Electronic Supplementary Material (ESI) for Dalton Transactions.
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Redox responsive UCNPs-DPA conjugated NGO-PEG-BPEI for cancer theranostic

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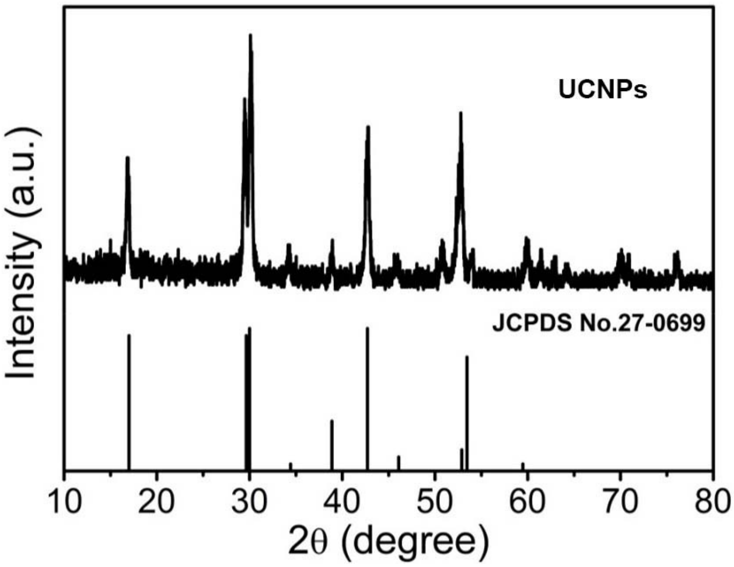

Fig. S1 XRD pattern of UCNPs. The standard pattern of hexagonal phases $NaGdF_4$:Yb^{3+}, Er^{3+}@$NaGdF_4$ is given for reference (JCPDS No.27-0699).

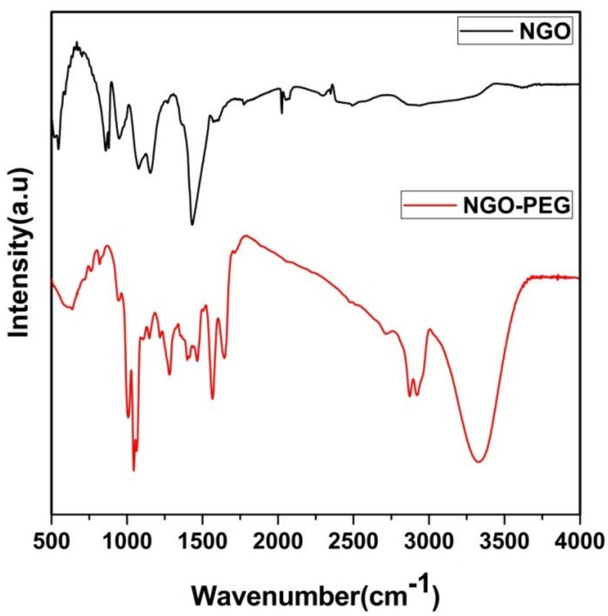

Fig. S2 FT-IR spectra of NGO-PEG and NGO. The strong stretching vibration peak of C–H (~2880 cm^{-1}) demonstrated the presence of PEG in the NGO-PEG. The appearance of the new absorption at ~1649 cm^{-1} for –CONH– further indicated that PEG has been covalently boned on the surface of NGO successfully.

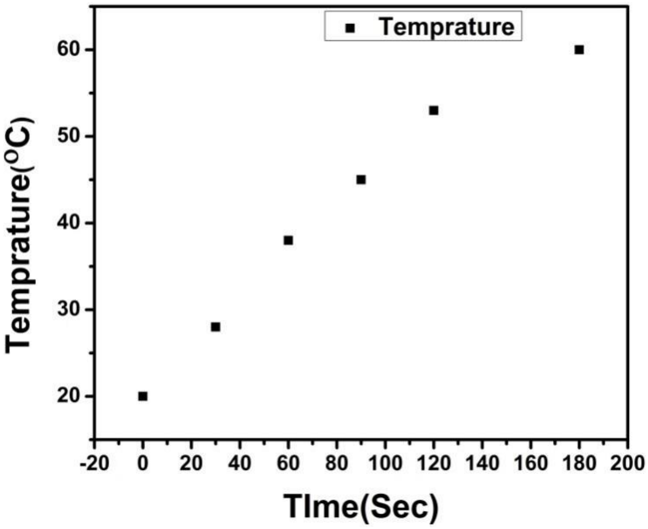

Fig. S3 Temperature variation curves of the NGO-PEG solution subjected to the 980 nm laser at a power density of 0.72 W/cm^2.

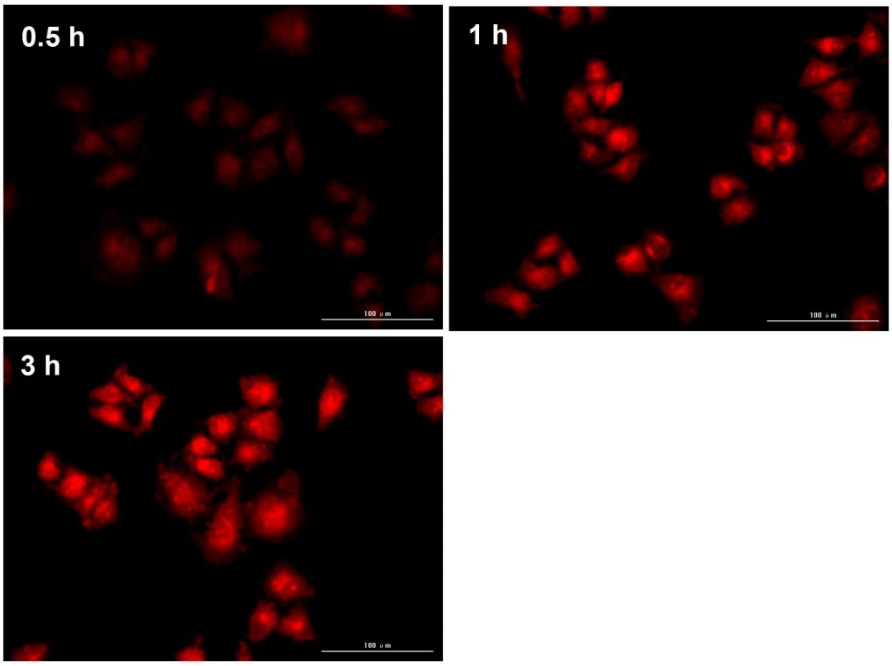

Fig. S4 LSUCLM images of HeLa cells when incubating with UCNPs-DPA-NGO-PEG-BPEI-DOX for 0.5 h, 1 h, and 3 h.

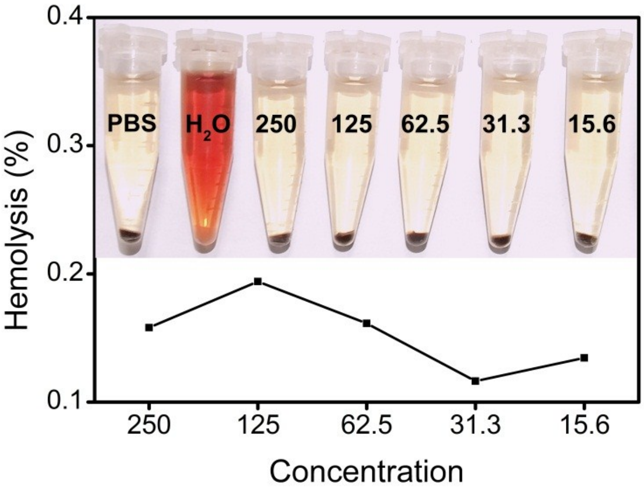

Fig. S5 Hemolytic assay of UCNPs-DPA-NGO-PEG-BPEI-DOX by human red blood cells.

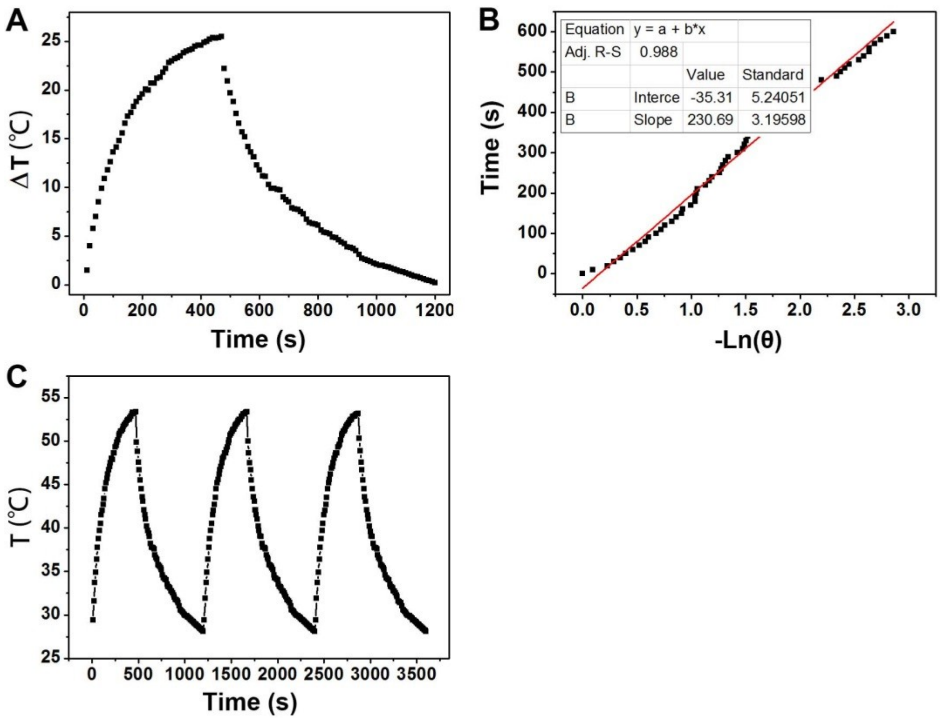

Fig. S6 (A) The photothermal response of the UCNPs-DPA-NGO-PEG-BPEI-DOX aqueous solution (200 μg/ mL) radiated with 980 nm laser (0.72 W/cm^2) and then the laser was shut off. (B) Linear time data *versus* –ln θ obtained from the cooling period of Fig. S6A. (C) Temperature change of UCNPs-DPA-NGO-PEG-BPEI-DOX under three irradiation/cooling cycles (0.72 W/cm^2).