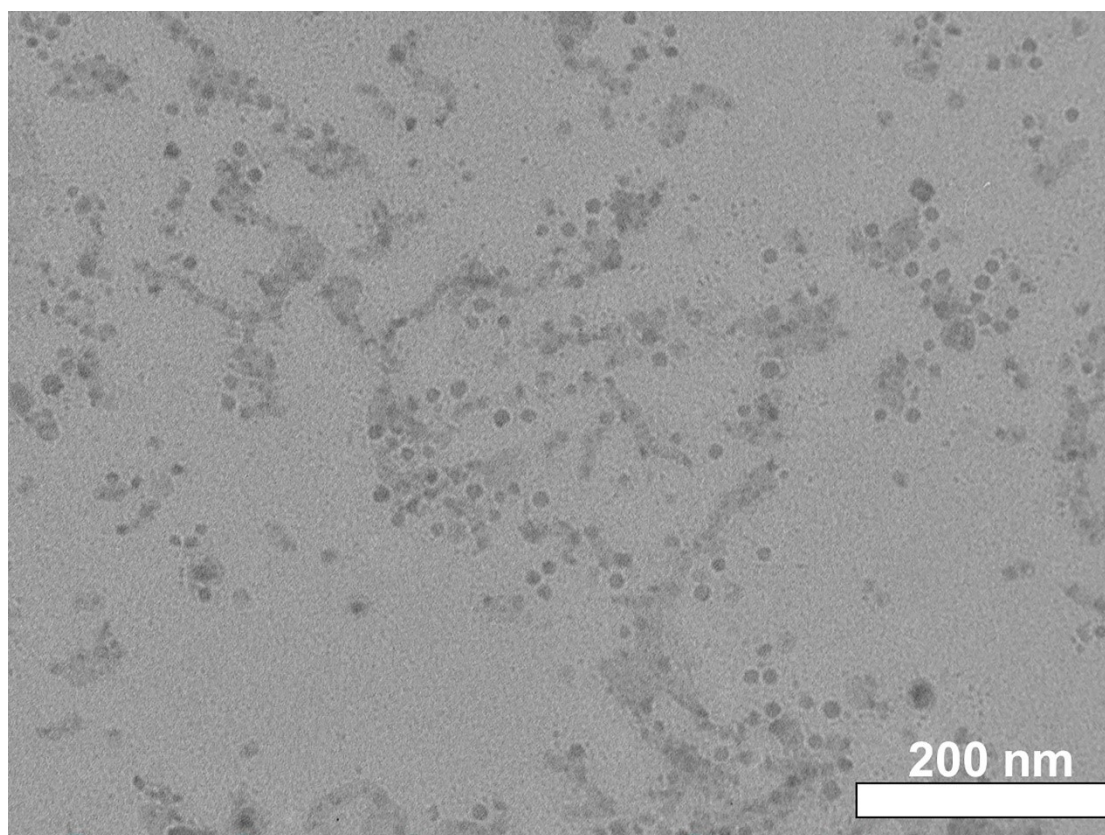


## Supporting Information



**Fig. S1** TEM image of MnSN. MnSN was transferred into aqueous media by DSPE-MPEG2000, scale bar is 200 nm.

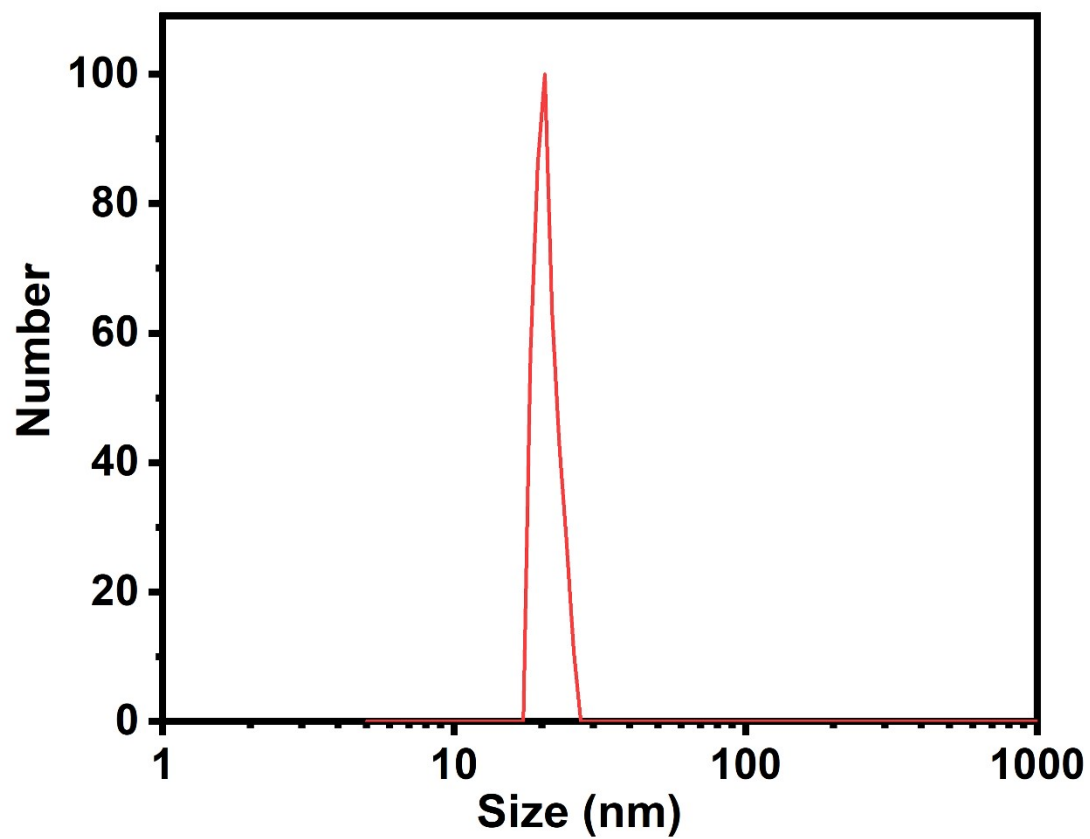


Fig. S2 DLS analyses of MnSN, indicating the well dispersion in aqueous media.

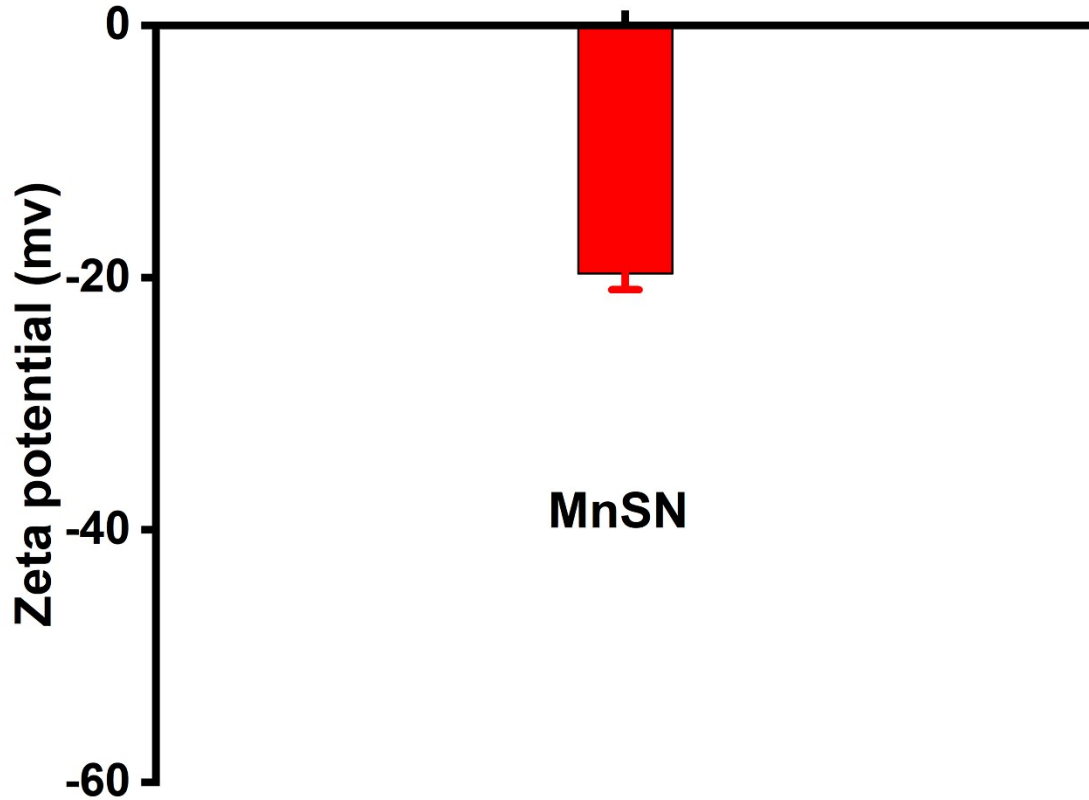


Fig. S3 Zeta potentials of MnSN, Data are presented as mean  $\pm$  SD (n = 3/group).

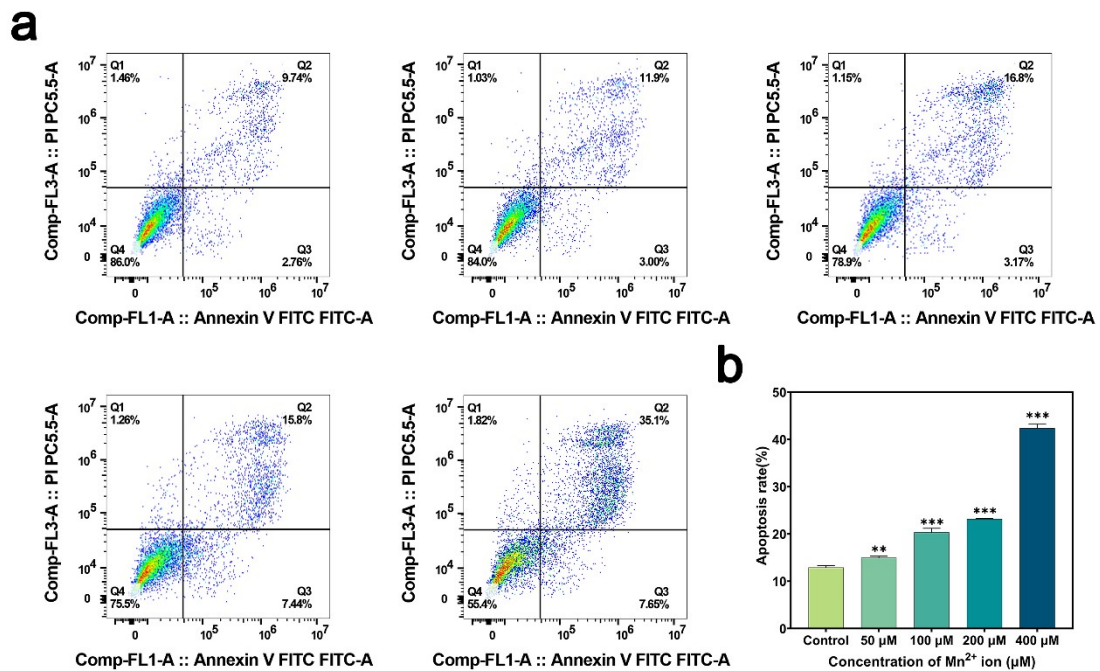
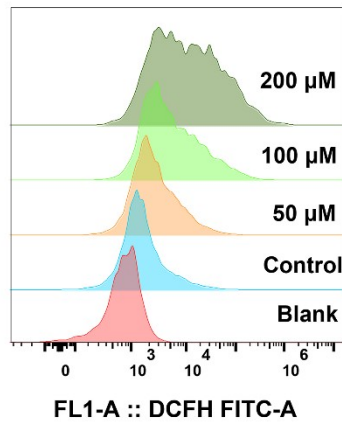
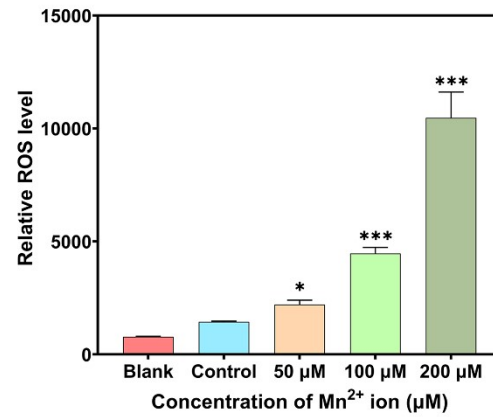
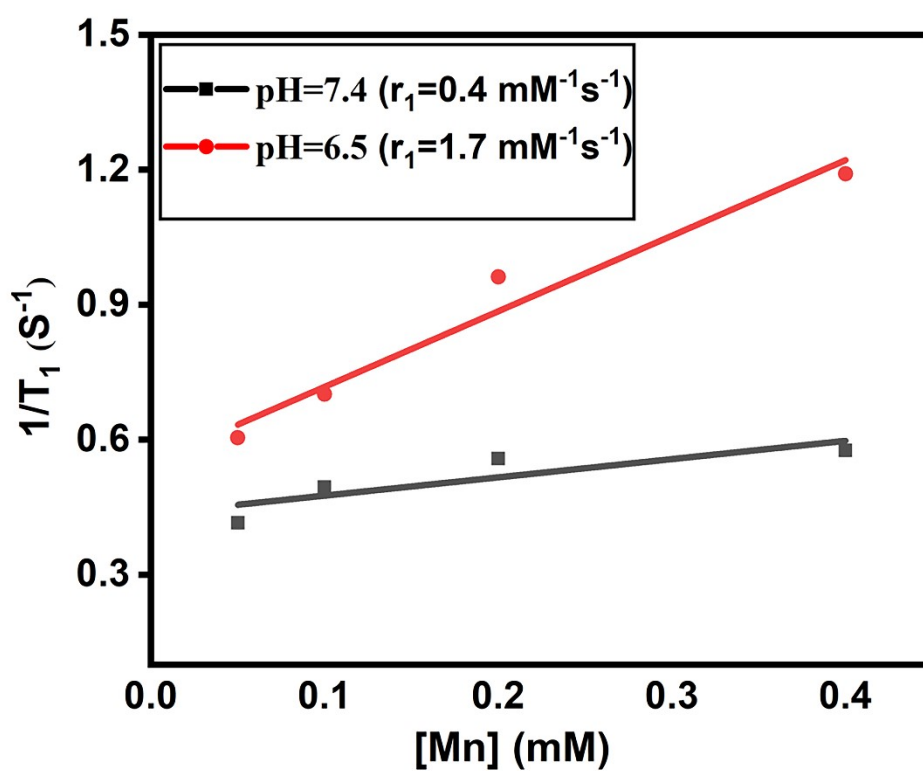
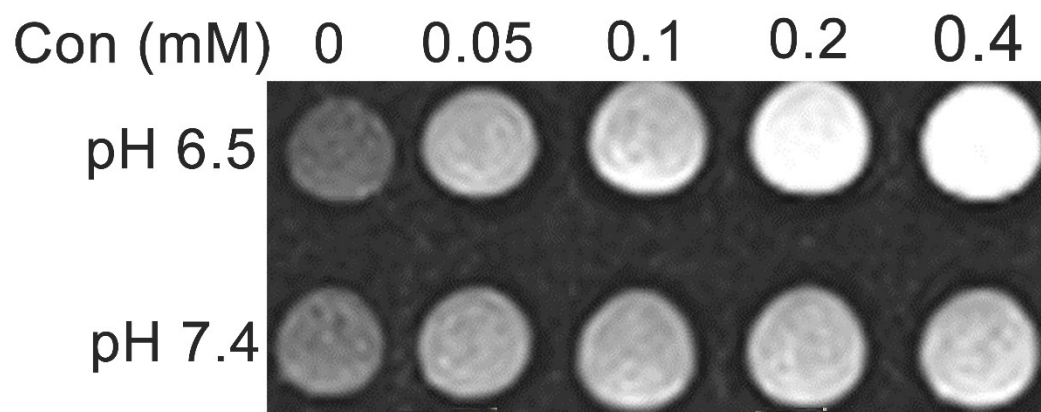


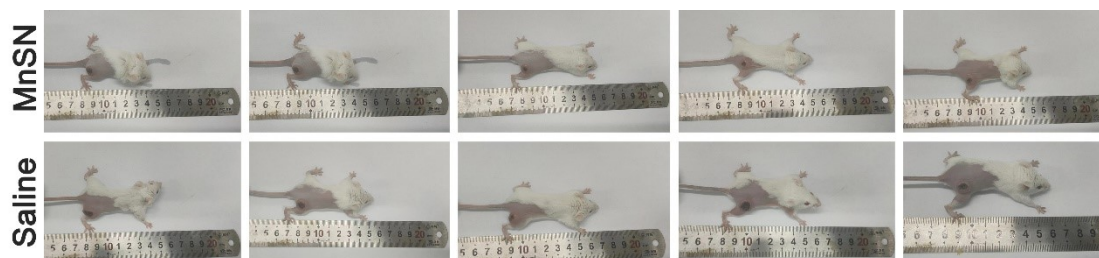
Fig. S4 (a, b) Apoptosis of 4T1 cells after different treatments measured by annexin V-FITC/PI double staining assay and flow cytometry. Data are presented as means  $\pm$  SD (n = 3). Statistical significance was analyzed by a one-way ANOVA. \*\*P < 0.01, \*\*\*P < 0.001.

**a****b**

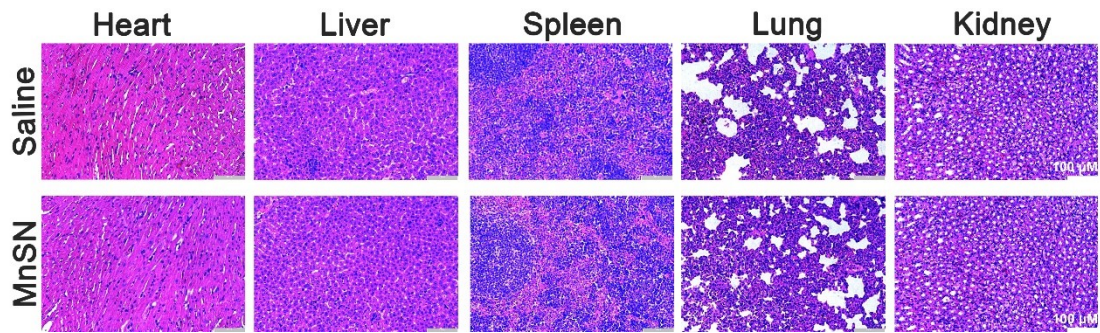
**Fig. S5** (a) Fluorescence distributions of DCF showing ROS levels in 4T1 cells treated with different concentrations of MnSN measured by flow cytometry. (b) Relative ROS level of 4T1 cells after different concentrations of MnSN for 24 h. Data are presented as means  $\pm$  SD ( $n = 3$ ). Statistical significance was analyzed by a one-way ANOVA. \* $P < 0.05$  and \*\*\* $P < 0.001$ .



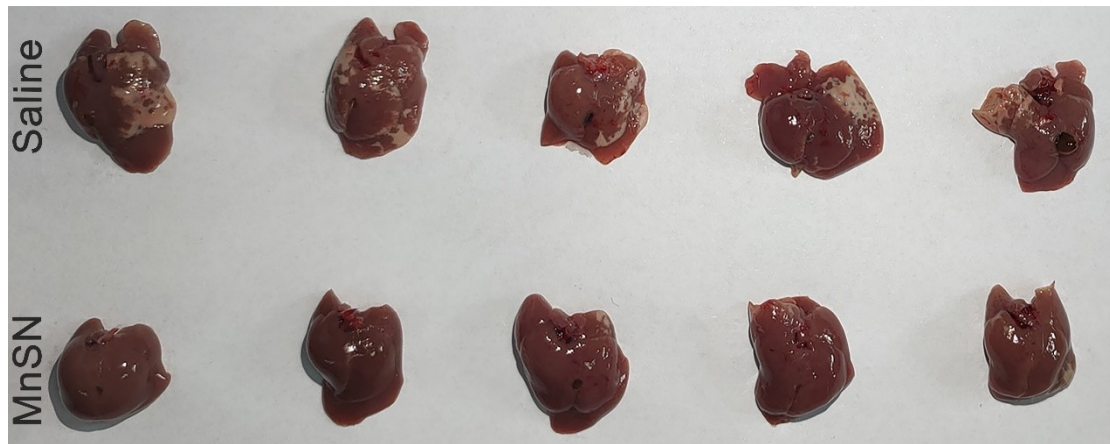
**Fig. S6** T1 relaxation of MnSN in PBS solutions at different pH values (pH=6.5 and pH=7.4).



**Fig. S7** Digital photographs of mice taken at 12 days after different treatments.



**Fig. S8** In vivo biosafety assessment of MnSN. H&E staining images of major organs of the mice with different treatments. Scale bar is 100  $\mu\text{m}$ .



**Fig. S9** In BALB/c mice, 4T1 cells of exponential growth stage were injected into the spleen as an artificial mimic of liver metastasis. All the groups received intravenously injected treatments every two days for a total of two times. The photographs of Liver metastasis in each group at the end of experiment.