**Additional file**

**Bactericidal effects and accelerated wound healing using Tb4O7 nanoparticles with intrinsic oxidase-like activity**

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**Other Experiments**

**Oxidase-like activities measurements**

Kinetic measurements were carried out in time course mode by monitoring the absorbance change at 652 nm according to a previous report.24 Experiments were carried out by using Tb4O7 NPs in a reaction volume of 1 mL buffer solution (25 mM Na2HPO4, pH 2.0-10.0). The Michaelis–Menten constant was calculated using the Lineweaver–Burk plot: 1/v = (*K*m/*V*max)/[S] + 1/*V*max, where *v* is the initial velocity, *V*max is the maximal reaction velocity, and [S] is the concentration of substrate.

**Antibacterial activity of Tb4O7 NPs**

*E. coli* and *S.aureus* were grown in Luria-Bertani and [Trypticase Soy Broth](https://www.atcc.org/~/media/F11236DC0E36489ABFA10BF4A411C525.ashx) to reach the mid-exponential growth phase at 37 °C, respectively. Bacterial suspensions were centrifuged (5000 rpm, 5 min) and washed with PBS buffer. The suspensions were diluted to obtain cell counts of 109 bacteria/mL, and the bacteria were incubated with different concentrations of Tb4O7 NPs (0-100 μg/mL) for 2 h. The survival rate of bacterial was determined by counting the number of colony forming units (CFUs). The antibacterial activity of Tb4O7 NPs was measured using a Live/Dead BacLight viability kit. After bacteria were treated with Tb4O7 NPs, the bacteria were stained with SYTO9 and propidium iodide (PI) for 30 min at dark. The bacteria cells were washed with PBS buffer, and samples were visualized using a confocal laser microscope (FV1200, Olympus, Japan).

**Cell morphology observation**

After antibacterial assessment, bacteria were harvested by centrifugation and fixed with 2.5% glutaraldehyde. The bacteria were gradually dehydrated in ethanol, and the dried bacteria were visualized using a scanning electron microscope (SEM, S-4700, Hitachi, Japan).

**In vivo toxicity study**

A total dose of 20 gTb4O7 NPs (100 μg/mL in PBS buffer) were subcutaneously injected into BALB/c mice (n = 5). After the 7th day of treatment, the major organs were collected under sterile conditions from mice for pathological examination.

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**Fig. S1** Characterization of Tb4O7 NPs. (**a,b**) TEM images of Tb4O7 NPs. (c) DLS data of Tb4O7 NPs. (**d**) UV-vis spectrum of Tb4O7 NPs.

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**Fig. S2** The oxidase-like catalytic activity of the Tb4O7 NPs against temperature (**a**) and pH (**b**). Error bars indicate the standard deviations of three independent measurements.

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**Fig. S3** The concentration of H2O2 generated in the catalytic system: AA alone (control) and AA with the different concentrations of Tb4O7 NPs. Error bars indicate the standard deviations of three independent measurements. \**p* < 0.05 and \*\**p* < 0.01, indicting significantly the statistical difference compared with control.

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**Fig. S4** SEM-EDS elemental images of *S. aureus* (**a**) and *E. coli* (**b**) cells exposed to Tb4O7 NPs.

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**Fig. S5** Analysis of the ROS levels of *S. aureus* after treatment by different concentrations of Tb4O7 NPs. \*\**p* < 0.05 and \*\*\**p* < 0.001 vs control.