

1 **Single-cell nanocapsules of gut microbiota facilitate fecal microbiota**
2 **transplantation**

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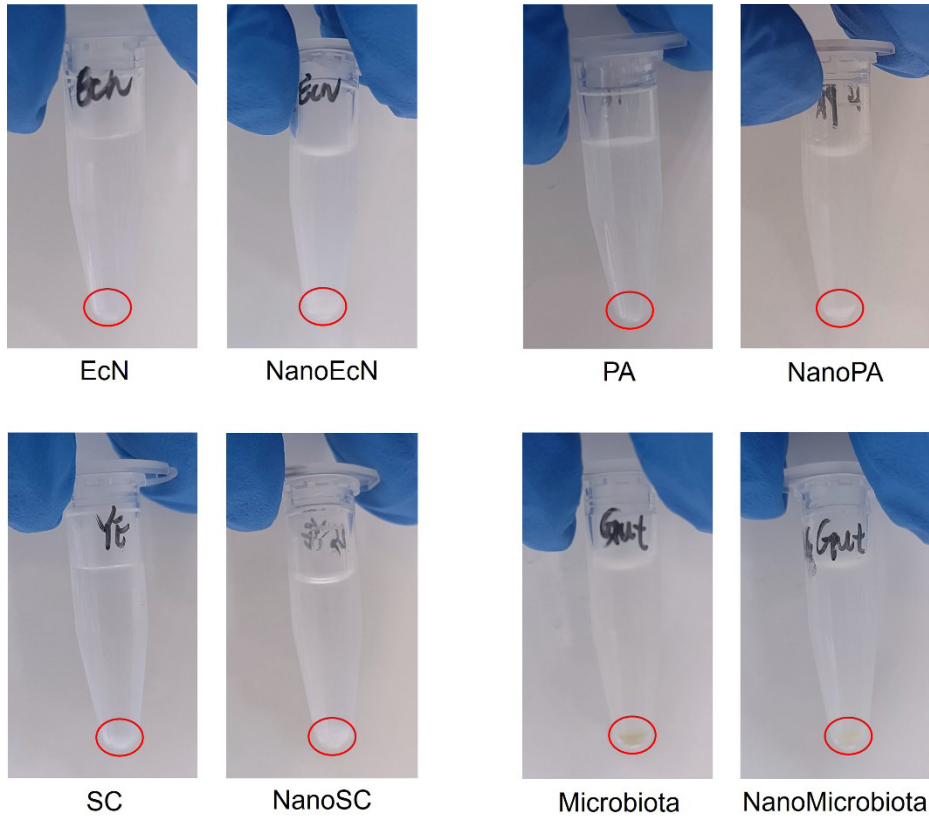
27 First Authors: Weiliang Hou, Yuan Cao, Jifeng Wang and Fang Yin contributed equally

1 to this work.

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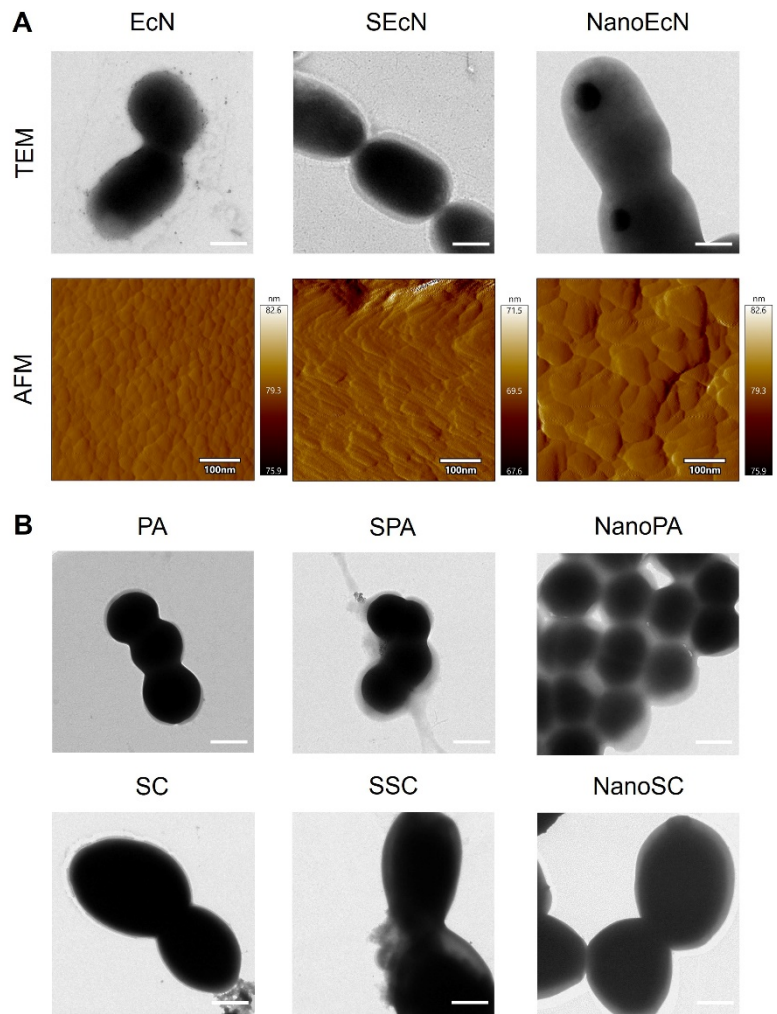
3 Li (lijuanjuan@hainanu.edu.cn) or Ruibing Wang (rwang@um.edu.mo), or Huanlong

4 Qin (huanlong_qin@live.cn).



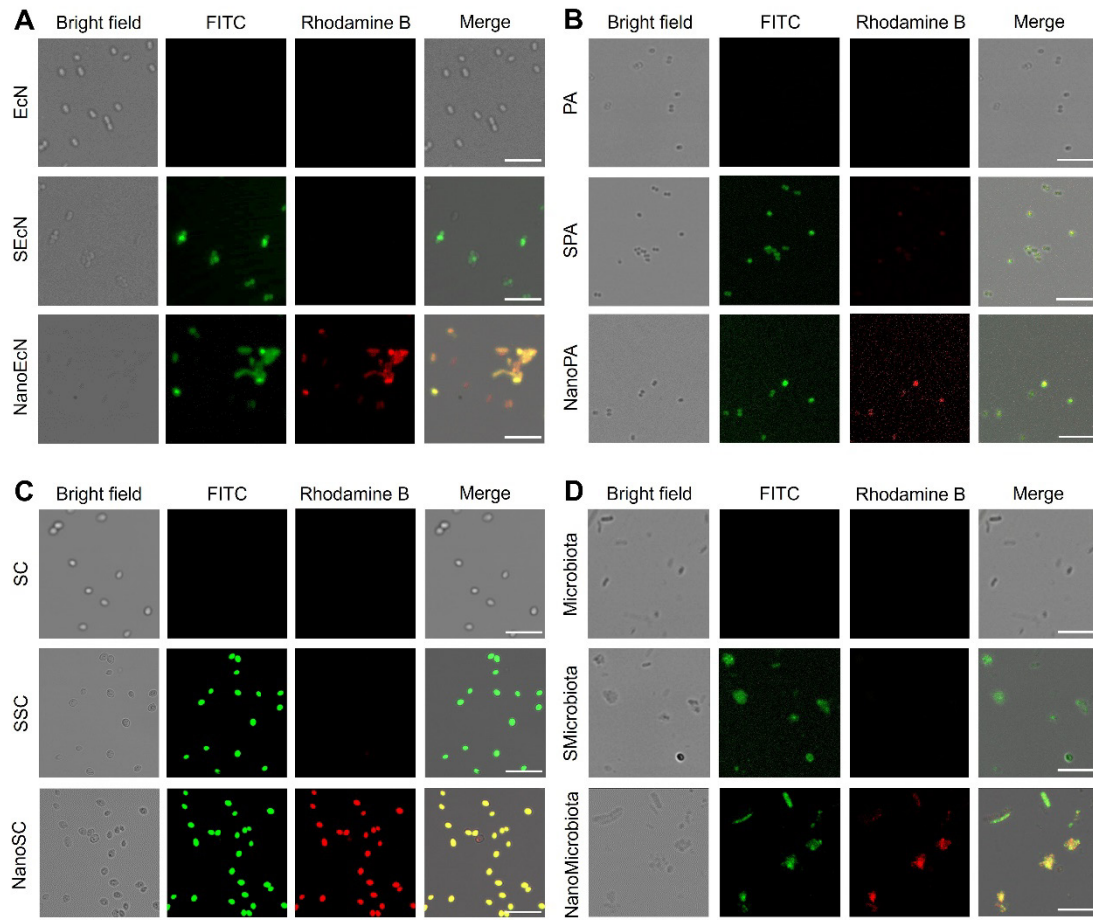
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Figure S1 Morphologic change of microbes after nanocapsule-coating.



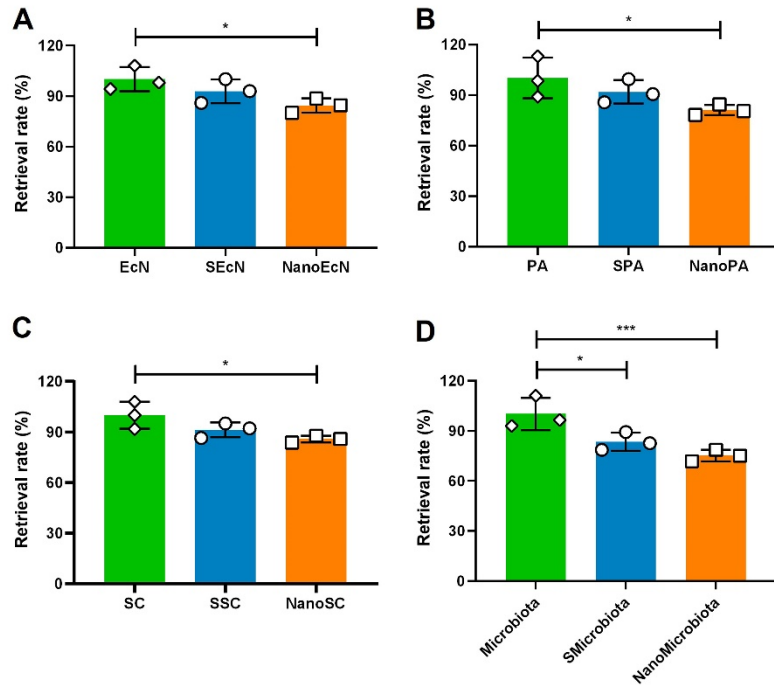
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Figure S2 Microscopic images of microbes and their nanoerivatives. (A) TEM and AFM images of EcN and its nanoerivatives. (B) TEM images of PA, SC and nanoerivatives. Scale bar: 500 nm (EcN and PA) or 2 μ m (SC).



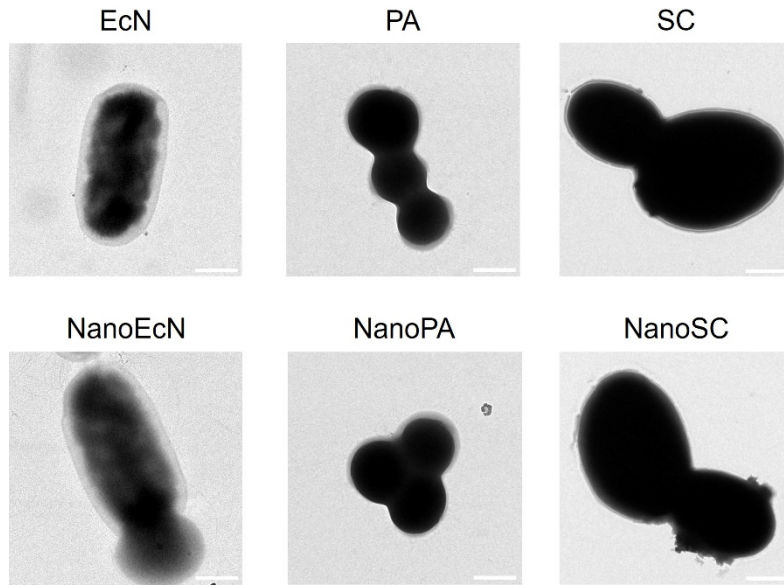
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Figure S3 Typical confocal images of microbes and their nanoerivatives. (A) Confocal images of EcN and its nanoerivatives. (B) Confocal images of PA and its nanoerivatives. (C) Confocal images of SC and its nanoerivatives. (D) Confocal images of microbiota and its nanoerivatives. Scale bar: 10 μm or 25 μm (SC).



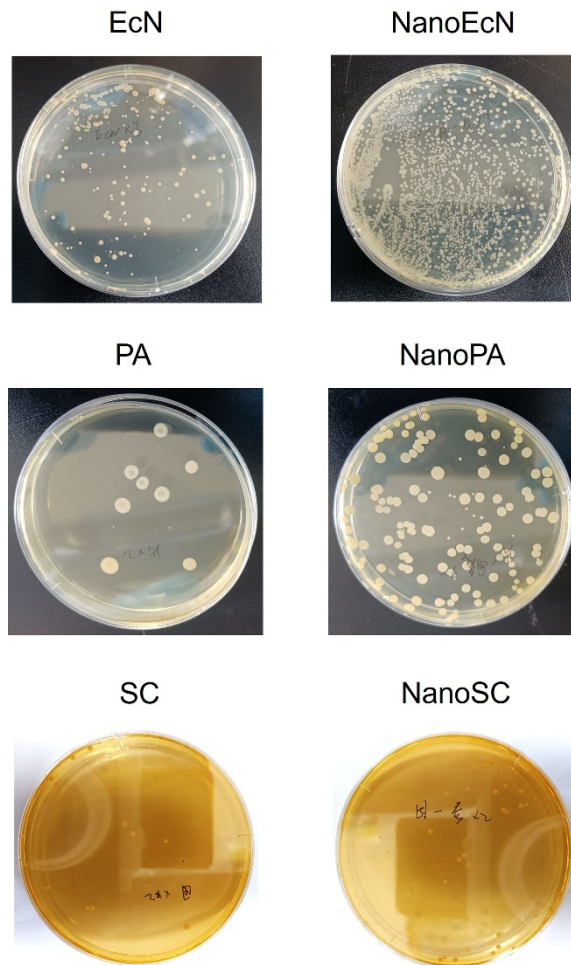
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Figure S4 Retrieval rates of microbes during the decorating with silk fibroin and phosphatidylcholine.



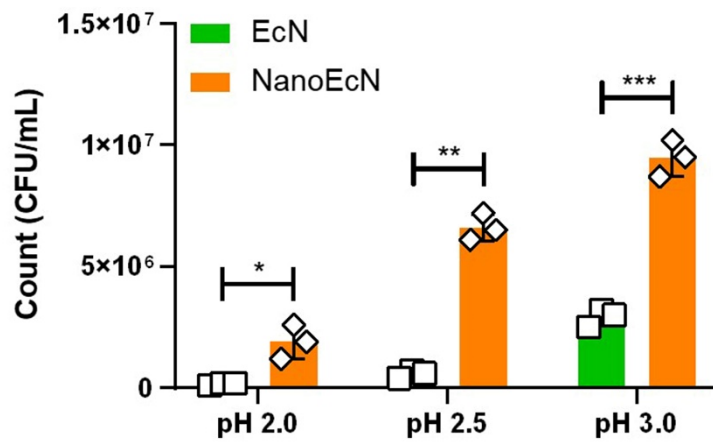
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Figure S5 Micromorphological comparison of microbes with their nanoderivatives after 4 h culture at 37 °C and 200 rpm. Scale bar: 500 nm (EcN, NanoEcN, PA and NanoPA) or 2 μ m (SC and NanoSC).



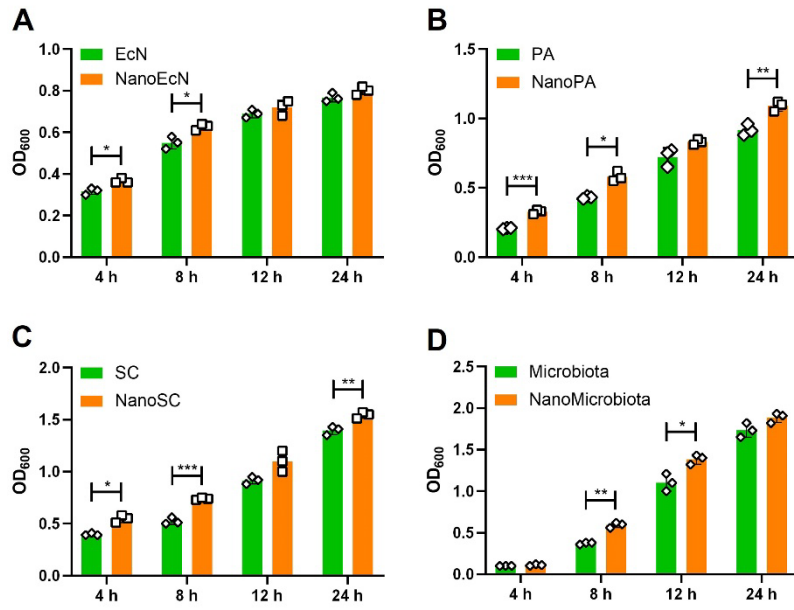
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Figure S6 Digital images of colony forming units. EcN, PA, SC, microbiota and their nanoerivatives were exposed to SGF (pH 2.5) supplemented with pepsin for 2 h at 37 °C and 200 rpm.



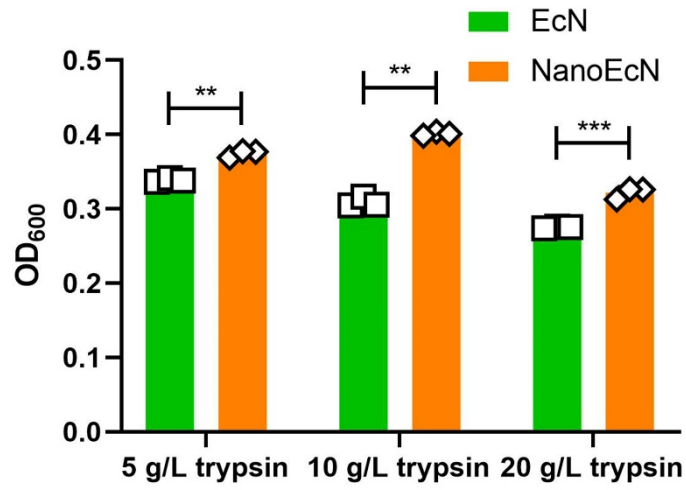
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Figure S7 Survival number of nanocapsule-coated EcN after exposure to SGF with different pHs for two hours at 37 °C and 200 rpm.



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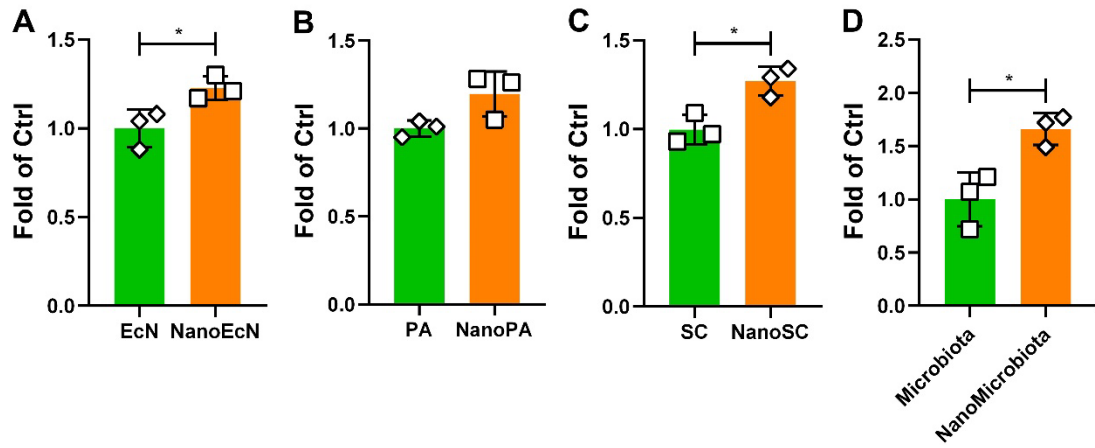
Figure S8 Growth curves of microbes incubated in SIF at 37 °C for 24 h.



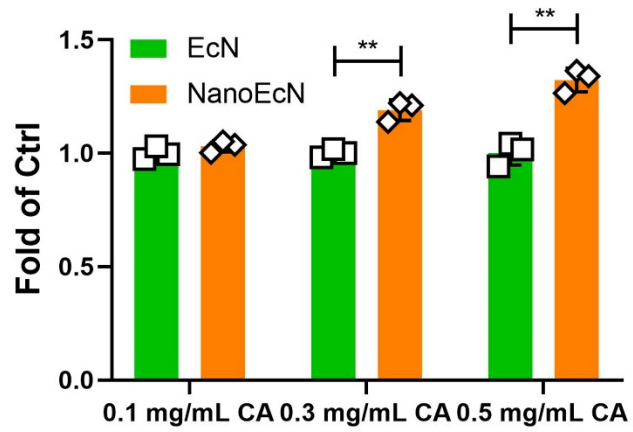
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2 **Figure S9** Growth curves of nanocapsule-coated EcN in SIF with different trypsin
3 concentrations for 4 h at 37 °C.

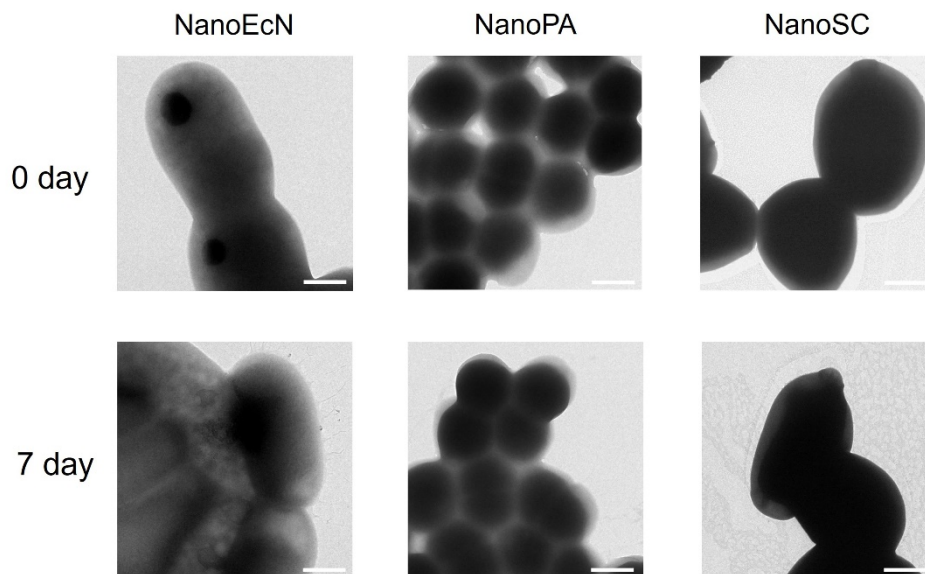
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 2 **Figure S10** Resistance of microbes after exposure to 0.3 mg/mL CA solution for 4 h
 3 at 37 °C and 200 rpm.
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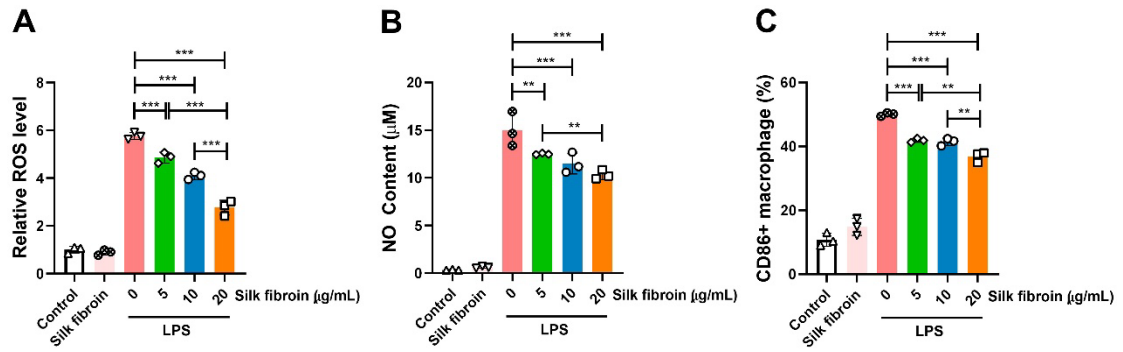


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 2 **Figure S11** Resistance of nanocapsule-coated EcN after exposure to CA solution for 4
 3 h at 37 °C and 200 rpm.
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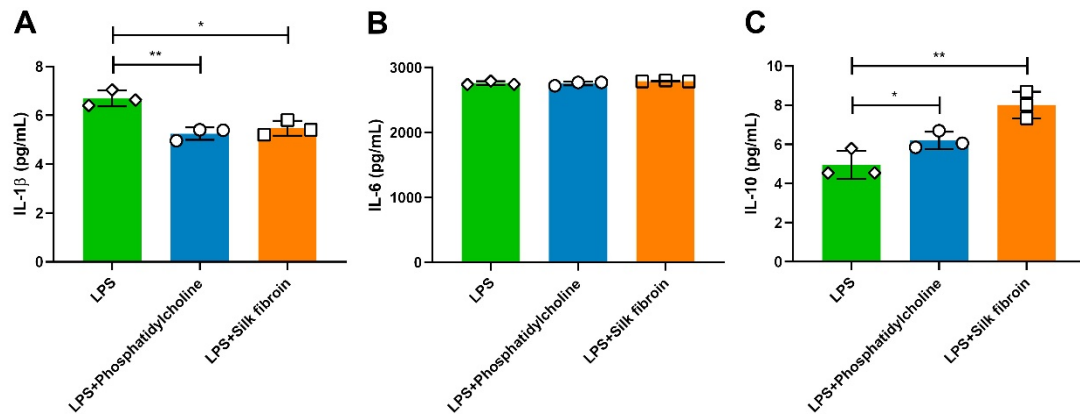
Figure S12 Stability of nanocapsules shown with TEM images after 7 day storage in 4 °C. Scale bar: 500 nm (EcN, NanoEcN, PA and NanoPA) or 2 μm (SC and NanoSC).



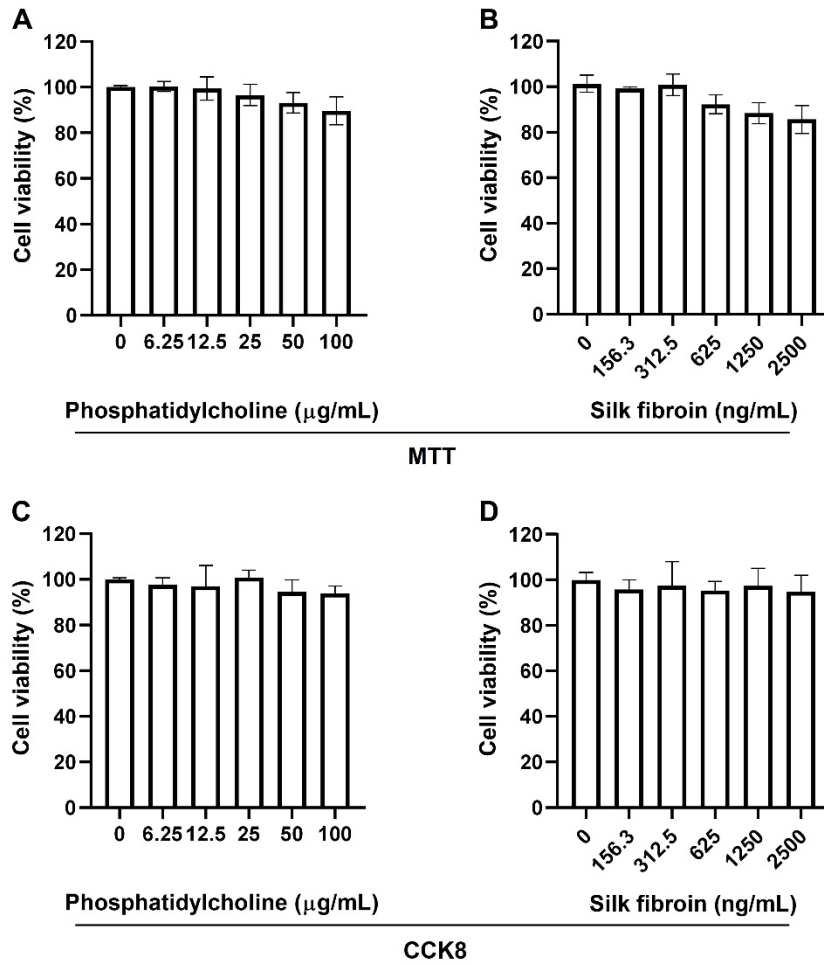
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2 **Figure S13** Impact of silk fibroin on ROS level, NO content and percentages of

3 CD86+ macrophages in RAW 264.7 cells.

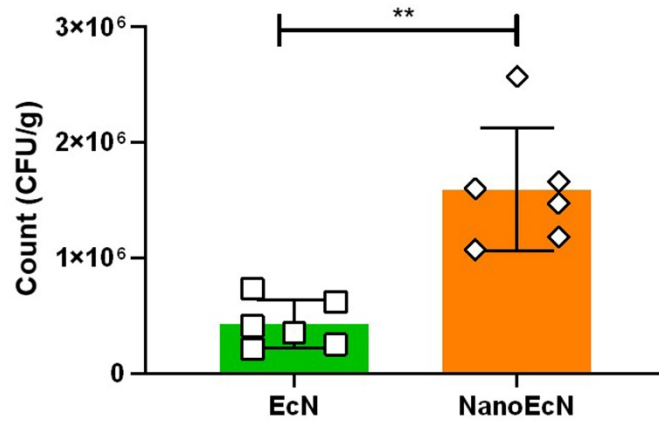


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 2 **Figure S14** Impact of silk fibroin and phosphatidylcholine on cytokine levels of RAW
 3 264.7 cells after LPS stimulation.

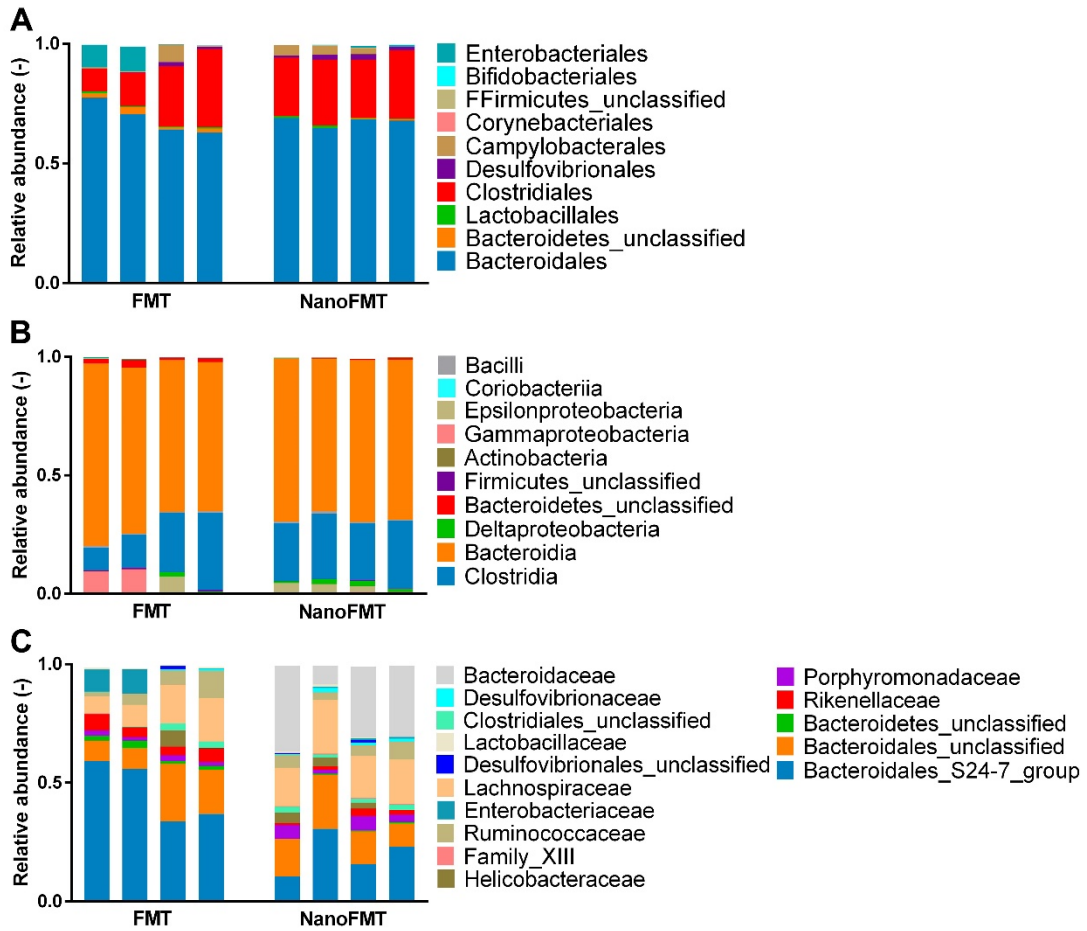


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Figure S15 Cell viability of Caco-2 measured with MTT and CCK8 after culture with phosphatidylcholine and silk fibroin for 24 h.

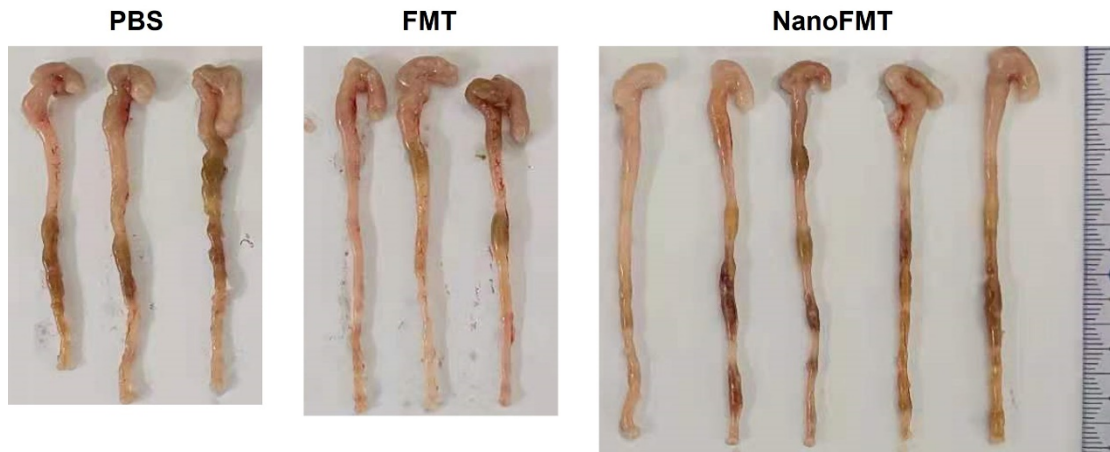


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2 **Figure S16** Colonization of EcN in mouse cecum after oral administration using
3 bacterial count of 2×10^7 CFU/mouse on 5 day.



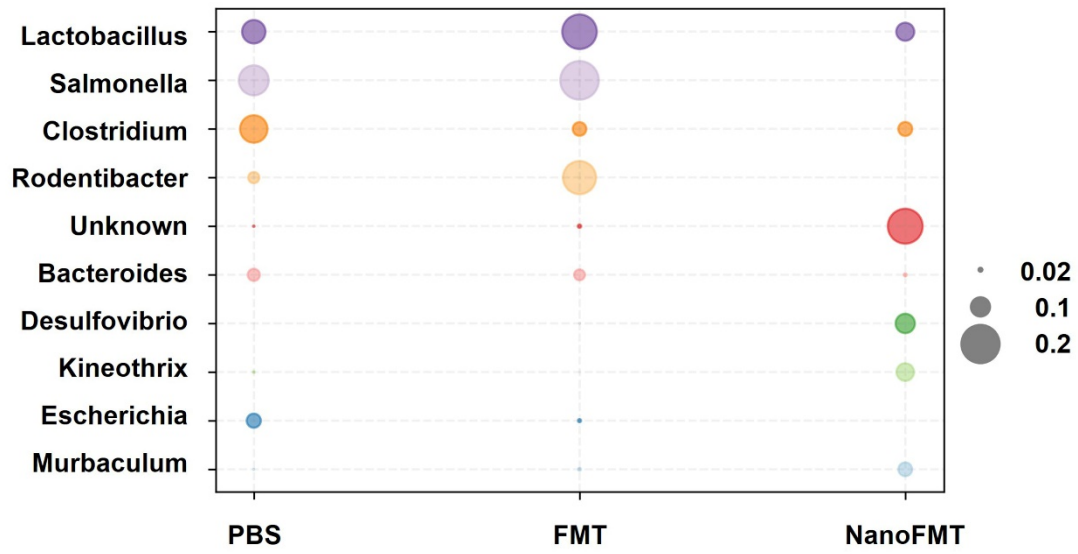
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Figure S17 Microbiota abundances of GF mice at order (A), class (B), and family level (C) after NanoFMT.



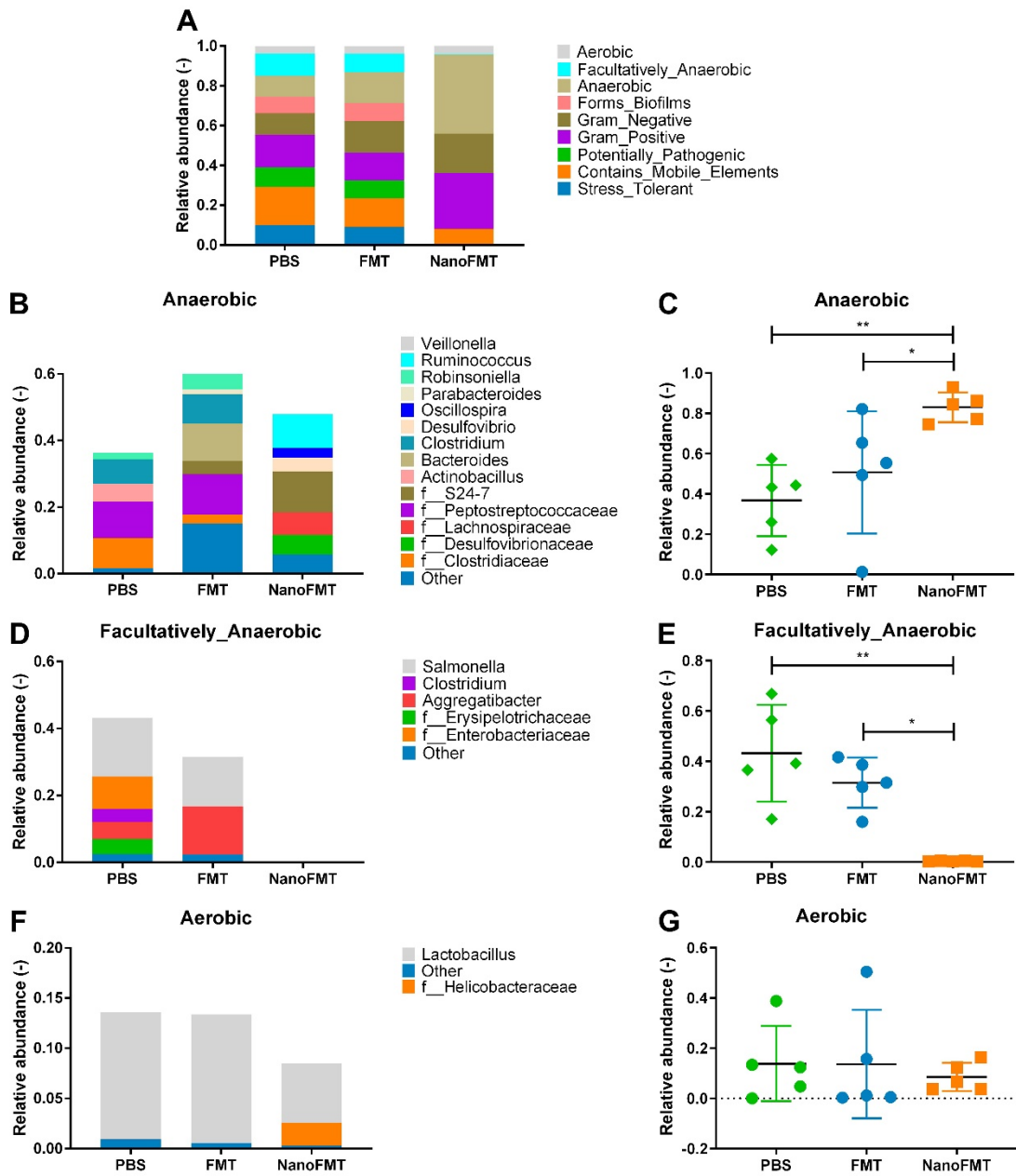
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2 **Figure S18** Digital images of colon length in the STm-induced colitis mouse model
3 after treatment.



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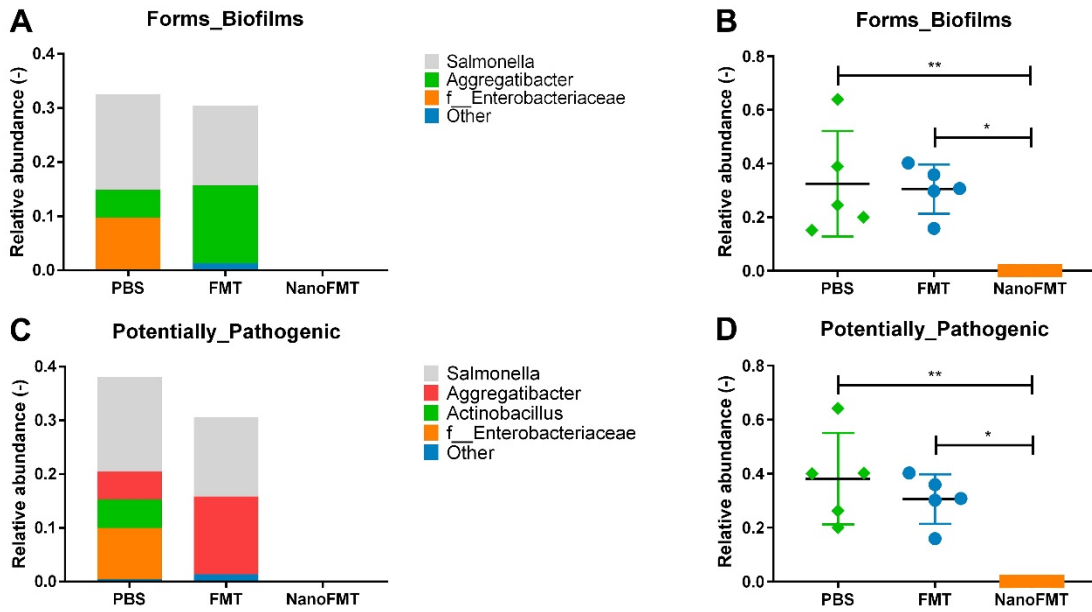
Figure S19 Bubble matrix of gut microbiota at the genus level in the STm-induced colitis mouse model after treatment.



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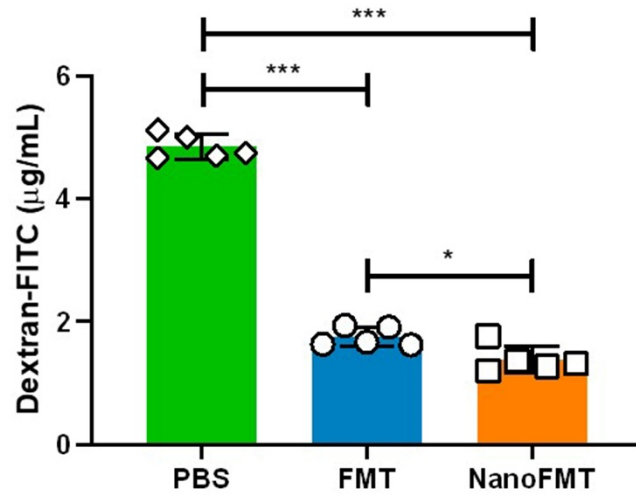
2 **Figure S20** Predicted phenotypes of the gut microbiota in the STm-induced colitis
 3 mouse model after treatment. (A) Relative abundance of all phenotypes. (B, C)
 4 Relative abundance of anaerobic microbes. (D, E) Relative abundance of facultative
 5 anaerobic microbes. (F, G) Relative abundance of aerobic microbes.

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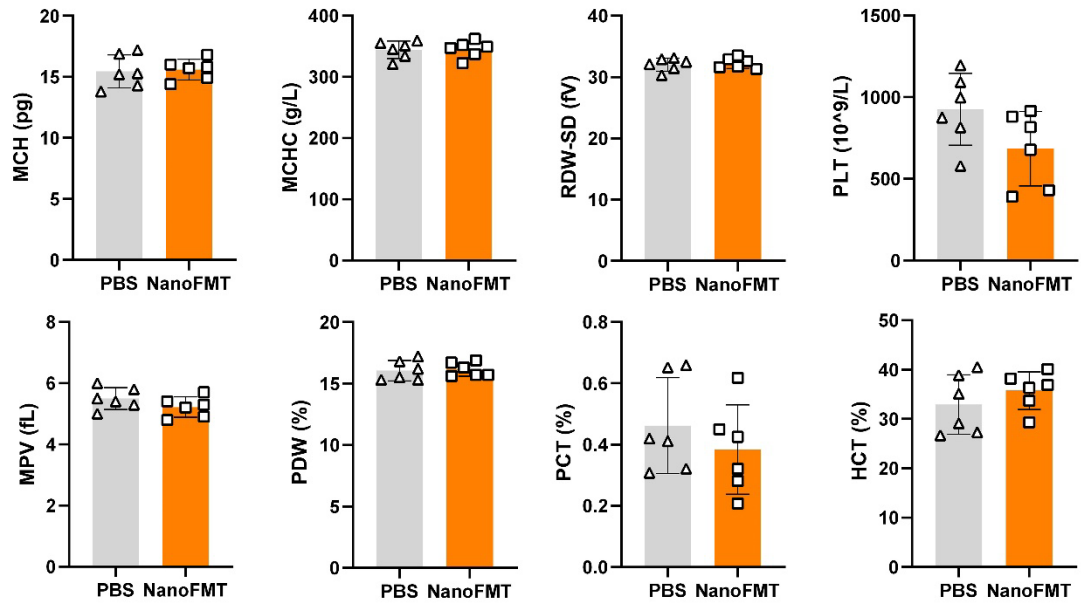


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Figure S21 Relative abundance of biofilms formable microbes (A, B) and potentially pathogenic microbes (C, D) in the STM-induced colitis mouse model after treatment.



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2 **Figure S22** Intestinal permeability of mice after NanoFMT treatment. Fluorescence
3 intensity of serum was measured after gavage 600 mg/kg mouse FITC-dextran.
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2 **Figure S23** Biosafety evaluation of NanoFMT using hematological analysis.