Electronic Supplementary Information (ESI) for Dalton Transactions

A Protein@Metal−Organic Framework Nanocomposite for pH-Triggered Anticancer Drug Delivery

Zuozhong Liang,[a] Zhiyuan Yang,[a] Haitao Yuan,[a] Chun Wang,[c] Jing Qi,[a] Kaiqiang Liu,[a] Rui Cao,[a, b] Haoquan Zheng[a]*

[a] Key Laboratory of Applied Surface and Colloid Chemistry, Ministry of Education, School of Chemistry and Chemical Engineering, Shaanxi Normal University, Xi'an 710119, China
[b] Beijing Key Laboratory for Green Catalysis and Separation and Department of Chemistry and Chemical Engineering, College of Environmental and Energy Engineering, Beijing University of Technology, Beijing 100124, P. R. China
[c] Xianning Central Hospital, The First Affiliated Hospital of Hubei University of Science and Technology, Xianning 437000, China

*Corresponding authors: zhenghaoquan@snnu.edu.cn.

Characterization of the materials

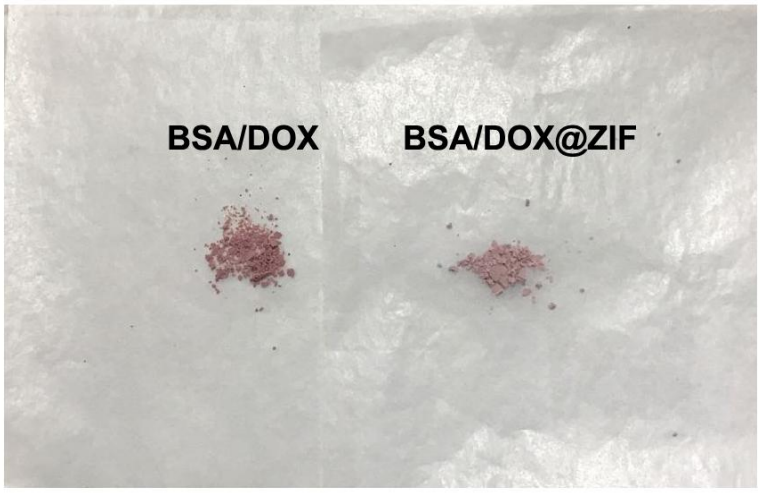

Fig. S1. The photographs of BSA/DOX and BSA/DOX@ZIF.

From the photograph, we can see that the color of BSA/DOX@ZIF is little lighter than that of BSA/DOX. This obsevation also demonstrates the coating of ZIF, which has a white color.

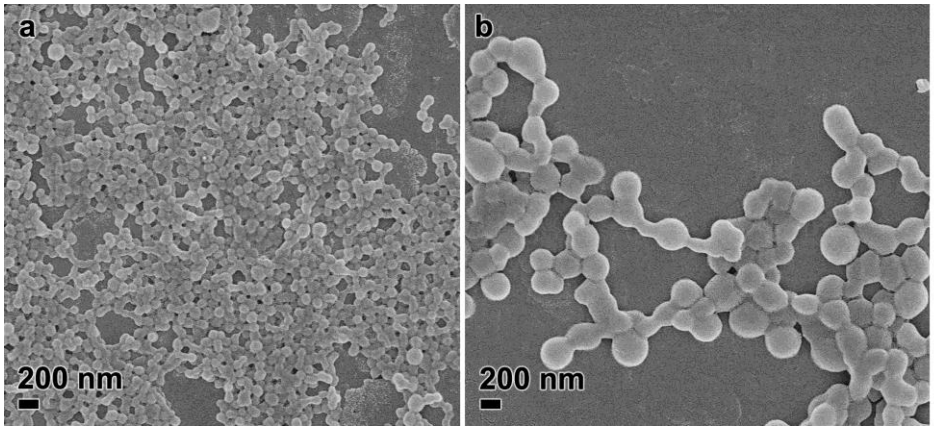

Fig. S2. SEM images of BSA nanoparticles synthesized with 1 mL of (a) 5 mM NaCl solution and (b) 10 mM NaCl solution.

The concentration of NaCl will affect the particle size of BSA based nanoparticles. If we added more NaCl, BSA based nanoparticles would have a larger particle size.

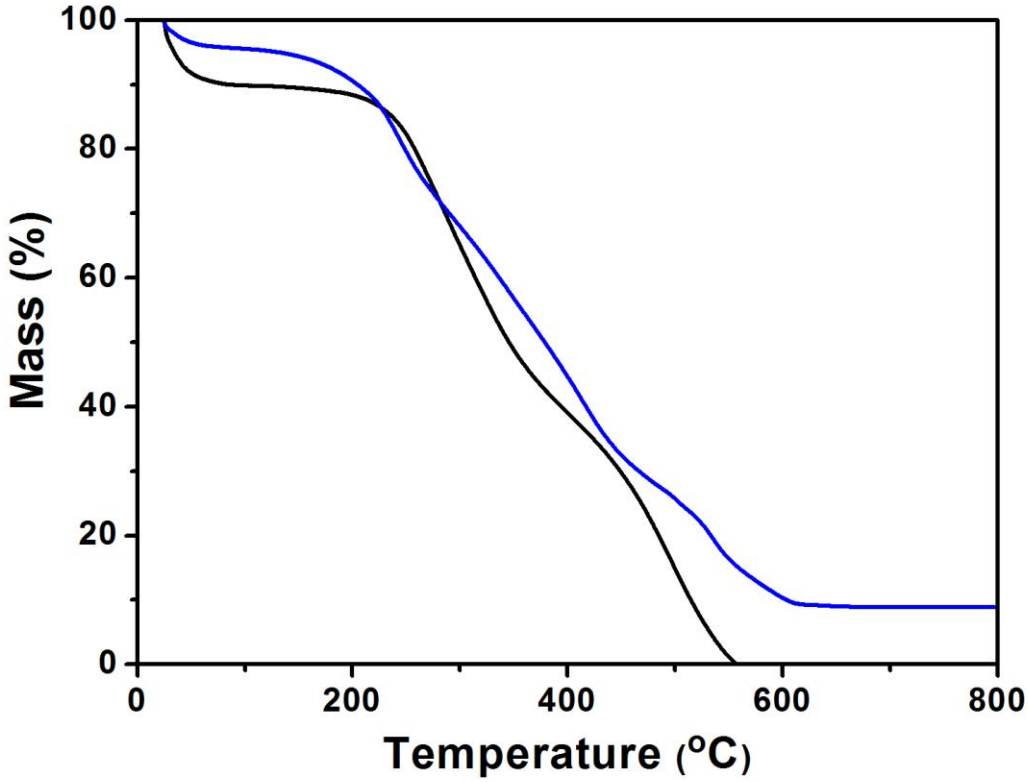

Fig. S3. TGA curves of BSA/DOX (black) and BSA/DOX@ZIF (blue).

The BSA/DOX completely decomposed at 350-550 °C in air, while the weight loss of BSA/DOX@ZIF is around 92% after reaching 800 °C. ZnO derived from ZIF-8 of BSA/DOX@ZIF remained, indicating the successful coating of ZIF on BSA/DOX@ZIF. We then calculate the content of ZIF using the molar Zn:Hmim ratio of 1:2. The obtained ZIF content is around 20% (wt).

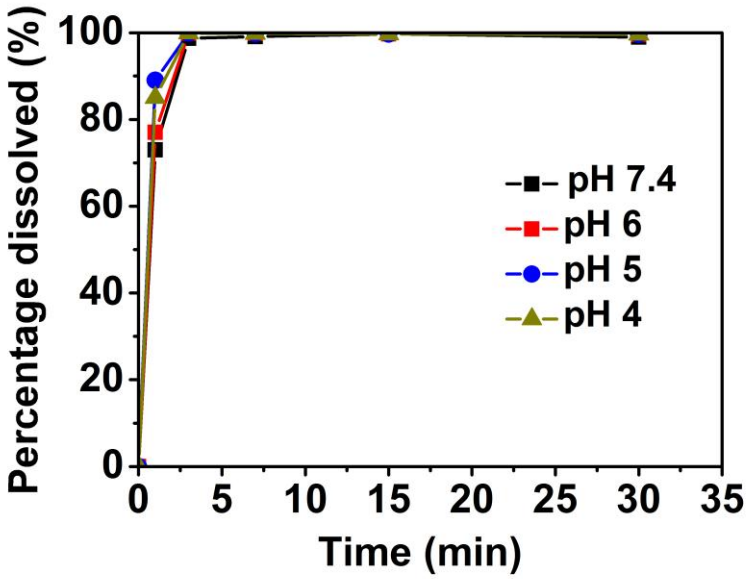

Fig. S4. Time-dependent dissolving profiles of free DOX at different pHs.

The same amount of DOX as the DOX content in BSA/DOX@ZIF was used. We found that DOX was completely dissolved in 3 minutes

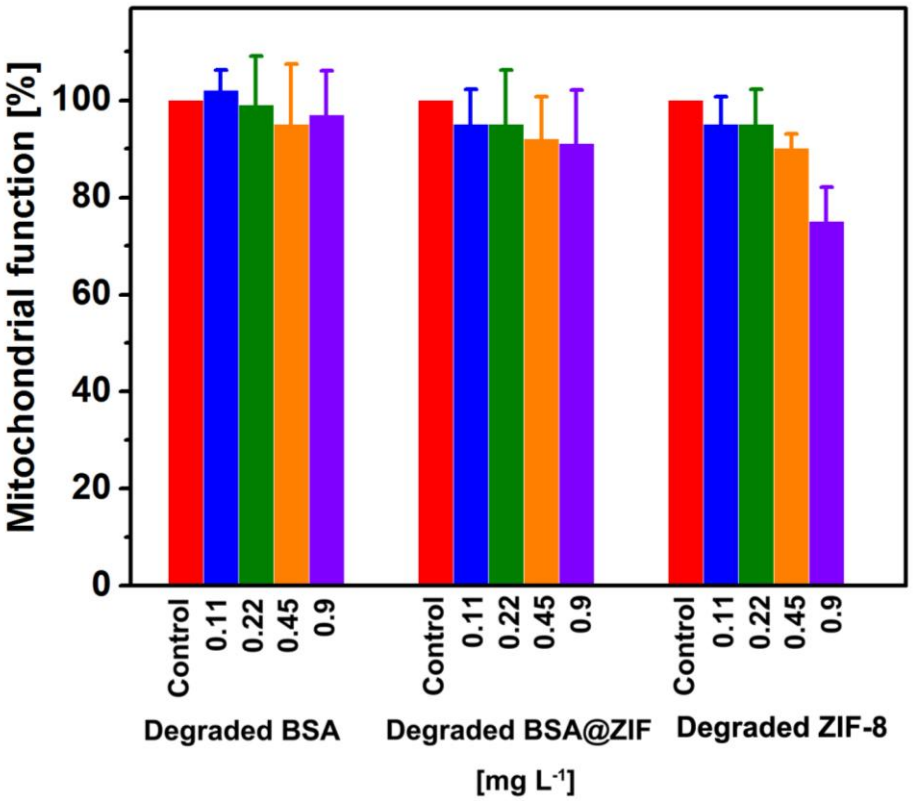

Fig. S5. Mitochondrial function of MCF-7 exposed to degraded BSA, BSA@ZIF and ZIF-8 for 24 h.

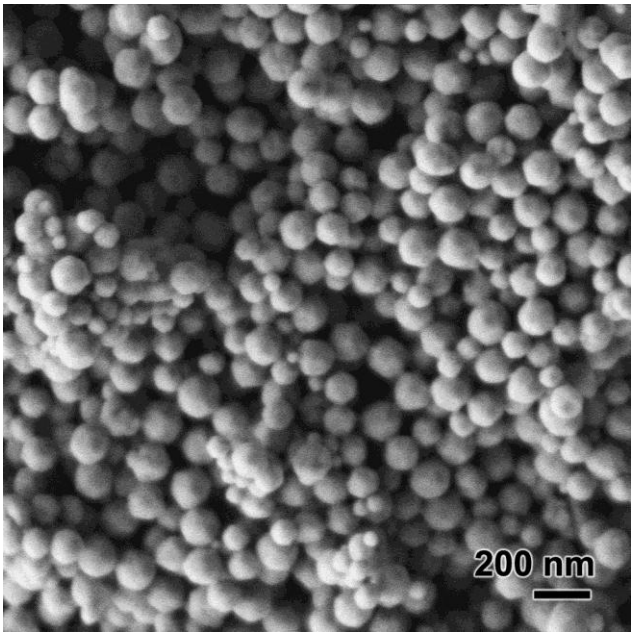

Fig. S6. SEM image of pure ZIF-8 nanoparticles as control.

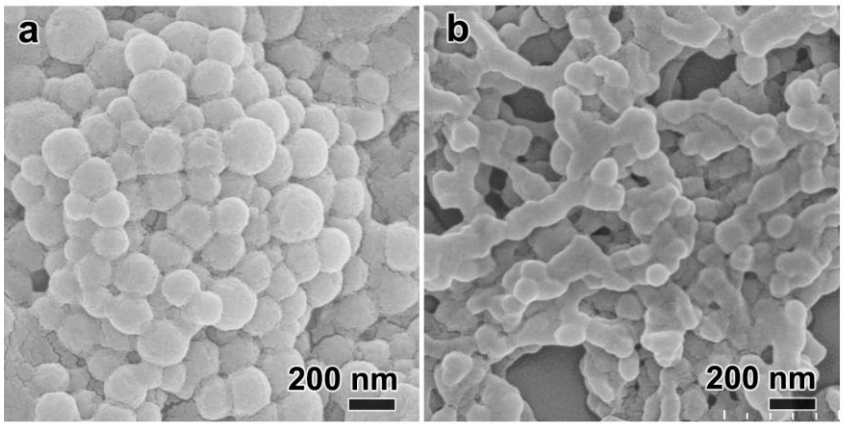

Fig. S7. SEM image of BSA/DOX@ZIF with DOX loading of 15 % (a) and 19 % (b), respectively.

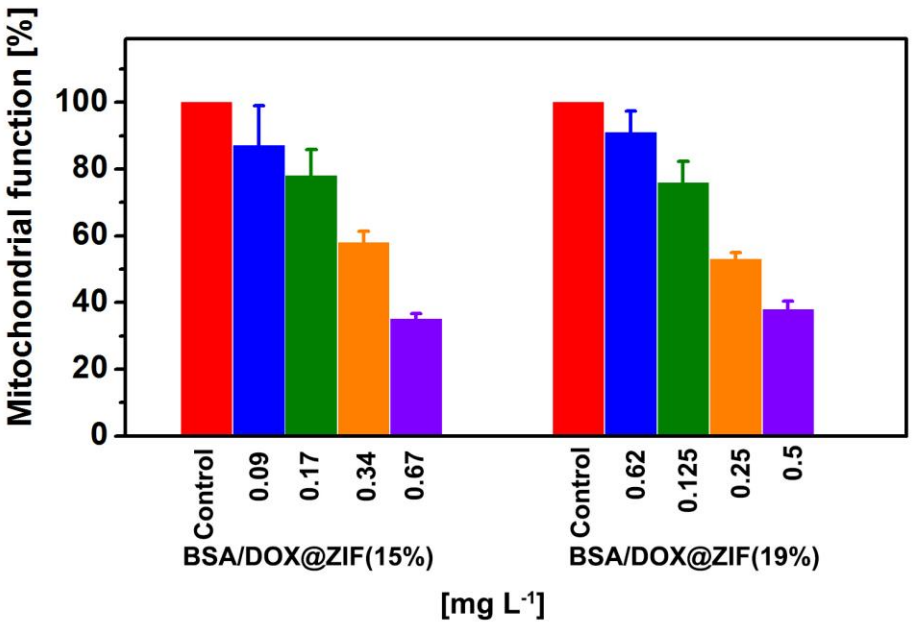

Fig. S8. Mitochondrial function of MCF-7 exposed to BSA/DOX@ZIF with DOX loading of 15 % (a) and 19 % (b), respectively.

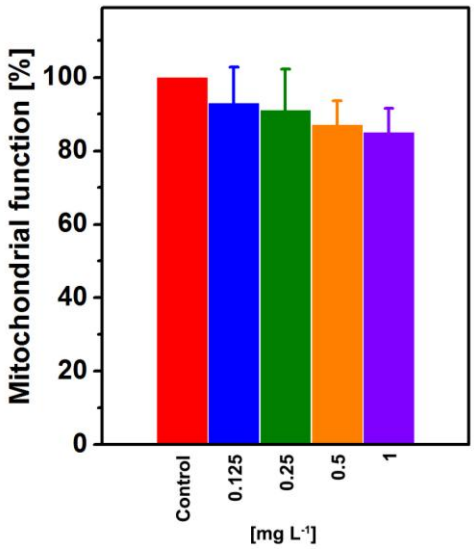

Fig. S9. Mitochondrial function of house ear institute-organ of corti 1 (HEI-OC1) cells exposed to BSA/DOX@ZIF for 72 h.

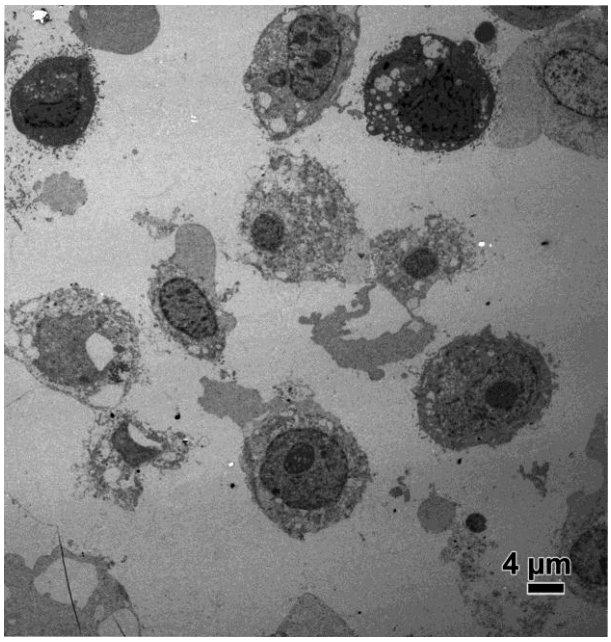

Fig. S10. TEM image of MCF-7 cells treated with BSA/DOX@ZIF for 2 h.

The black dots in the TEM image were BSA/DOX@ZIF. Intracellular uptake of BSA/DOX@ZIF in the MCF-7 cell has been also confirmed.