Supporting information

Intelligent tumor microenvironment responsive nanotheranostic agent for T1/T2 dual-modal magnetic resonance imaging-guided and self-augmented photothermal therapy

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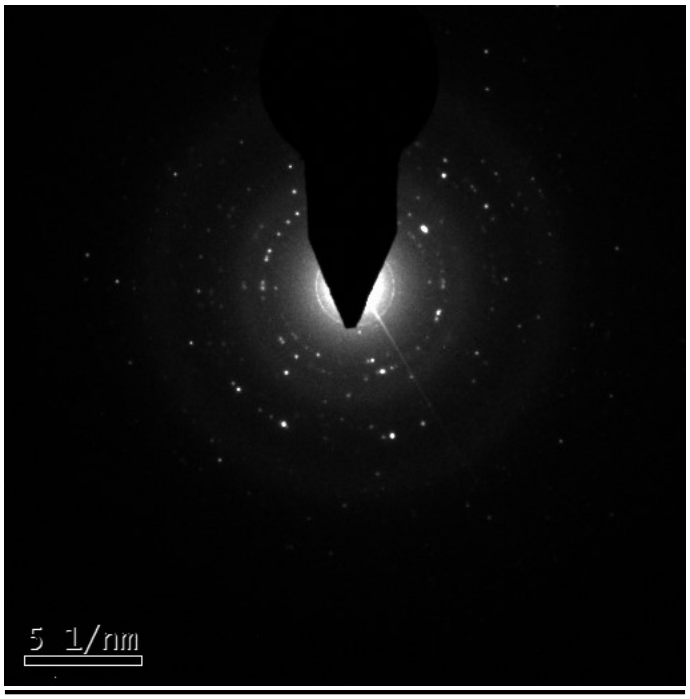

Fig. S1 SAED pattern of $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs.

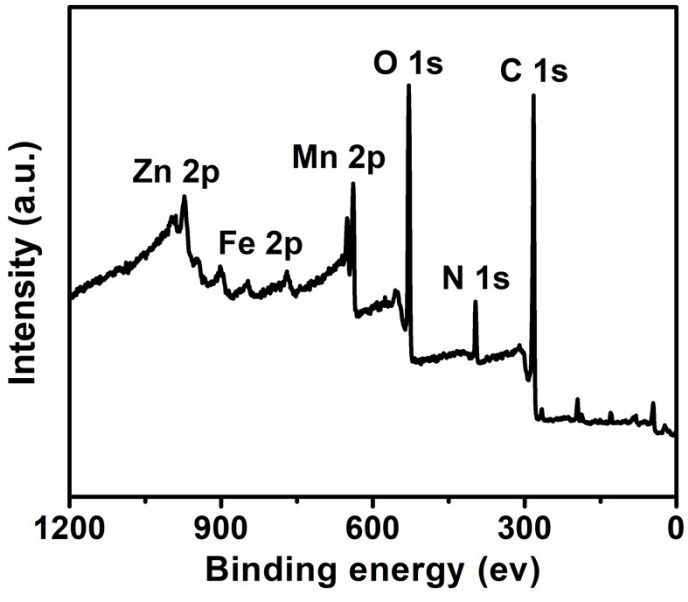

Fig. S2 XPS survey spectrum of $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs.

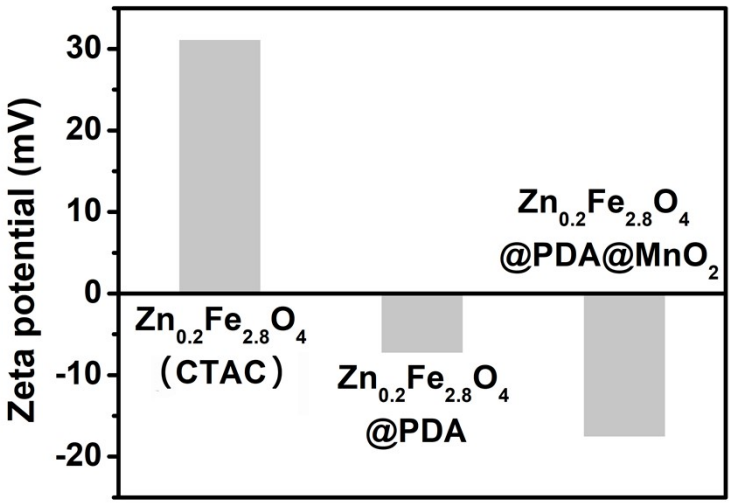

Fig. S3 Zeta potentials of CTAC modified $Zn_{0.2}Fe_{2.8}O_4$ NPs, $Zn_{0.2}Fe_{2.8}O_4$@PDA NPs, and $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs under aqueous condition. Data are presented as the mean ± SD (*n* = 3).

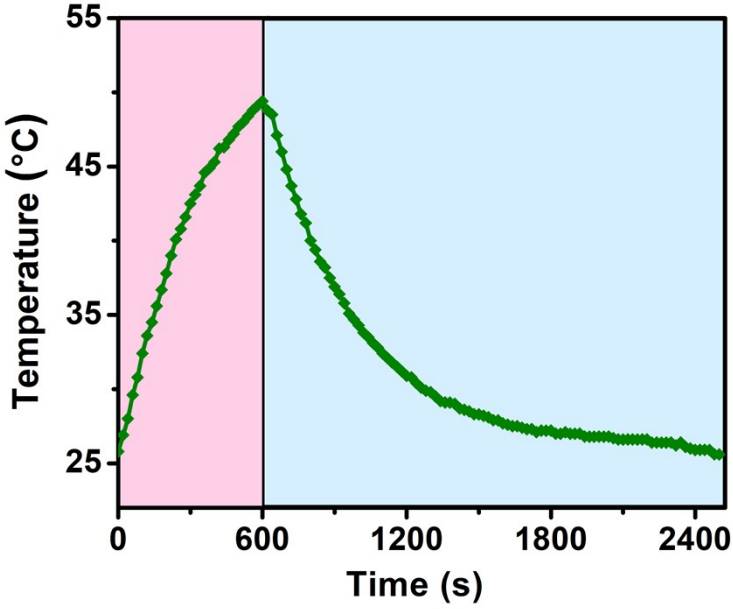

Fig. S4 Heating and cooling curve of $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs (150 μg mL^{-1}) irradiated by 808 nm laser irradiation (1.5 W cm^{-2}).

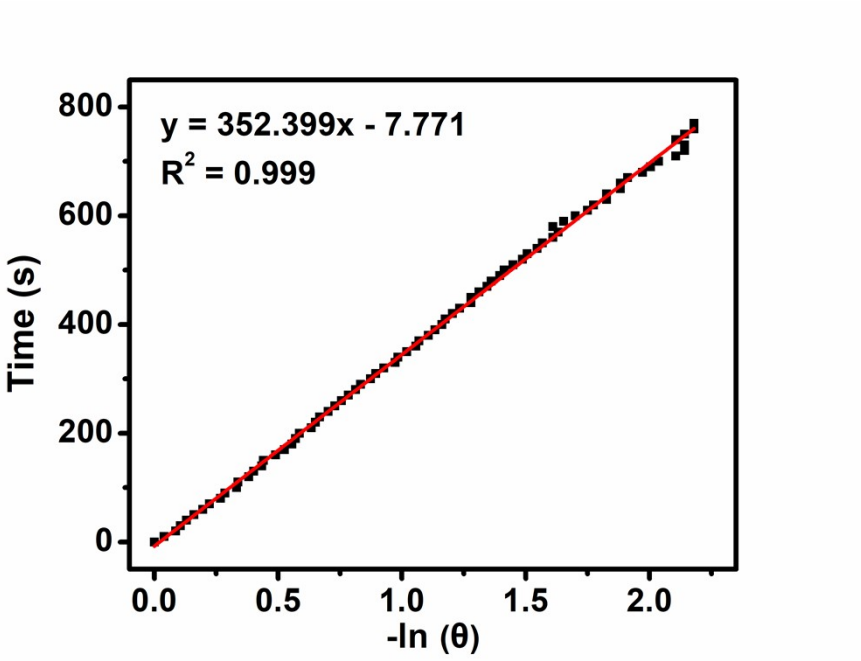

Fig. S5 Linear time data obtained from the nature cooling period.

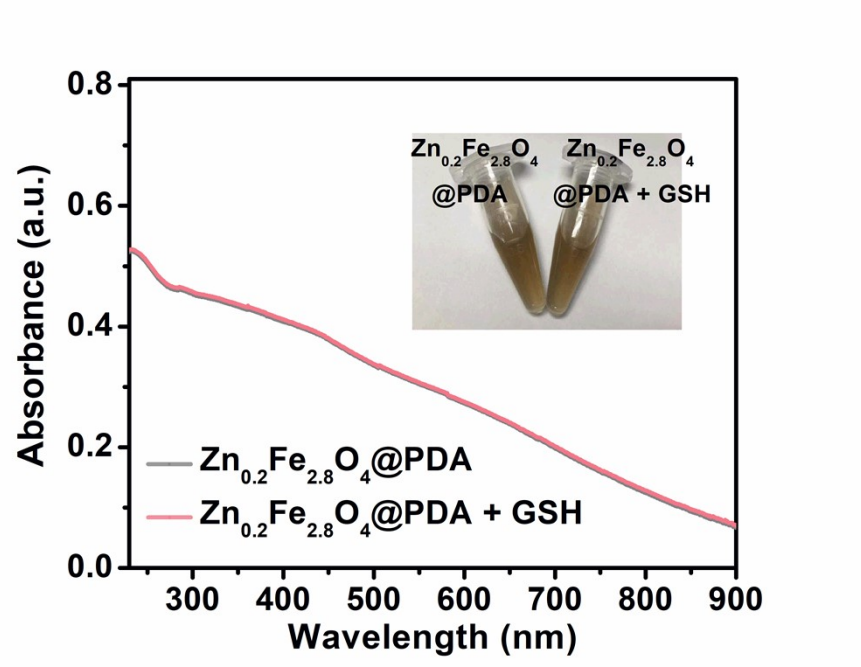

Fig. S6 UV-vis absorption spectra of $Zn_{0.2}Fe_{2.8}O_4$@PDA NPs with/without GSH (10 mM). Inset: Colour change of the $Zn_{0.2}Fe_{2.8}O_4$@PDA NPs dispersion after adding 10 mM GSH.

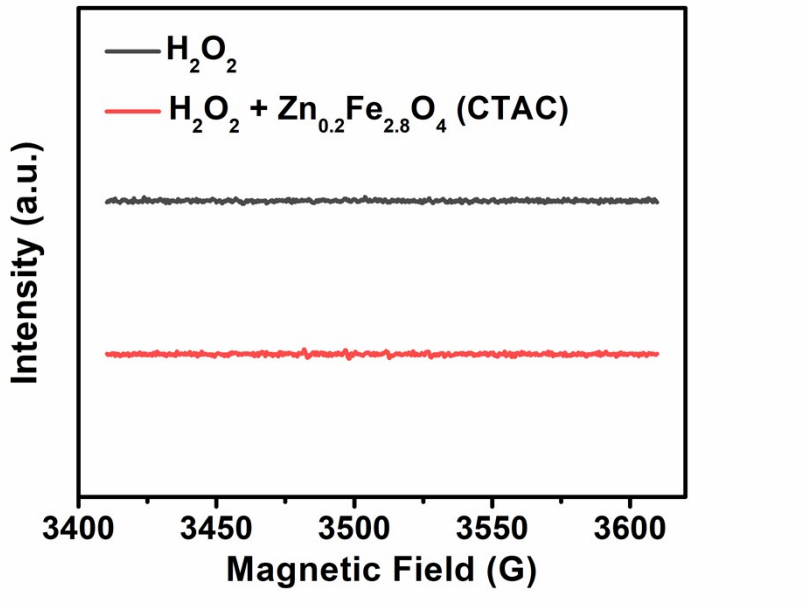

Fig. S7 •OH measurement via ESR spectra ($Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs: 150 μg mL^{-1}, H_2O_2: 1 mM).

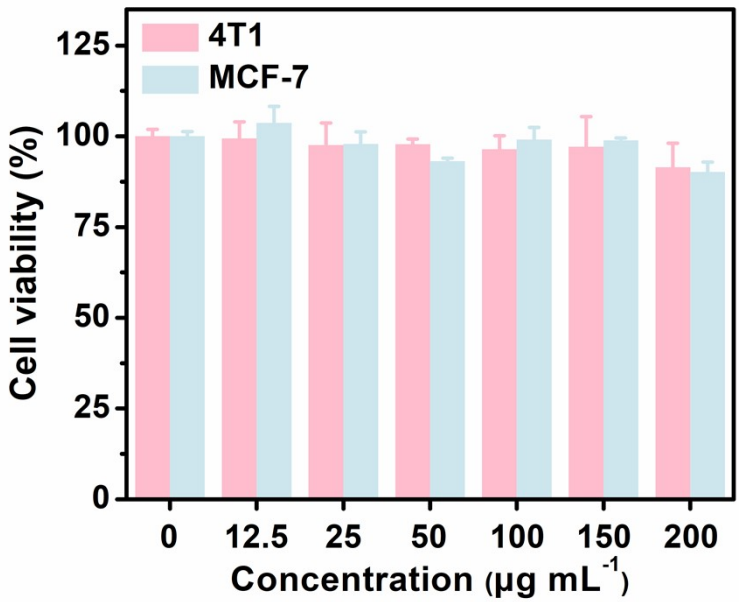

Fig. S8 Cell viability of 4T1/MCF-7 cells co-incubated with $Zn_{0.2}Fe_{2.8}O_4$@PDA NPs (0-200 μg mL^{-1}).

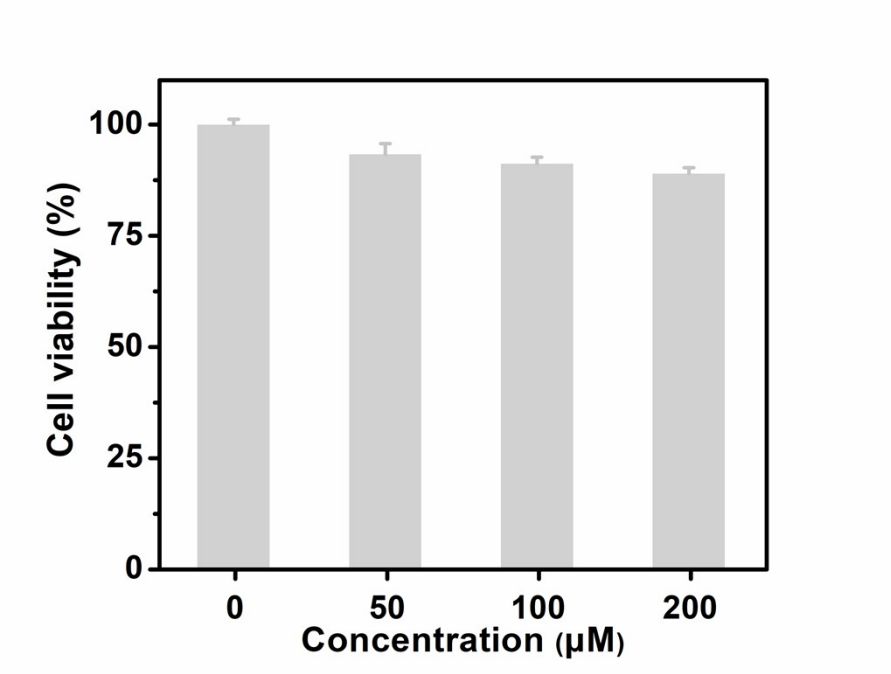

Fig. S9 Cell viability of 4T1 cells incubated with H_2O_2 (0-200 μM) and $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs (150 μg mL^{-1}).

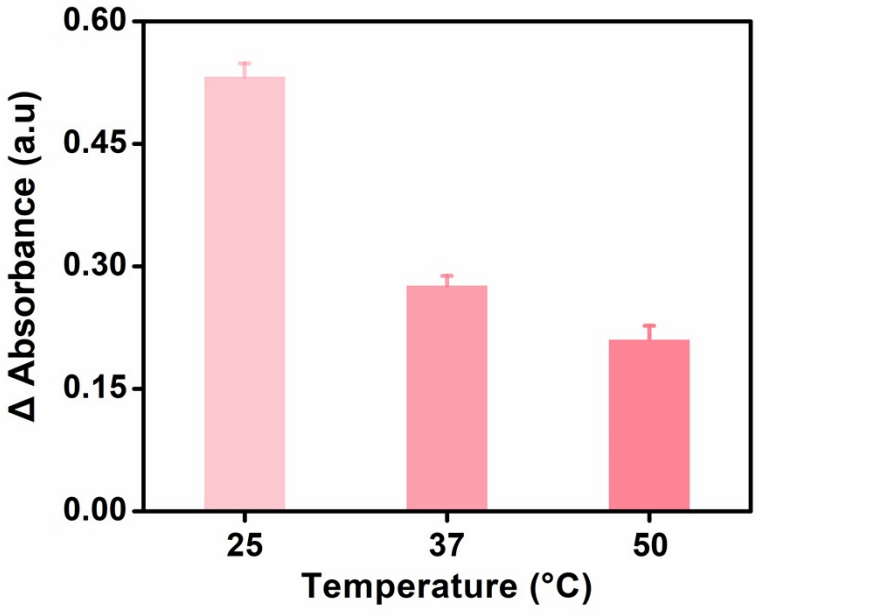

Fig. S10 Degradation of MB (10 μg mL^{-1}) after incubating with GSH-treated $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs (Mn: 500 μM, H_2O_2: 10 mM, 60 min) in the $NaHCO_3$/5% CO_2 buffer solution at various temperature.

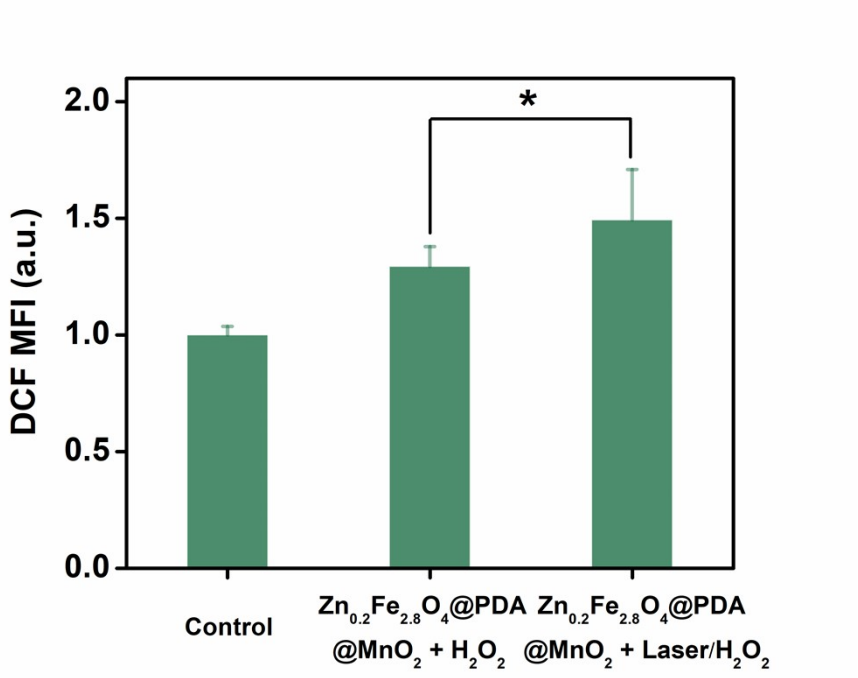

Fig. S11 Mean fluorescence intensity of DCF in 4T1 cells after different treatments ($Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs: 150 μg mL^{-1}; H_2O_2: 100 μM).

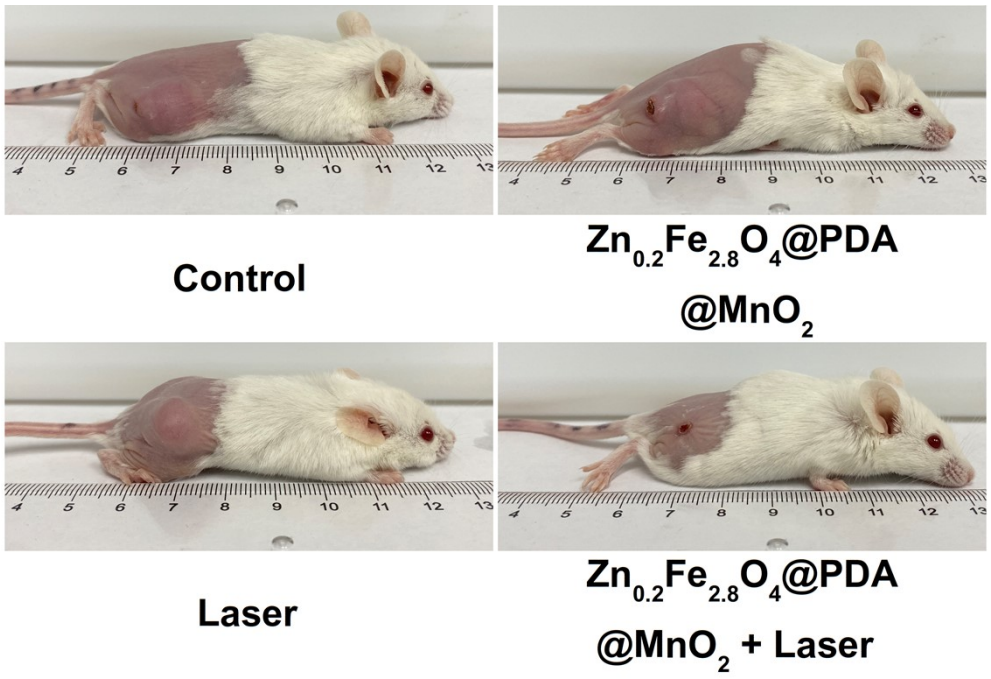

Fig. S12 Representative digital photographs of the mice under different treatments on day 12.

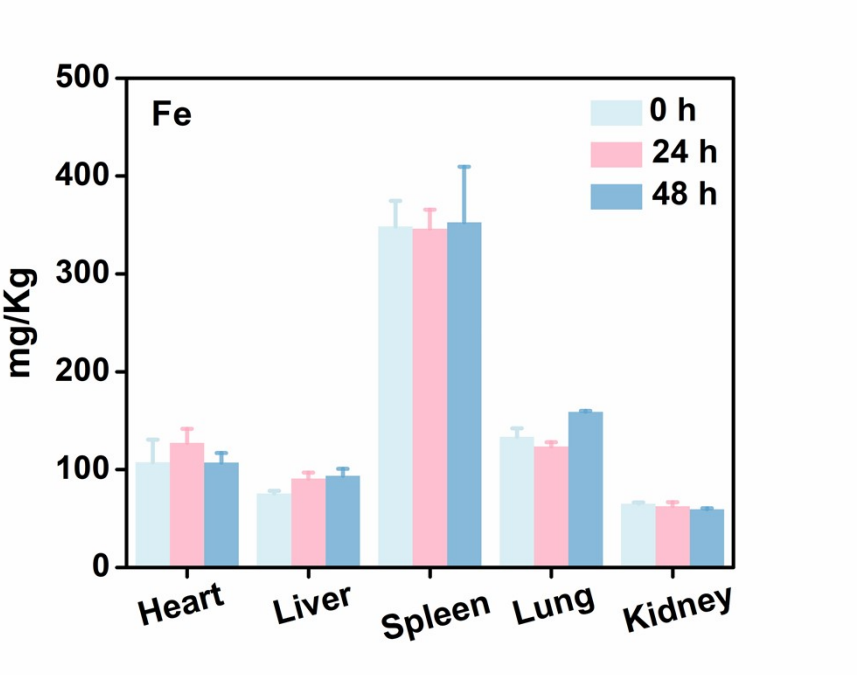

Fig. S13 Bio-distribution of the Fe element in major organs at 0, 24, and 48 h after intravenous injection of $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs (100 µL, 4 mg mL^{-1}).

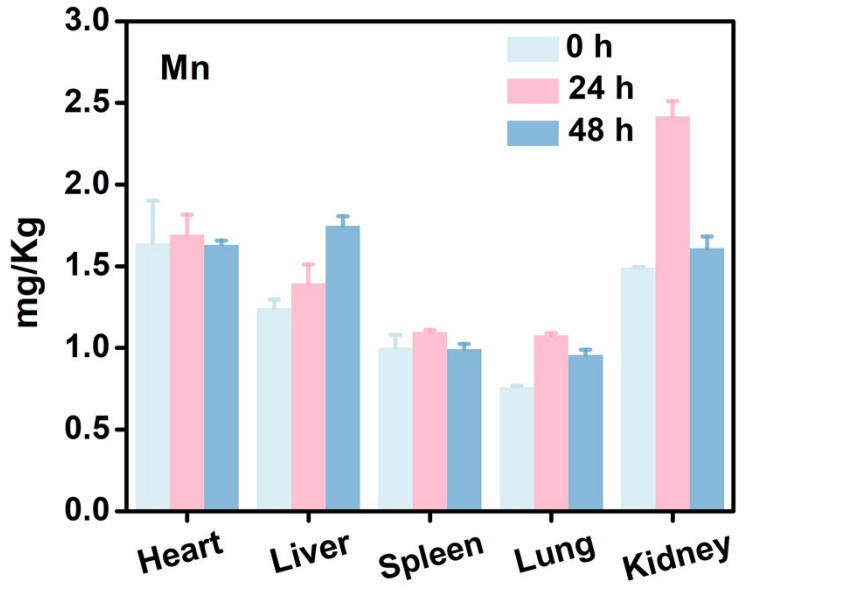

Fig. S14 Bio-distribution of the Mn element in major organs at 0, 24, and 48 h after intravenous injection of $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs (100 µL, 4 mg mL^{-1}).

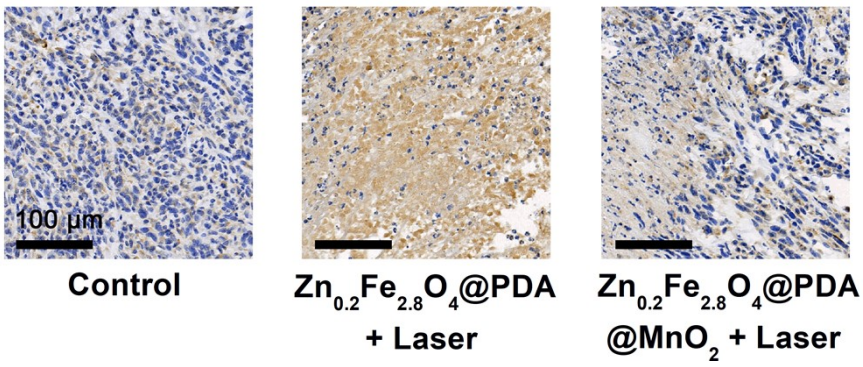

Fig. S15 Immunohistochemical analysis of the expression of HSP70 on the tumor tissues exposed to 808 nm laser irradiation (1.5 W cm^{-2}) after intratumoral injection of saline, $Zn_{0.2}Fe_{2.8}O_4$@PDA NPs or $Zn_{0.2}Fe_{2.8}O_4$@PDA@MnO_2 NPs (100 μL, 4 mg mL^{-1}).