

Supplementary Data for

Biomimetic Macrophage–Fe₃O₄@PLGA Particle-Triggered Intelligent Catalysis for Killing Multidrug-Resistant *Escherichia coli*

Jieni Fu ^{a,b}, Xiangmei Liu ^c, Zhaoyang Li ^a, Yufeng Zheng ^b, Yu Zhang ^d, Hui Jiang ^a, Yanqin Liang ^a, Shengli Zhu ^a, Zhenduo Cui ^a, Shuilin Wu ^{a,b,*}

^a Key Laboratory of Advanced Ceramics and Machining Technology of the Ministry of Education, School of Materials Science and Engineering, Tianjin University, Tianjin 300401, China

^b School of Materials Science and Engineering, Peking University, Beijing 100871, China

^c School of Health Sciences and Biomedical Engineering, Hebei University of Technology, Tianjin 300401, China

^d Department of Orthopedics, Guangdong Provincial People's Hospital, Guangdong Academy of Medical Sciences, Guangzhou 510080, China

* Corresponding author.

E-mail address: slwu@pku.edu.cn (S. Wu)

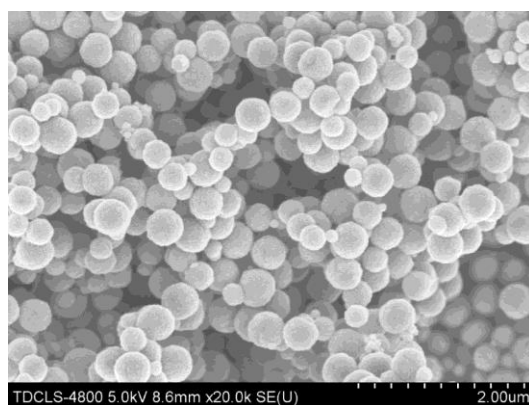


Fig. S1. The scanning electron microscope (SEM) image of Fe₃O₄ nanoparticles (NPs).

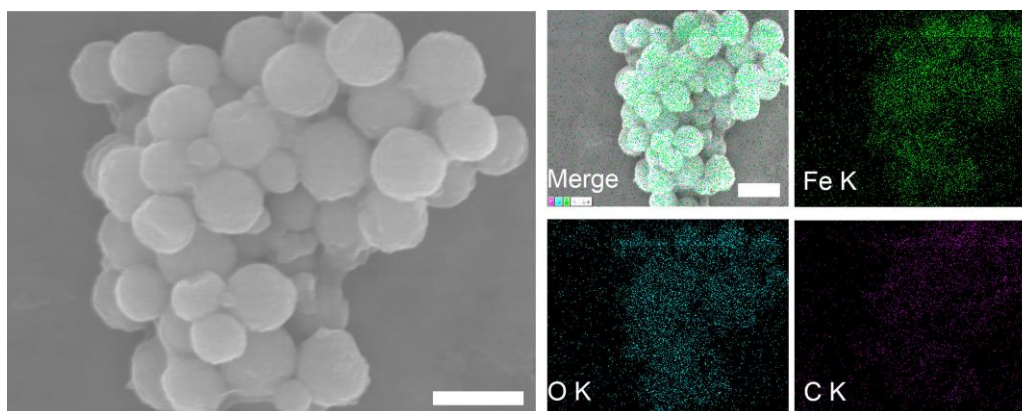


Fig. S2. The SEM and electronic differential system (EDS) image of Fe₃O₄@PLGA NPs. Left: SEM image of Fe₃O₄@PLGA NPs. Scale bar: 500 nm. Right: EDS element mapping images of Fe₃O₄@PLGA NPs. Scale bar: 500 nm.

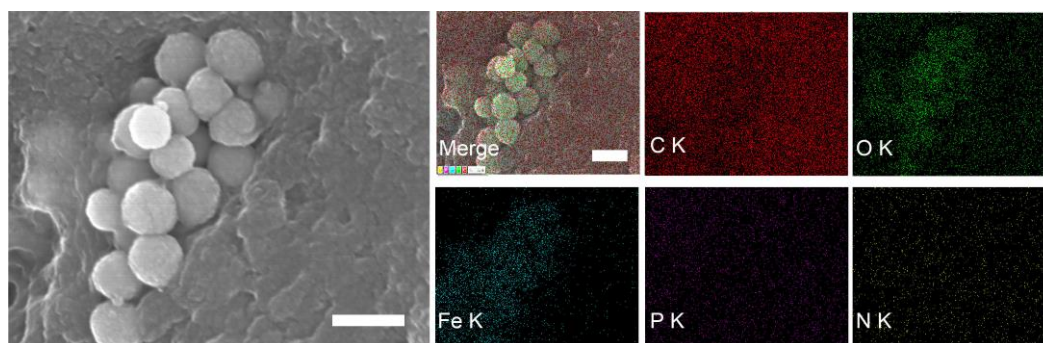


Fig. S3. The SEM and EDS image of MΦ–Fe₃O₄@PLGA particles. Left: SEM image of Fe₃O₄@PLGA NPs. Scale bar: 500 nm. Right: EDS element mapping images of Fe₃O₄@PLGA NPs. Scale bar: 500 nm.

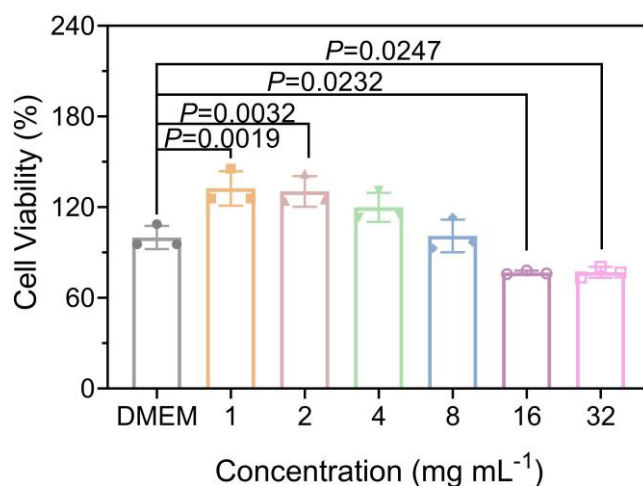


Fig. S4. Cell viability of MΦ after treating with different concentrations of Fe₃O₄@PLGA NPs (1, 2, 4, 8, 16, and 32 mg·mL⁻¹) (*n* = 3 independent samples). Data are expressed as mean ± standard deviation.

As shown in Fig. S4, when the concentration of Fe₃O₄@PLGA NPs was up to 16 mg·mL⁻¹, it presented toxicity to cell viability.

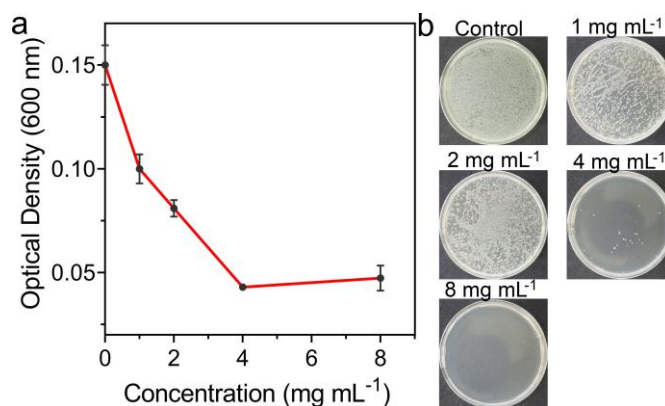


Fig. S5. (a) The optical density (OD) plot of *Staphylococcus aureus* (*S. aureus*) after treating with different concentrations of Fe₃O₄@PLGA NPs (1, 2, 4, and 8 mg·mL⁻¹). (b) The corresponding pictures of spread plate after different concentrations of Fe₃O₄@PLGA NPs (1, 2, 4, and 8 mg·mL⁻¹).

As shown in Fig. S5, the concentration of Fe₃O₄@PLGA NPs was up to 4 mg·mL⁻¹, the Fe₃O₄@PLGA NPs were fatal to bacteria.

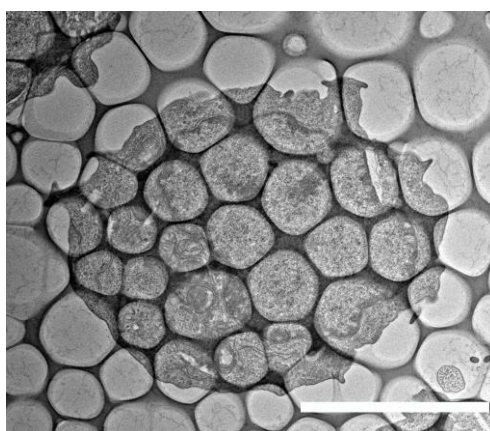


Fig. S6. TEM images of MΦ, scare bar: 5 μm.

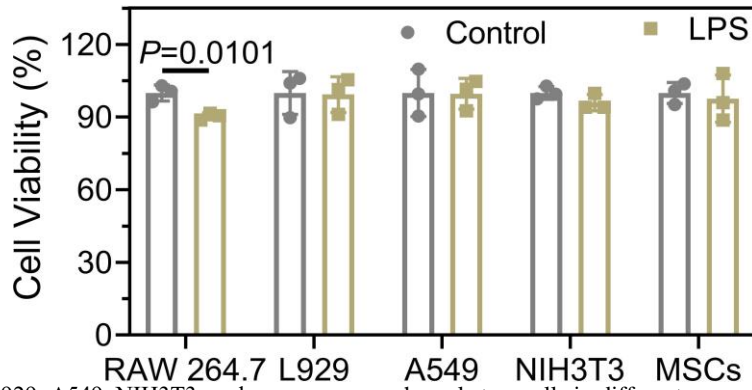


Fig. S7. Cell viability of MΦ, L929, A549, NIH3T3, and marrow mesenchymal stem cells in different groups (control and LPS (500 ng·mL⁻¹)) for 16 h (*n* = 3 independent samples). Data are expressed as mean ± standard deviation.

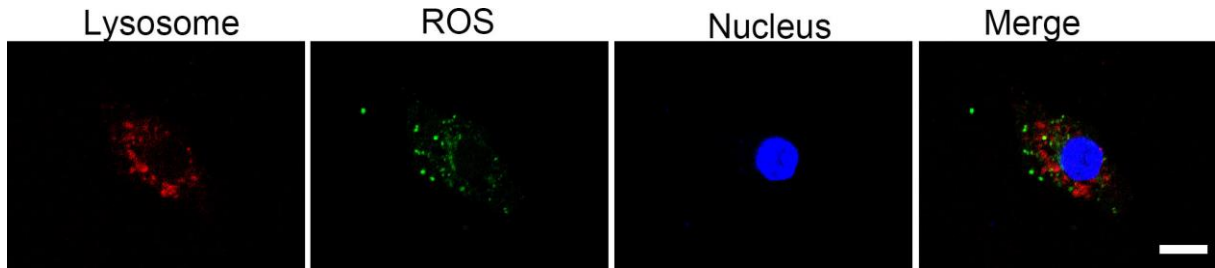


Fig. S8. The fluorescence images of MΦ-Fe₃O₄@PLGA with *Escherichia coli* (*E. coli*). The lysosome, intracellular reactive oxygen species (ROS), and nucleus were stained by LysoTracker Red (red color), 2',7'-dichlorofluorescein diacetate (DCFH-DA) probe, and Hoechst 33342, respectively. Scale bar: 10 μm.

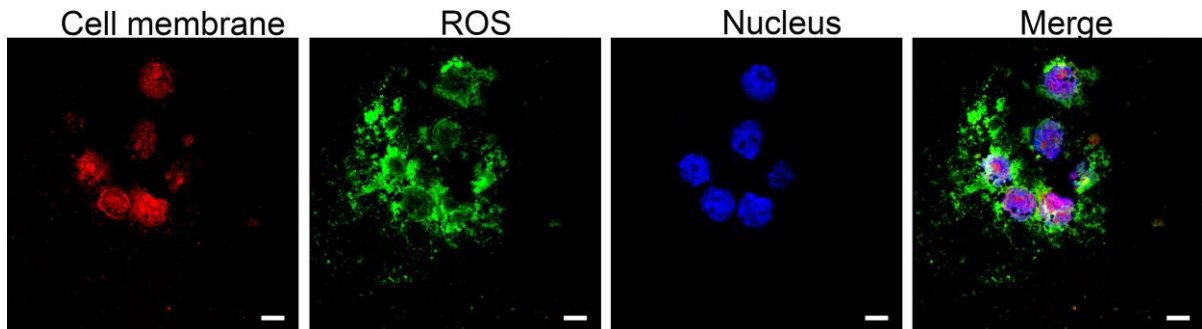


Fig. S9. The fluorescence images of MΦ-Fe₃O₄@PLGA with *E. coli*. The cell membrane, intracellular ROS, and nucleus were stained by DiC18(7) (DiR) dye (red color), DCFH-DA probe, and Hoechst 33342, respectively. Scale bar: 10 μm.

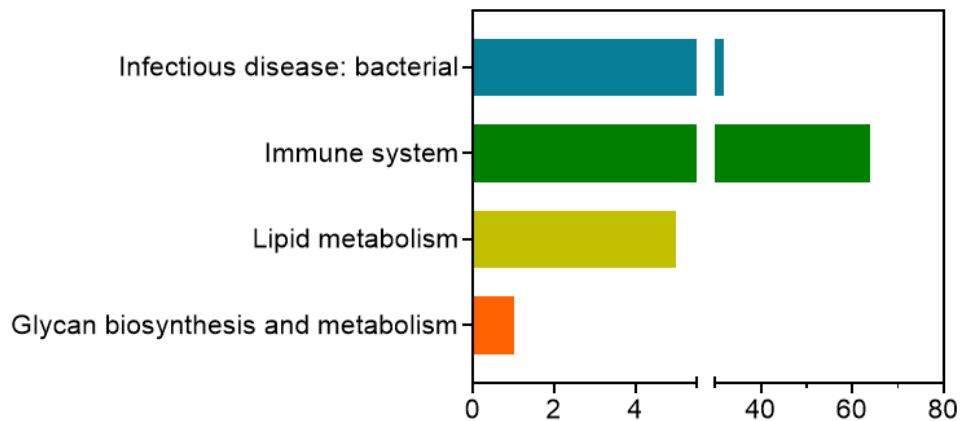


Fig. S10. Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analysis of the identified different gene expressions between MΦ with *E. coli* and MΦ.

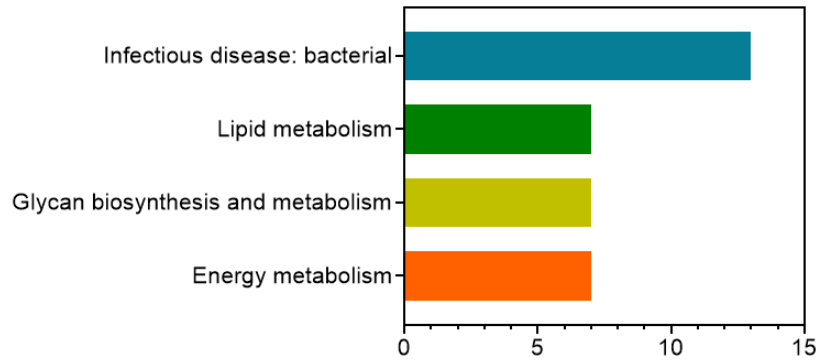


Fig. S11. KEGG pathway analysis of the identified different gene expressions between MΦ-Fe₃O₄@PLGA with *E. coli* and MΦ with *E. coli*.

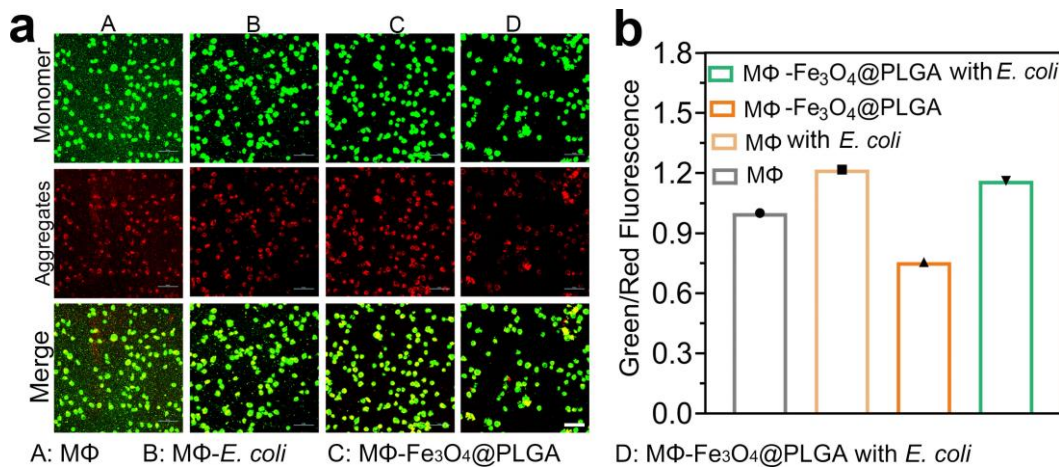


Fig. S12. (a) Fluorescence micrographs of MΦ, MΦ with *E. coli*, MΦ-Fe₃O₄@PLGA, and MΦ-Fe₃O₄@PLGA with *E. coli*. Mitochondria potential was stained with JC-1. Scale bar: 10 μm. (b) The quantitative analysis of the mean optical density of green/red fluorescence.

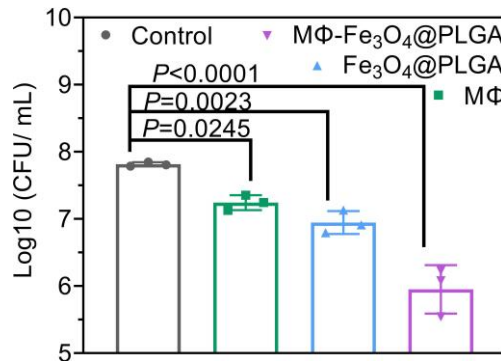


Fig. S13. The change of colony forming units (CFU) for different groups (control, MΦ, Fe₃O₄@PLGA, and MΦ-Fe₃O₄@PLGA groups) of blood after culturing for 1 h. The experiment was carried out by *n* = 3 independent samples.

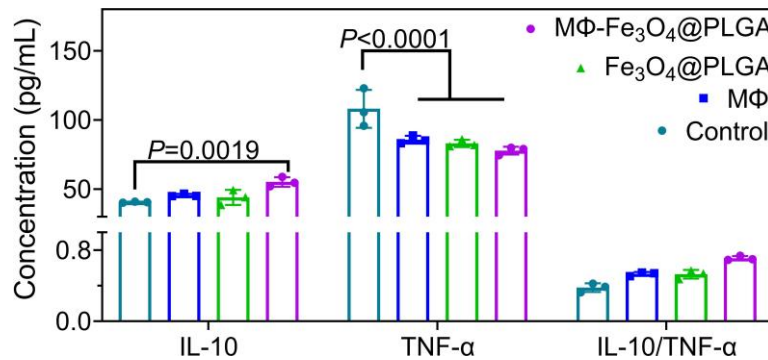


Fig. S14. The concentrate of IL-10 and TNF-α in blood after treating with control group and MΦ-Fe₃O₄@PLGA group for 24 h. The experiment was carried out by *n* = 3 independent samples. Data are expressed as mean ± SD. The data was analyzed by two-way ANOVA.

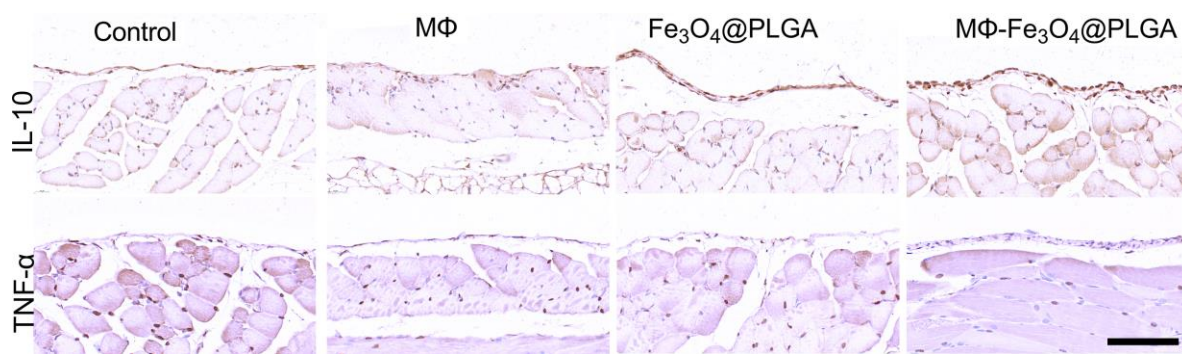


Fig. S15. Representative immunohistochemistry staining images for IL-10 and TNF- α of the peritoneum from control and M Φ -Fe₃O₄@PLGA groups were obtained at 1h. Scale bar: 100 μ m.