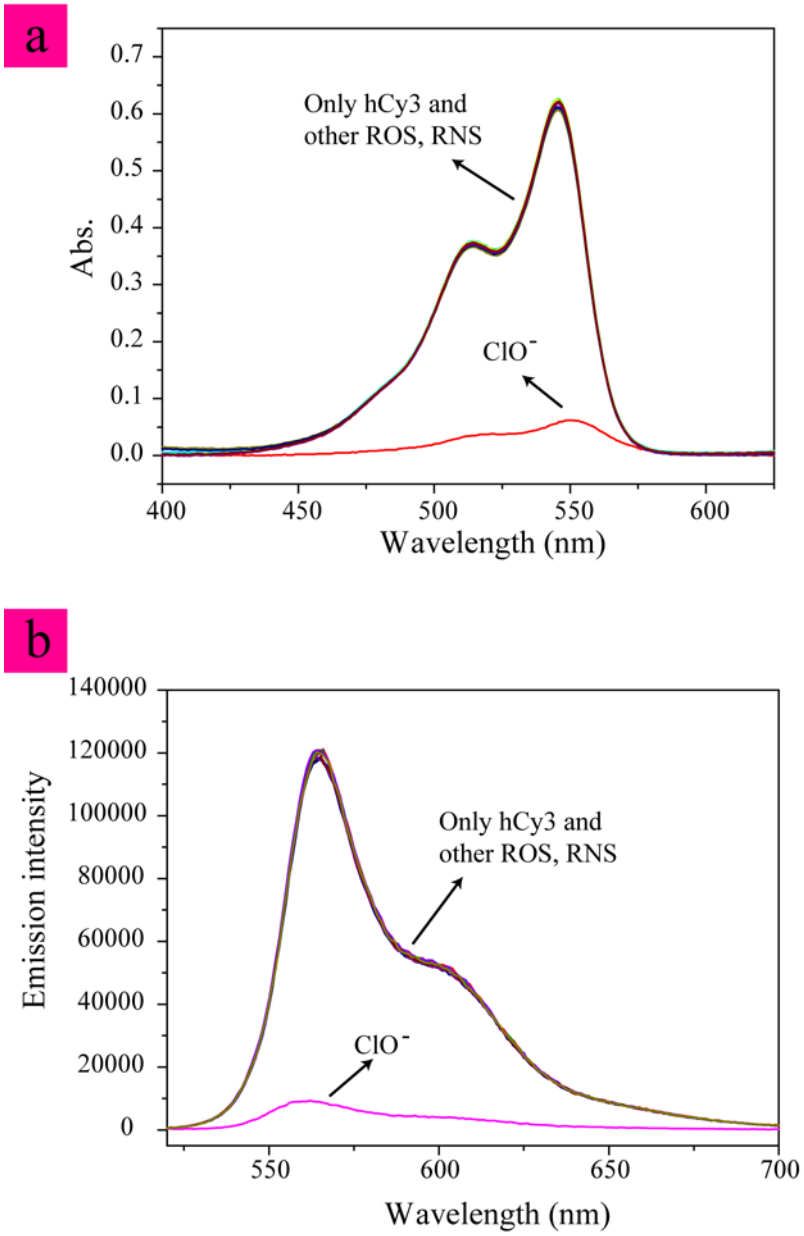


Fig. S6. Absorption (a) and Fluorescence (b) of 5 μM solution of Cy3 (EtOH:PBS=1:1) after reaction with various ROS.

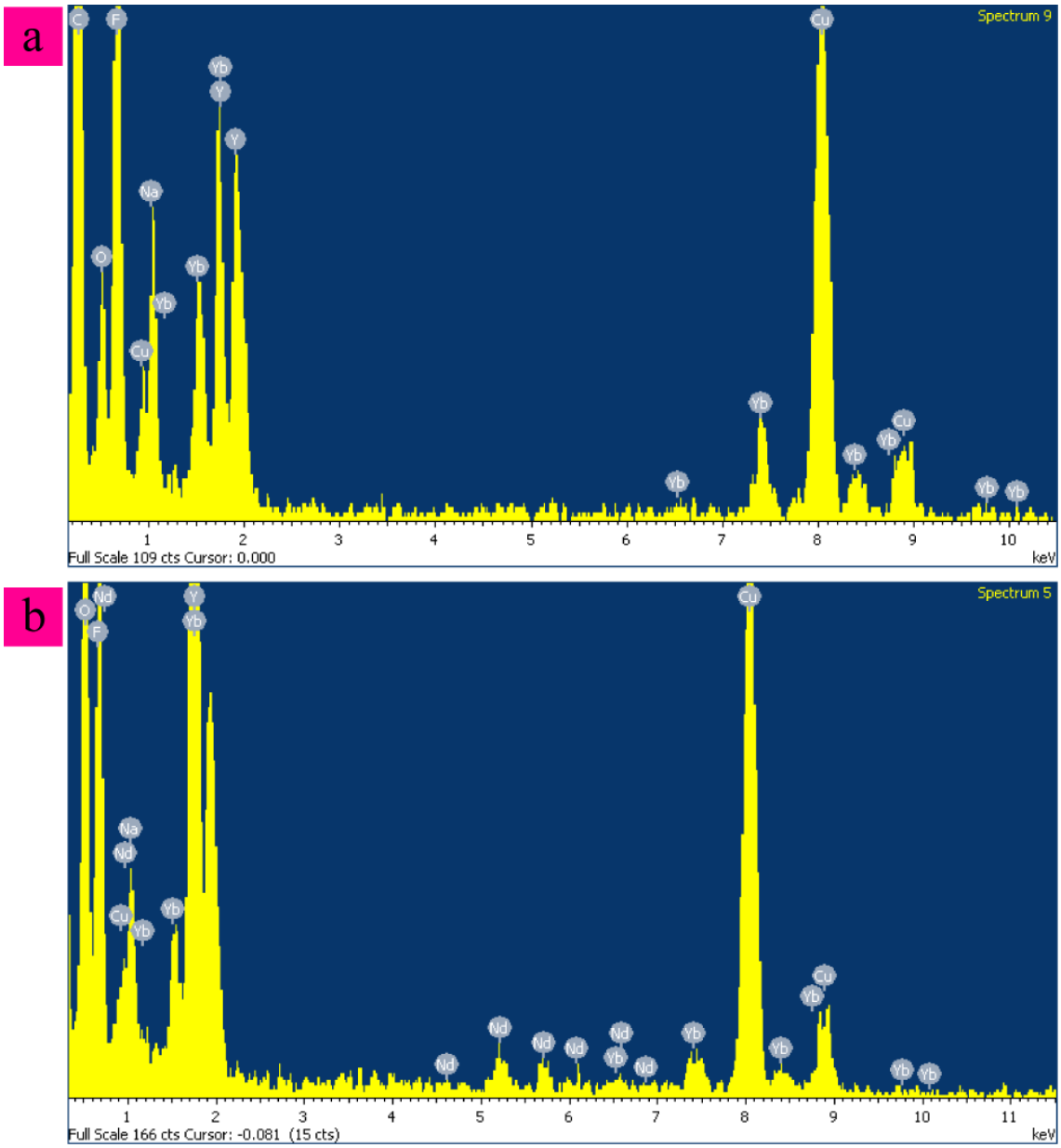


Fig. S7 The EDXA of the OA-UCNPs (a) and OA-cs UCNPs:Nd (b).

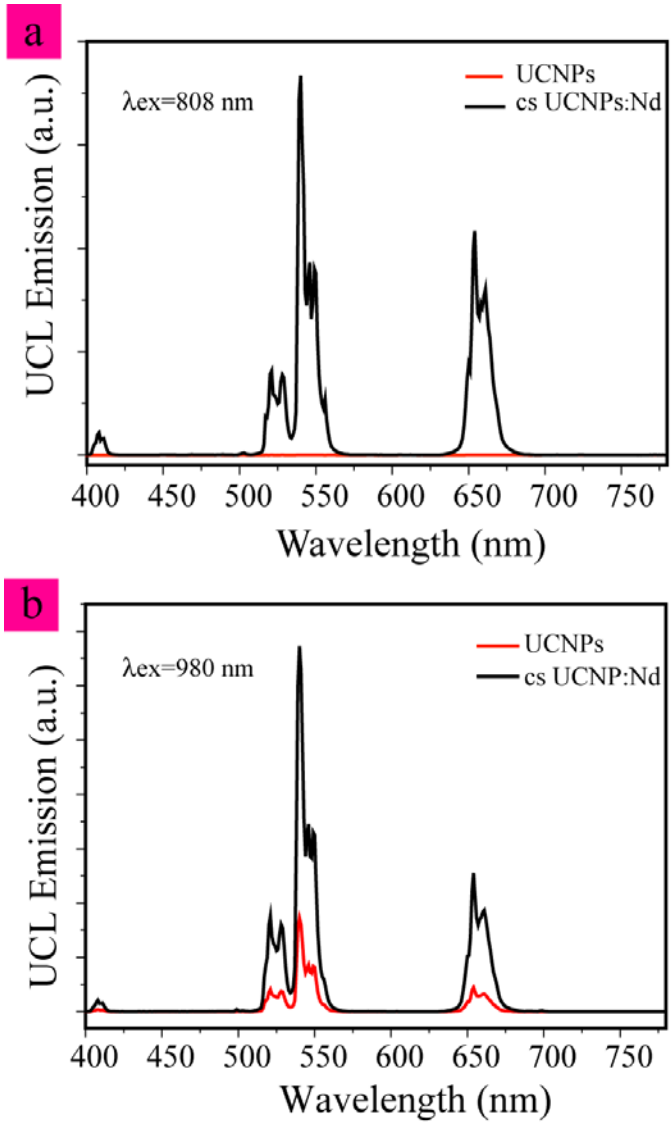


Fig. S8 UCL emission spectra of the $NaYF_4$: 30%Yb, 0.5%Er, 1%Nd (UCNPs) and $NaYF_4$: 30%Yb, 0.5%Er, 1%Nd@$NaYF_4$: 20%Nd (cs UCNPs:Nd) under 808 nm (a) and 980 nm (b) irradiation.

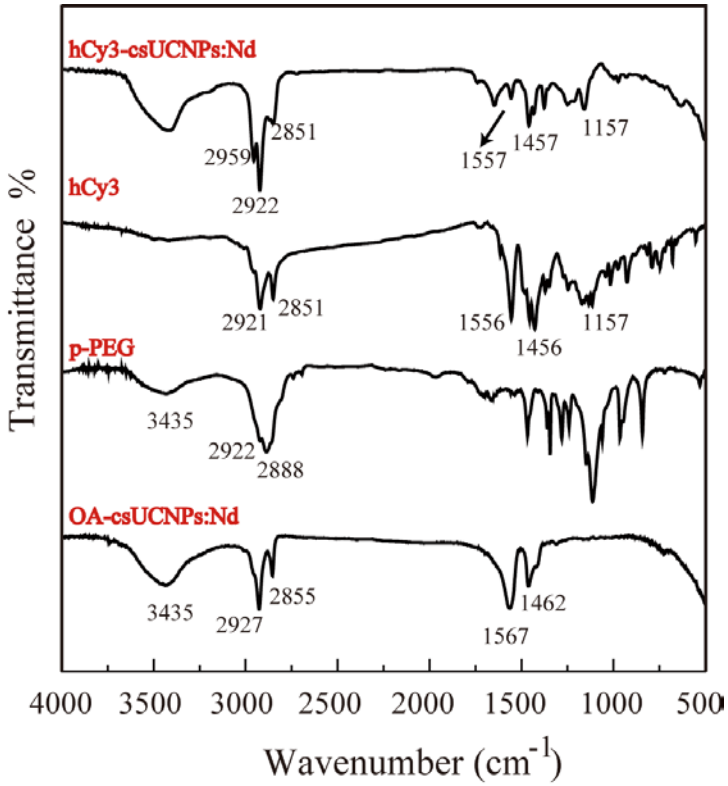


Fig. S9 The FTIR spectra of the OA-csUCNPs:Nd, p-PEG, hCy3, and hCy3-csUCNPs:Nd.

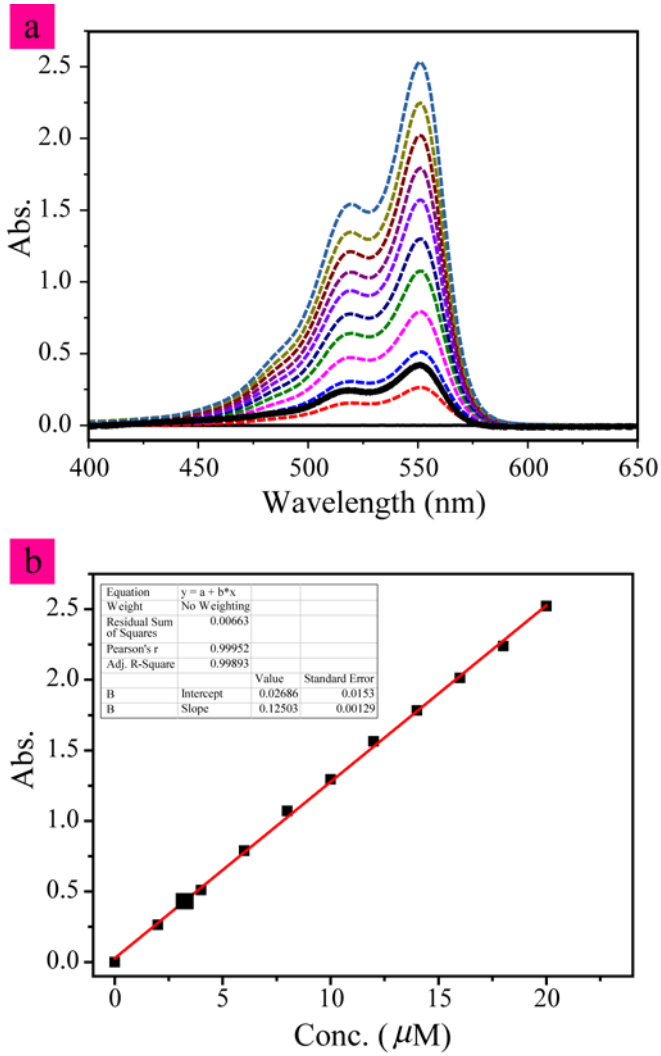


Fig. S10 The concentration of hCy3 loaded in the hCy3-csUCNPs:Nd was calculated using the absorption spectroscopy technique. (a) Absorption spectra of the hCy3 with different concentrations of 0-20 μM. (b) The absorbance at 558 nm as a function of hCy3 concentration.

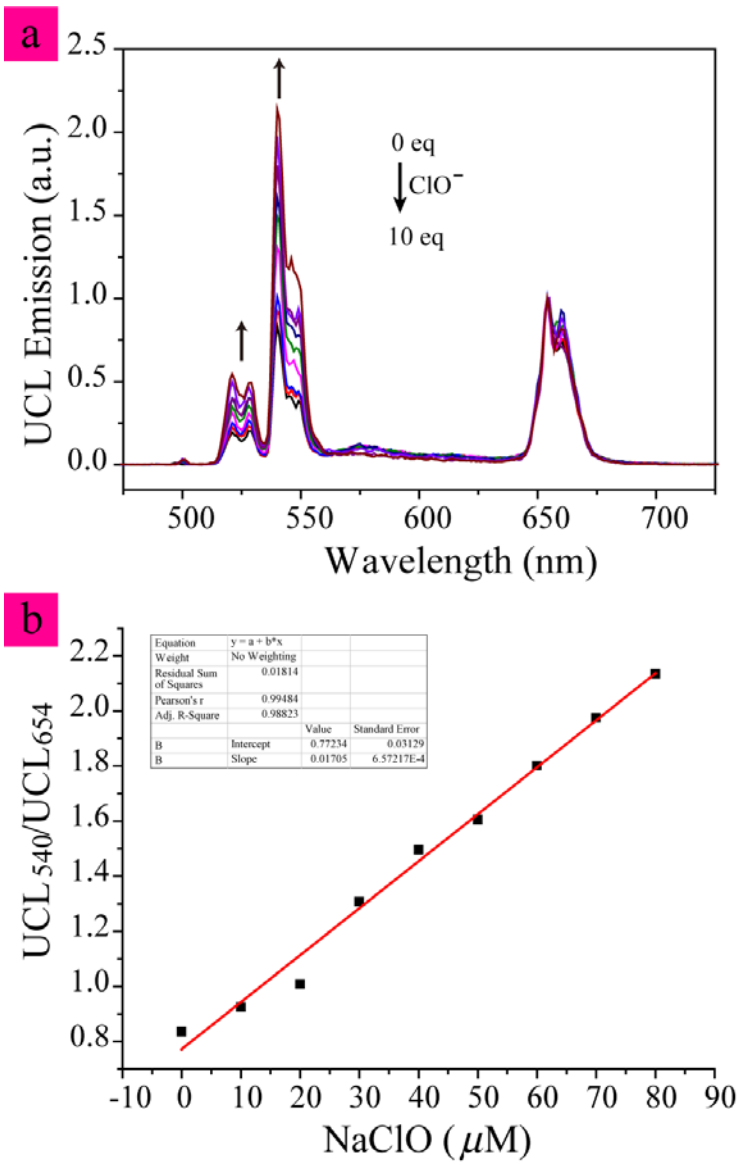


Fig. S11 (a) Upconcersion luminescence spectra of 0.1 mg/mL hCy3-csUCNP:Nd under 980 nm irradiation.in the aqueous solution upon gradual addition of NaClO (from 0 to 80 μM). (b) The ration of the UCL emission at 540 nm to 654 nm as a function of NaClO concentration.

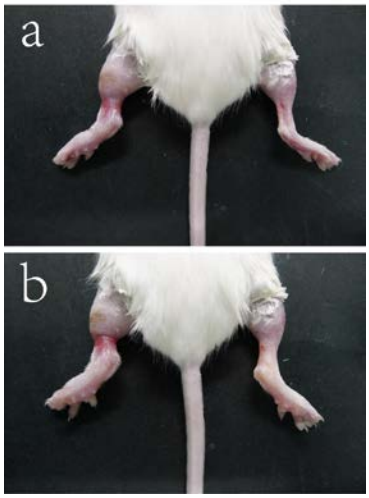


Fig. S12 (a) after four hours injection with λ-carrageenan (10 mg/mL, in 0.9% NaCl), the arthritis was successfully induced in the left leg, the right leg was normal which injection with physiological saline. (b) the left and right legs were injected with the same amount of hCy3-csUCNPs:Nd.

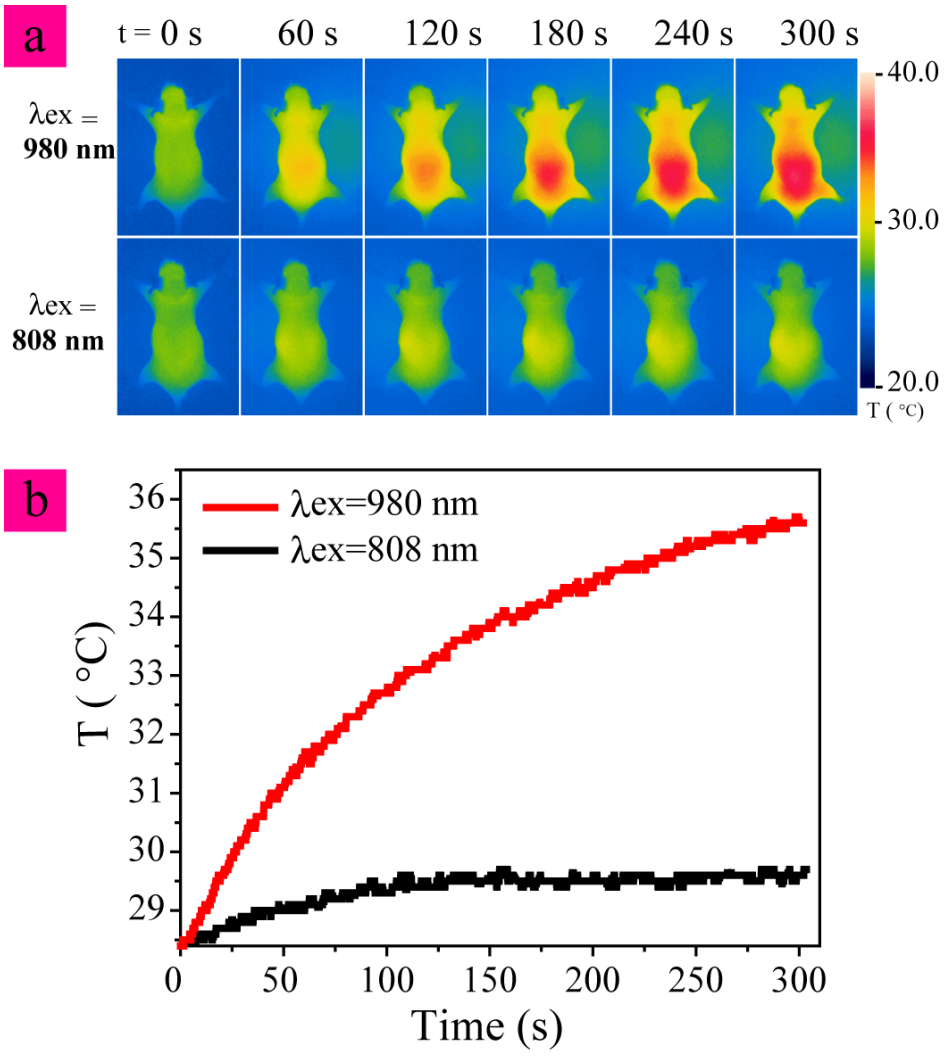


Fig. S13 In vivo heating effect induced by laser irradiation.(a) 980 nm (top) and 808 nm (below) laser irradiation for 300 s, and (b) temperature curve along with the change of irradiation time.

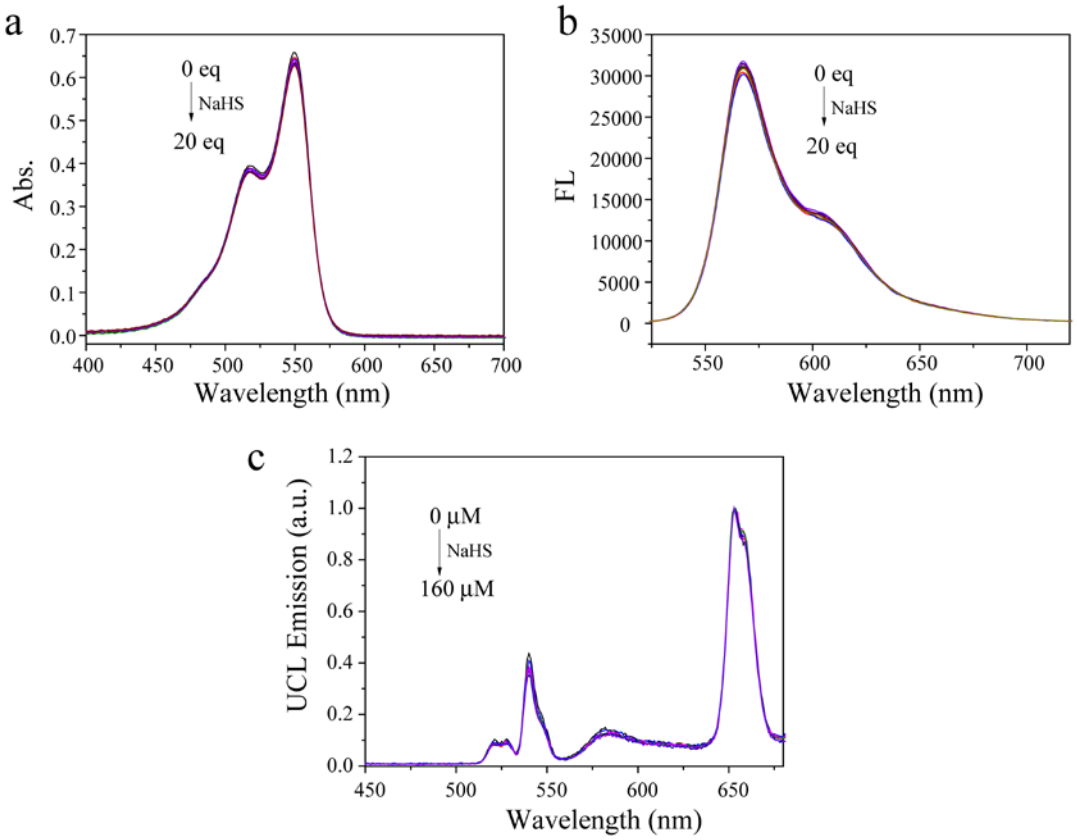


Fig. S14. Absorbance (a) and fluorenscence (b) intensity changes of hCy3 (5 μM) upon addition of NaHS from 0 eq to 20 eq. (C) UCL emission intensity changes of 0.1mg/ml hCy3-csUCNPs:Nd under 808 nm irradiation in aqueous upon addition of NaHS from 0 μM to 180 μM. The data indicated that the NaHS had no significant effect on our nanosystem.

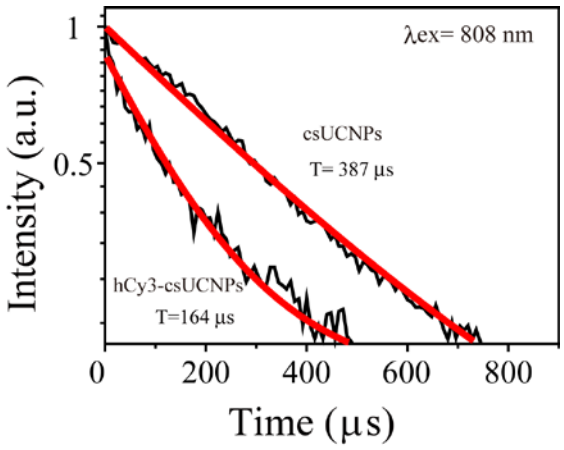


Fig. S15. The decay lifetime of $NaYF_4$: Yb/Nd/Er@$NaYF_4$:Nd (csUCNPs) and hCy3-csUCNPs.