Electronic Supplementary Material (ESI) for Nanoscale.

Neutrophil Cell Membrane-Biomimetic Nanoplatform Based on L-Arginine Nanoparticles for Early Osteoarthritis Diagnosis and Nitric Oxide Therapy

Qianqian Yu[b*,1] Yuqin Huang[a,1], Xu Chen[a], Yutong Chen[a], Xufeng Zhu[a], Yanan Liu[a], and Jie Liu[a*]

[a]College of Chemistry and Materials Science, Jinan University, Guangzhou, China

[b]South China Advanced Institute for Soft Matter Science and Technology, School of Molecular Science and Engineering, South China University of Technology, Guangzhou, China

*Corresponding author. E-mail: tliuliu@jnu.edu.cn

[1]These authors contributed equally to the work.

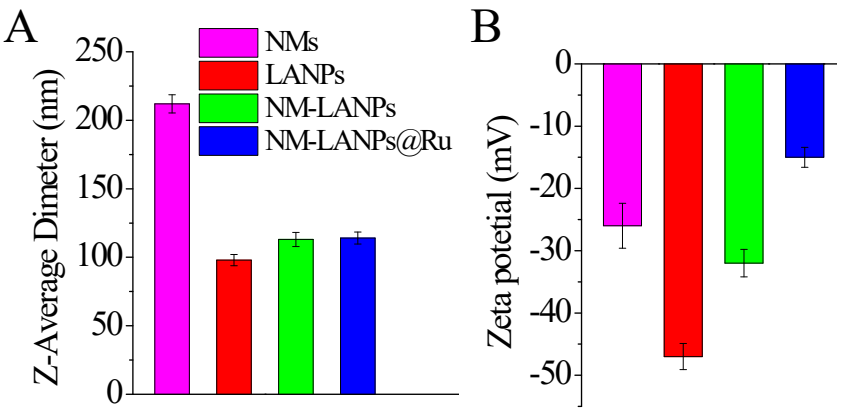

Figure S1. Z-average diameter (A), and zeta potentials (B) of different nanoparticles (LANPs, NM-LANPs, NM-LANPs@Ru) and neutrophil cell membrane in buffer measured by DLS.

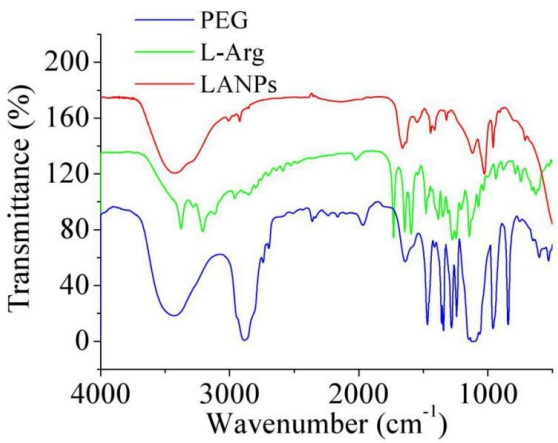

Figure S2. FTIR spectra of PEG, L-Arg and LANPs nanoparticles.

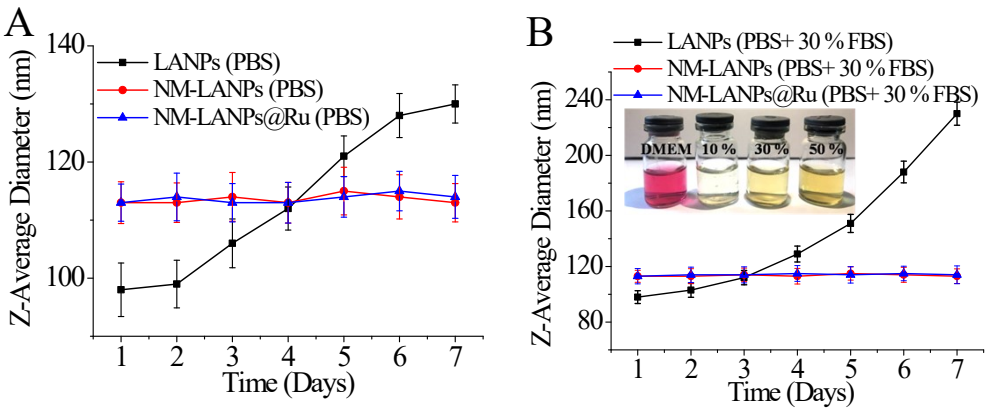

Figure S3. Stability of LANPs@Ru, and NM-LANPs@Ru in PBS with (A) and withoutserum (B) as monitored by dynamic light scattering every 24 h over a period of 7 days, Digital photo of collected NM-LANPs@Ru(bottom) and upper aqueous solution after centrifugation.

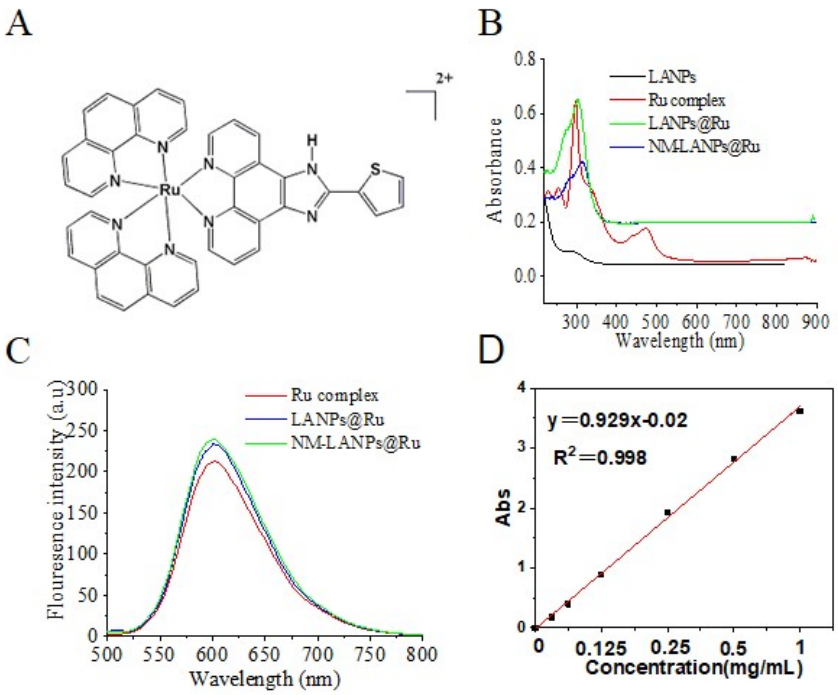

Figure S4. (A) The structure of the Ru complex. UV-visible spectra (B) and fluorescence spectra (C) of Ru complex, LANPs@Ru, and NM-LANPs@Ru.(D) Standard curve drawn from different concentrations of Ru complex.

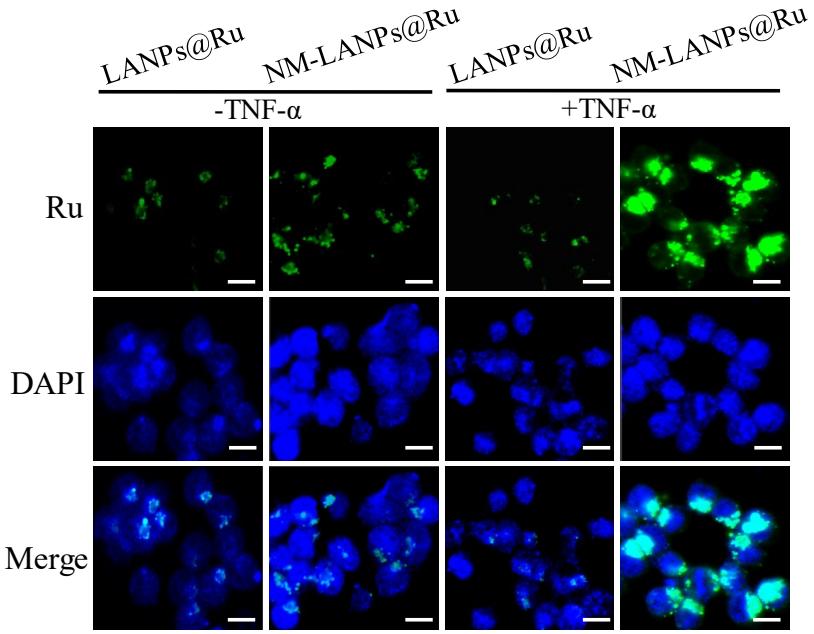

Figure S5. Confocal images of C28/I2 cells pretreated with or without TNF-α (3 ng/mL, for 12 h), respectively, followed by incubation with NM-LANPs@Ru or LANPs@Ru for 6 h, wherein the intensity represents the total integrated intensity of green fluorescence from ruthenium complex,

emitted at 560-615 nm; blue emission from Hoechst 33342 excited at 405 nm and emitted at 420-480 nm, the scale bar is 80 μm.

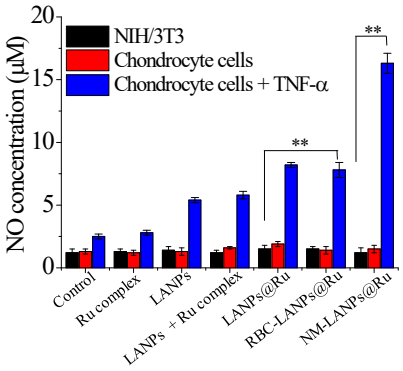

Figure S6. NO concentration after different nanoparticles treatment in NIH/3T3 cells and C28/I2 cell with or without TNF-α induced (**p < 0.01).

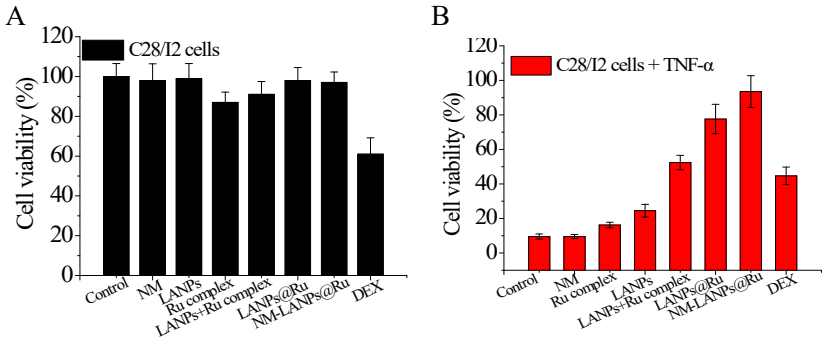

Figure S7.Cell viability of C28/I2 cells or TNF-αpreincubate C28/I2 cells after incubation with different groups.

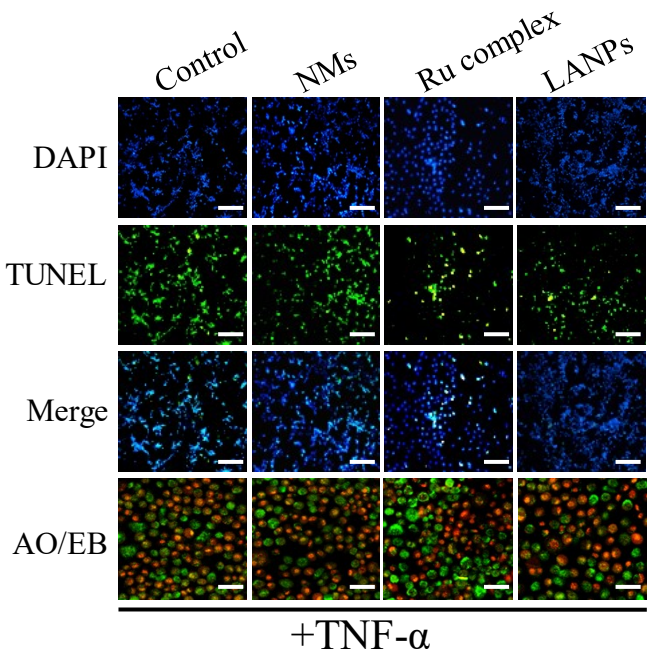

Figure S8. Confocal images of TUNEL of C28/I2 cells pretreated with TNF-α (3 ng/mL, for 12 h) followed by incubation with NMs, Ru complex or LANPs for 6 h, wherein the intensity represents the total integrated intensity of green fluorescence from TUNEL; blue emission from Hoechst 33342, the scale bar is 80 μm.

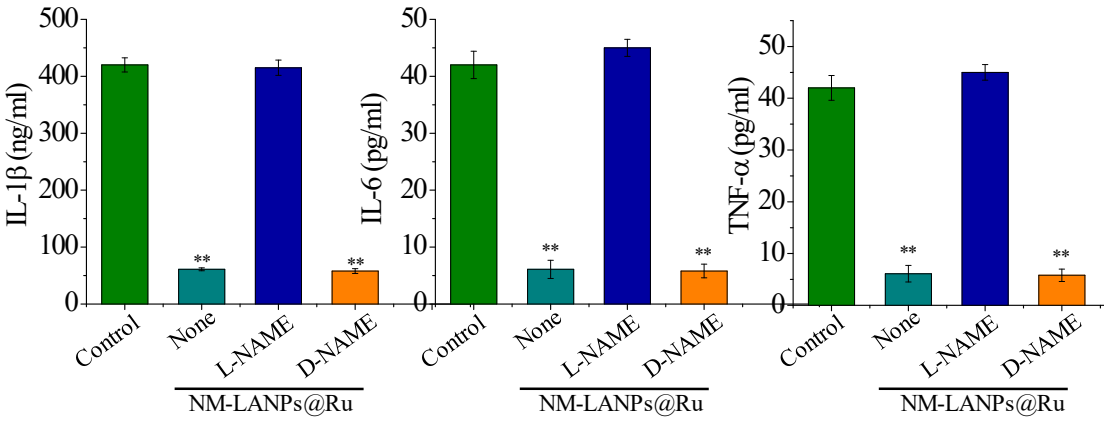

Figure S9. The effect of inflammatory factor IL-1, IL-6 and TNF-α after on day 2, when early arthritis was clearly established, mice were randomly divided into groups and given serial daily injections of targeted NPs without drug (Ctrl NP) or Fum-PD NP for three consecutive doses. In some groups, mice were given L-NAME or D-NAME (100 mg/kg) iv 30 min prior to the NP injection. On day 9 paws were harvested and homogenized, and paw lysates analyzed for cytokine levels (CG) by cytometric bead array (CBA) and ELISA.

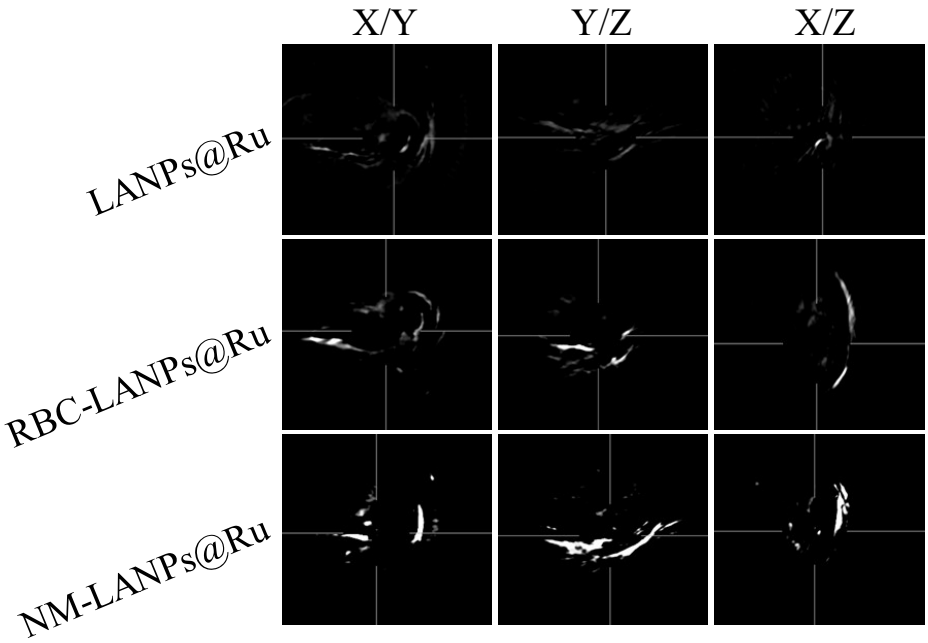

Figure S10. 3D PA imaging of OA in mice from three directions treated with LANPs@Ru, RBC-LANPs@Ru and NM-LANPs@Ru, respectively.

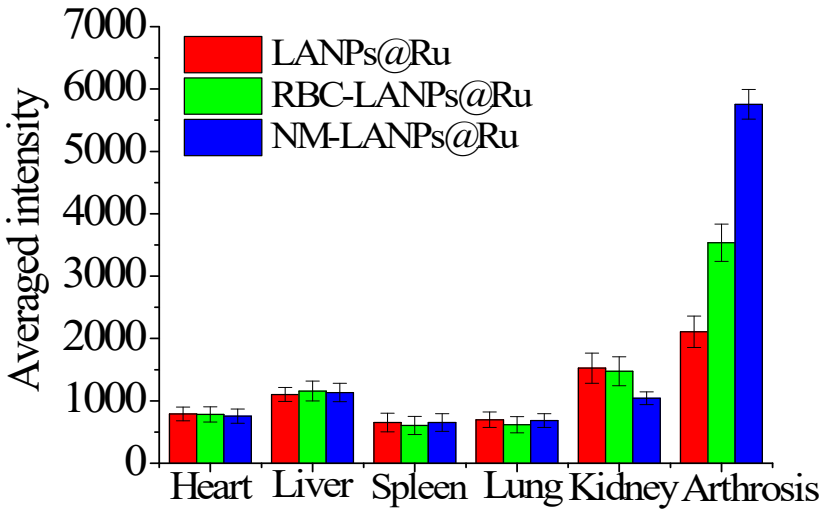

Figure S11. The mean fluorescent intensity of nanoparticles in the major organs and Knee osteoarthritis of KM mice after injected with different nanoparticles.

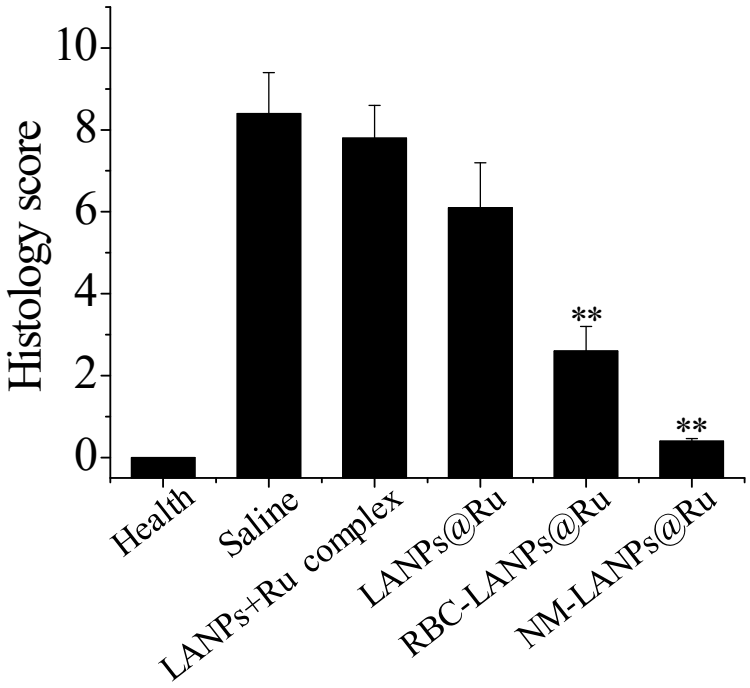

Figure S12. Histological histology scores of the knee joints different nanoparticles-treated OA.

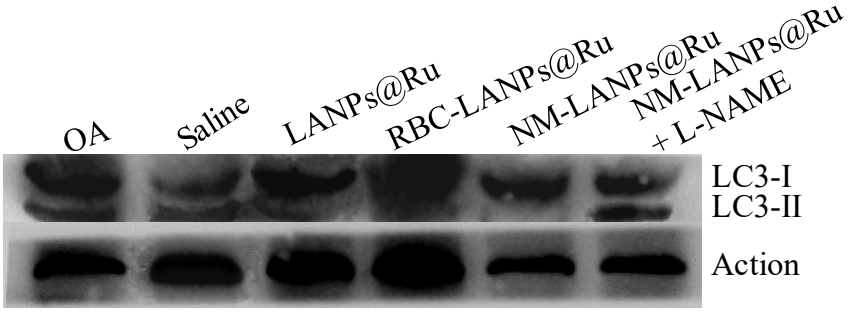

Figure S13. The expression of LC3-Iand LC3-II in the OA from the different treatment groups with or without L-NAME treatment.