Supporting Information

A versatile nanoplatform based on multivariate porphyrinic metal-organic frameworks for catalytic cascades-enhanced photodynamic therapy

Shen-Zhen Ren [a, b, †], *Xiao-Hua Zhu* [b, †], *Bin Wang* [b], *Ming Liu* [b], *Shu-Kai Li* [b], *Yu-Shun Yang* [b, *], *Hailong An* [a, *] *and Hai-Liang Zhu* [b, *]

[a] Key Laboratory of Molecular Biophysics, Hebei Province, Institute of Biophysics, School of Sciences, Hebei University of Technology, Tianjin 300401, China

[b] State Key Laboratory of Pharmaceutical Biotechnology, School of Life Sciences, Nanjing University, Nanjing 210023, China

[†] These two authors equally contributed to this paper.

[*] Corresponding authors. Tel. & fax: +86-25-89682572; E-mail: zhuhl@nju.edu.cn (H.L. Zhu); hailong_an@hebut.edu.cn (H.L. An); milanargint@163.com (Y.S. Yang).

Statistical Analysis.

All the experiments were repeated at least in triplicate, and the results were presented as mean ± standard deviation (SD). The statistical analysis was performed by using Origin 8.0 software. Statistical significance was determined using two-tailed Student's tests to compare between groups and P value <0.05 was considered statistically significant. *p < 0.05; **p < 0.01; ***p < 0.001.

Table S1. List of abbreviations in this study

Full name	Abbreviations
TCPP	Tetratopic tetrakis(4-carboxyphenyl) porphyrin
DA	Dopamine
PDA	Polydopamine
UIO	UIO-66-NH_2@TCPP
UIO@PDA	UIO-66-NH_2@TCPP@PDA
UIO@Ca	UIO-66-NH_2@TCPP@CaO_2@PDA
UIO@Pt	UIO-66-NH_2@TCPP@PDA@Pt
UIO@Ca-Pt	UIO-66-NH_2@TCPP@CaO_2@PDA@Pt

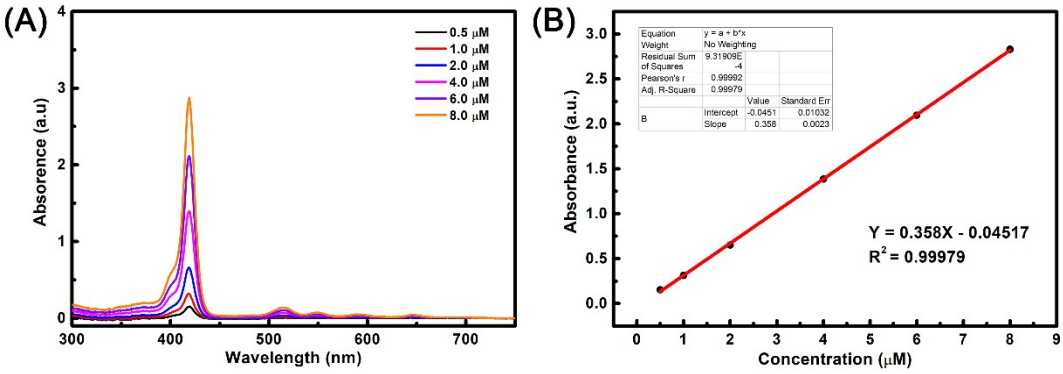


Fig. S1. UV−vis spectroscopy and standard curve of TCPP in DMF with different concentrations.

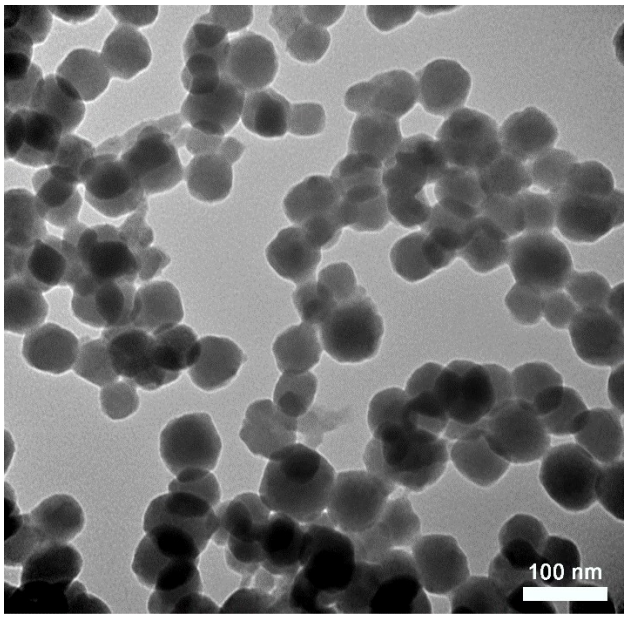


Fig. S2. TEM image of UIO@PDA NPs.

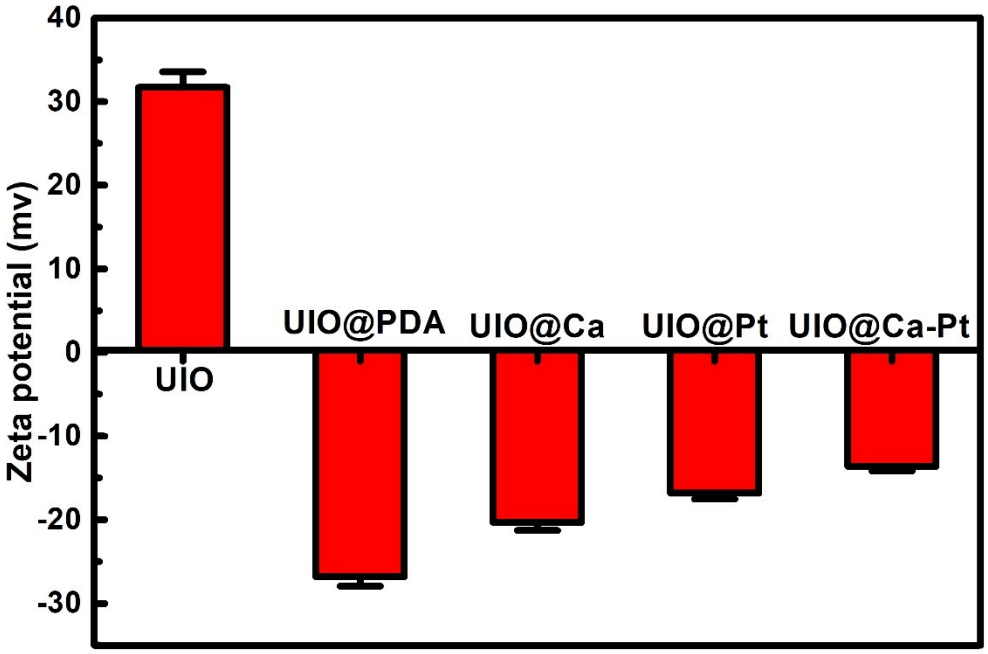


Fig. S3. ζ-potentials of UIO, UIO@PDA, UIO@Ca, UIO@Pt and UIO@Ca-Pt. All results were presented as mean ± SD.

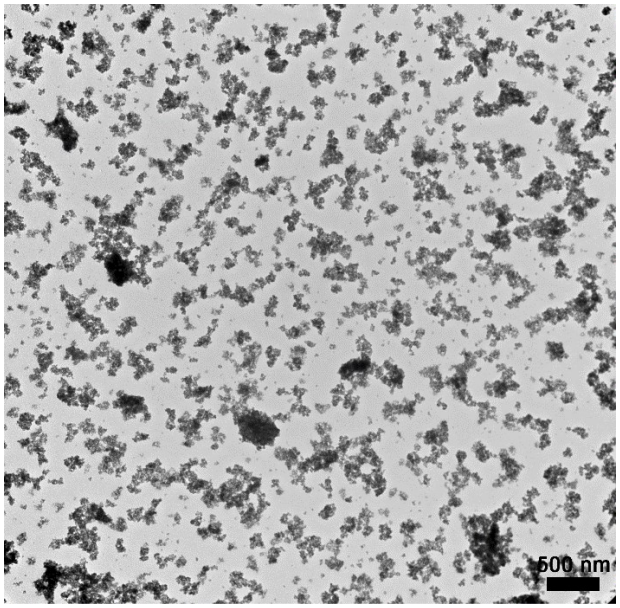


Fig. S4. TEM image of CaO_2 NPs.

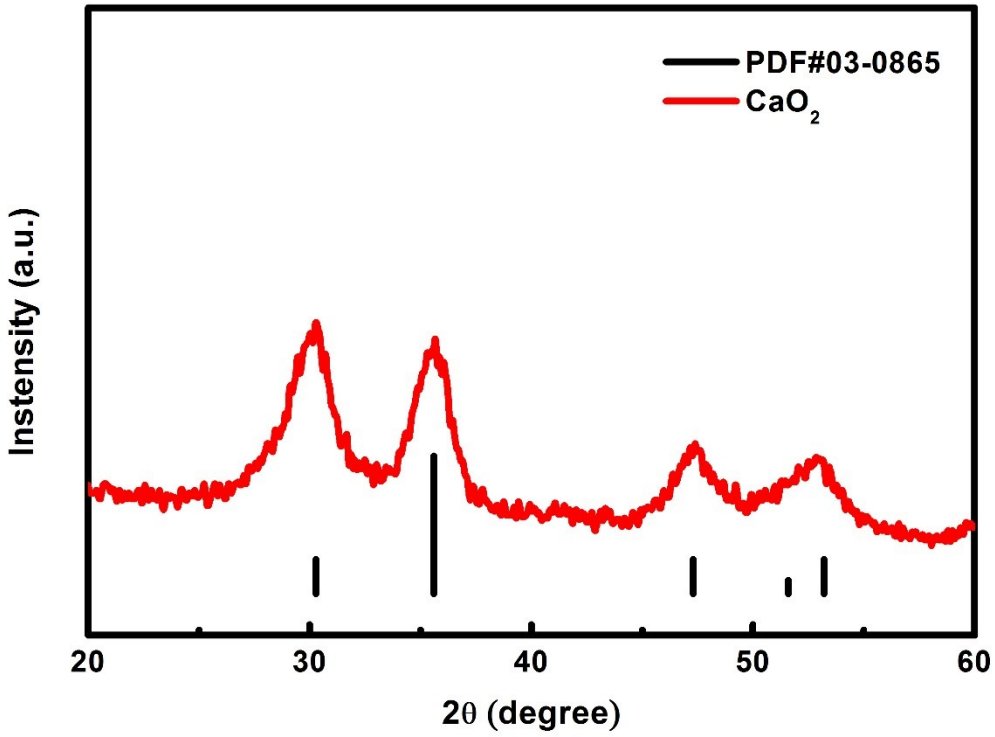


Fig. S5. XRD patterns of CaO_2 NPs.

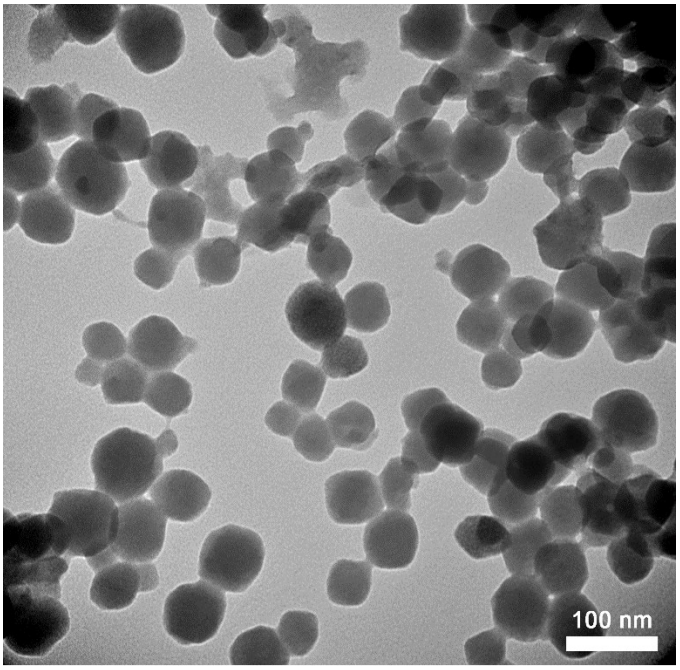


Fig. S6. TEM of UIO@Ca NPs.

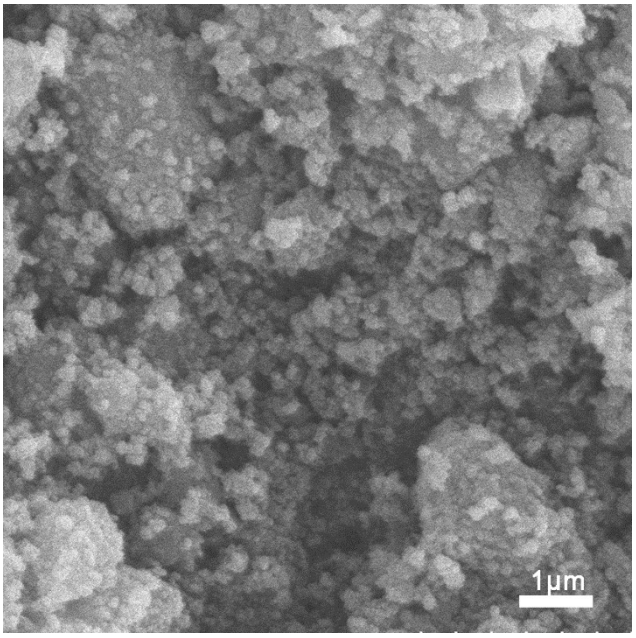


Fig. S7. SEM of UIO@Ca-Pt NPs

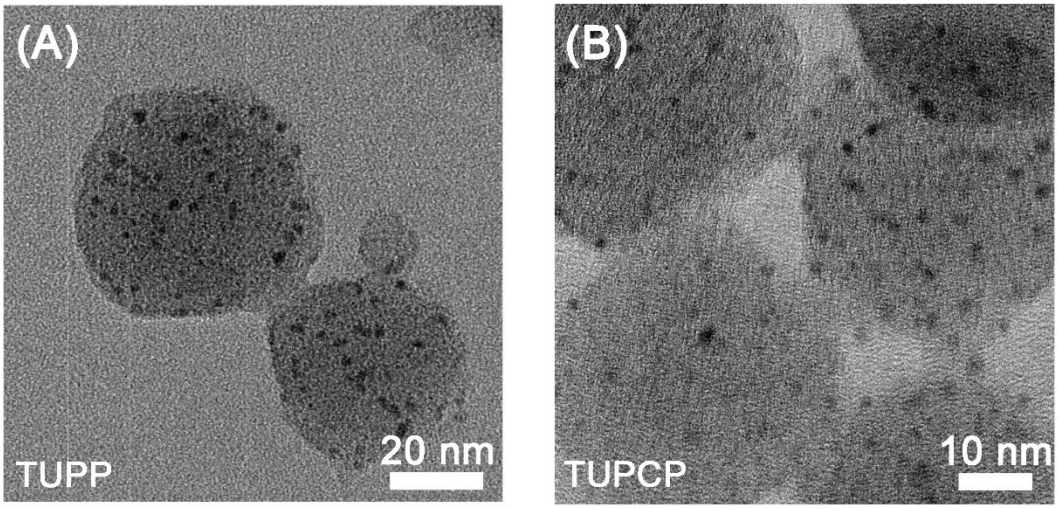


Fig. S8. TEM images of UIO@ Pt and UIO@Ca-Pt.

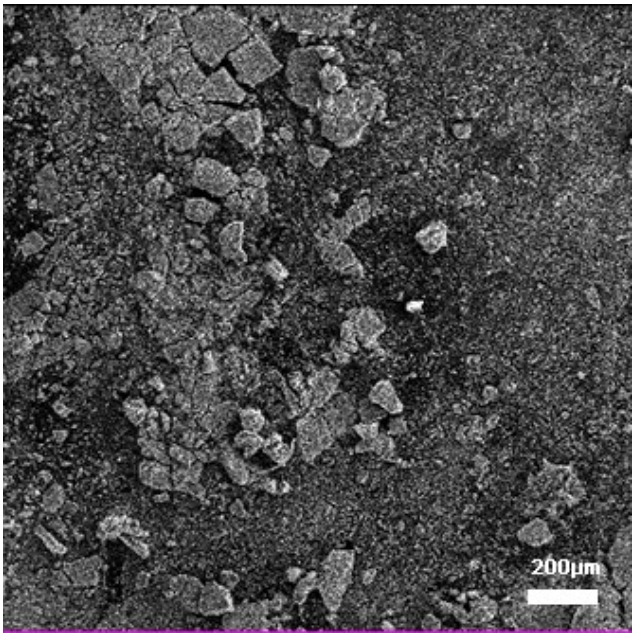
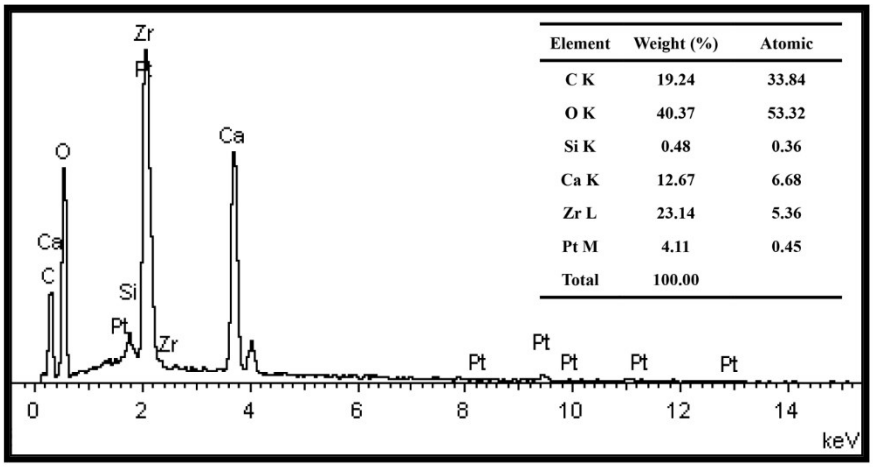


Fig. S9. Electronic image of EDX of UIO@Ca-Pt.



Element	Weight (%)	Atomic
C K	19.24	33.84
O K	40.37	53.32
Si K	0.48	0.36
Ca K	12.67	6.68
Zr L	23.14	5.36
Pt M	4.11	0.45
Total	100.00	

Fig. S10. EDX spectrum of UIO@Ca-Pt.

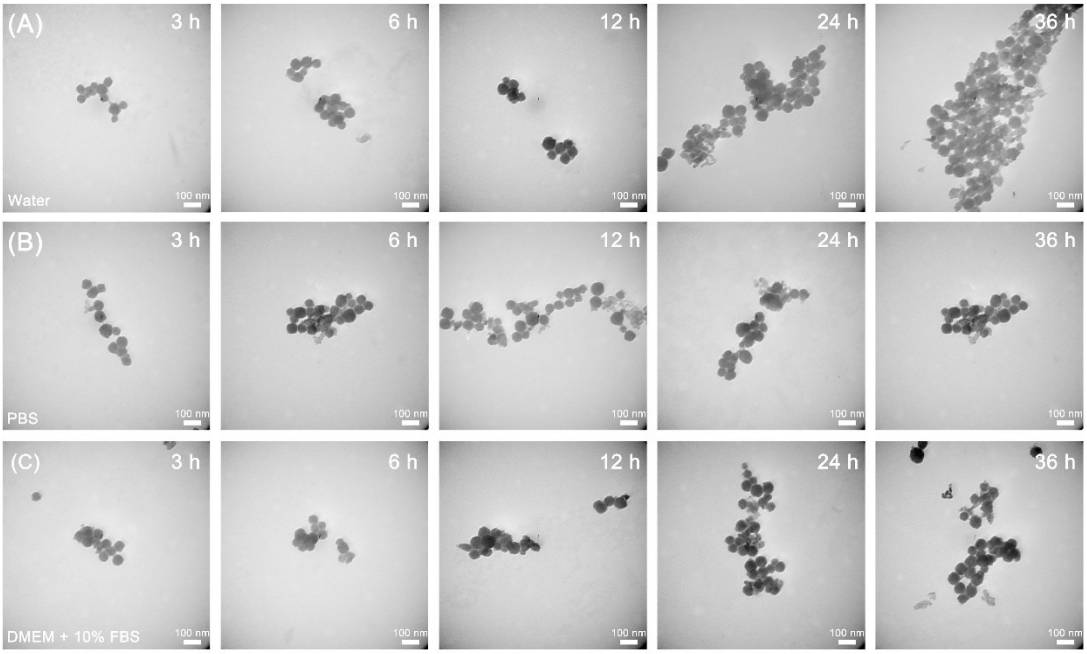


Fig. S11. TEM images of UIO@Ca-Pt after incubating with water (A), PBS (B) or DMEM containing 10% FBS (C) for 3, 6, 12, 24 or 48 h.

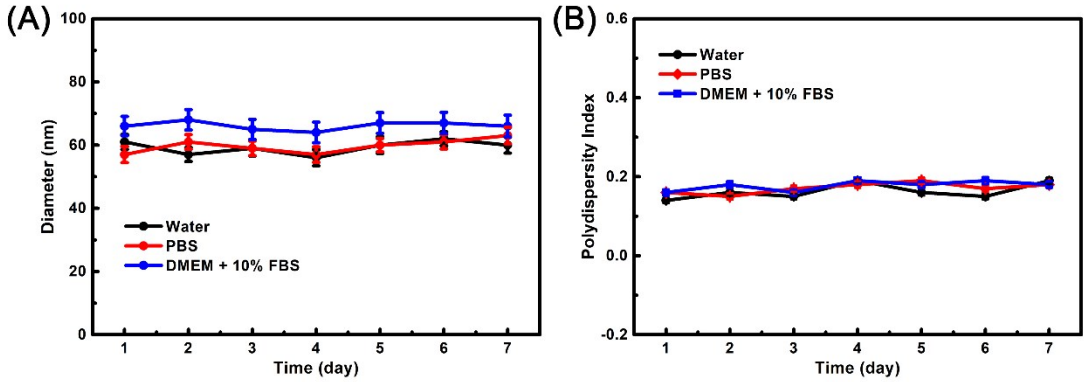


Fig. S12. Colloidal characterization of UIO@Ca-Pt in water, PBS or DMEM containing 10% FBS for different time (A) and corresponding polydispersity index (B). All results were presented as mean ± SD.

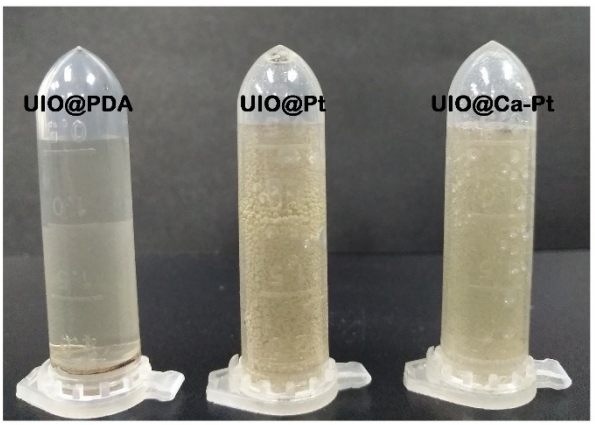


Fig. S13. A photo of hydrogen peroxide added to UIO@PDA, UIO@Pt, and UIO@Ca-Pt nanosolutions.

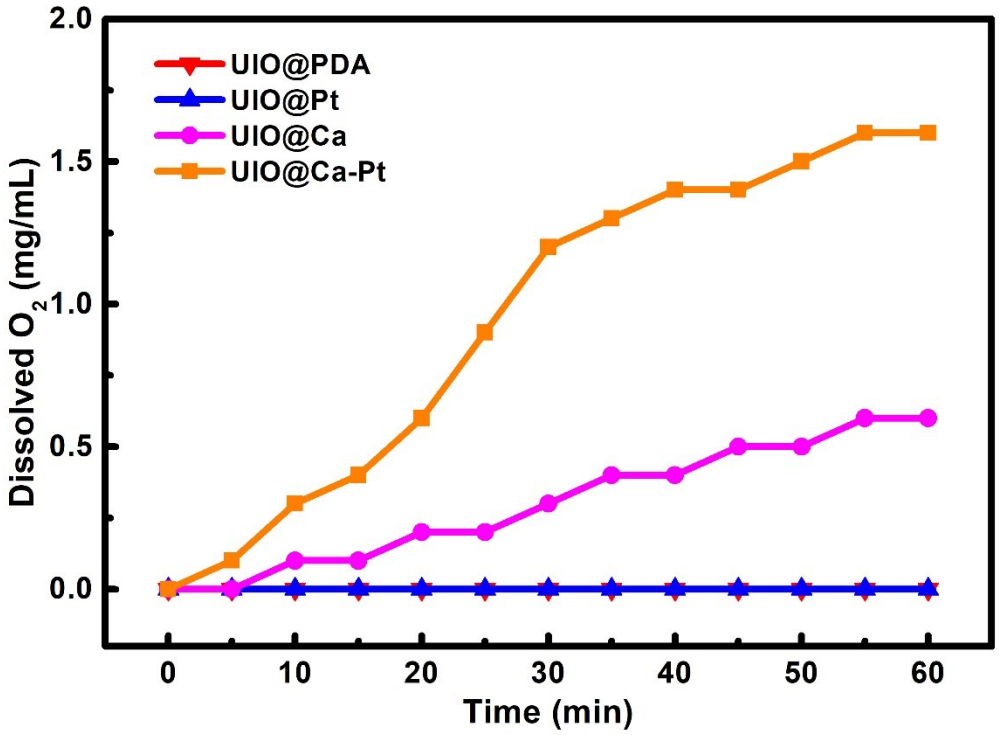


Fig. S14. Oxygen concentration changes of UIO@PDA, UIO@Pt, UIO@Ca and UIO@Ca-Pt solutions in the absence of H_2O_2.

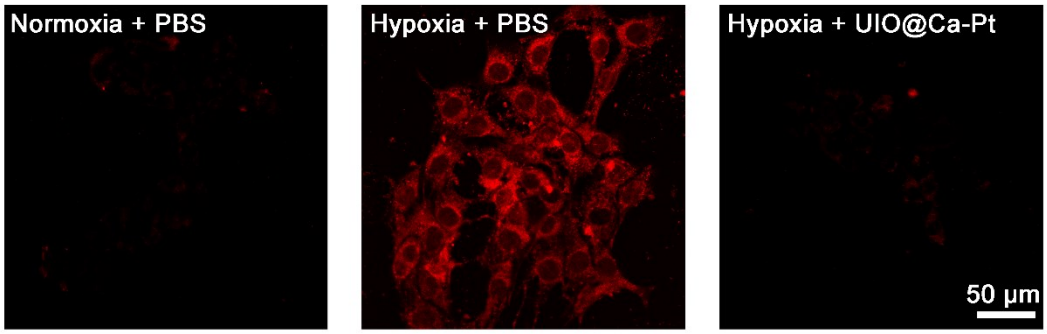


Fig. S15. Fluorescence images of cells treated using $[Ru(dpp)_3]Cl_2$ under different oxygen concentrations. Scale bars=50 μm.

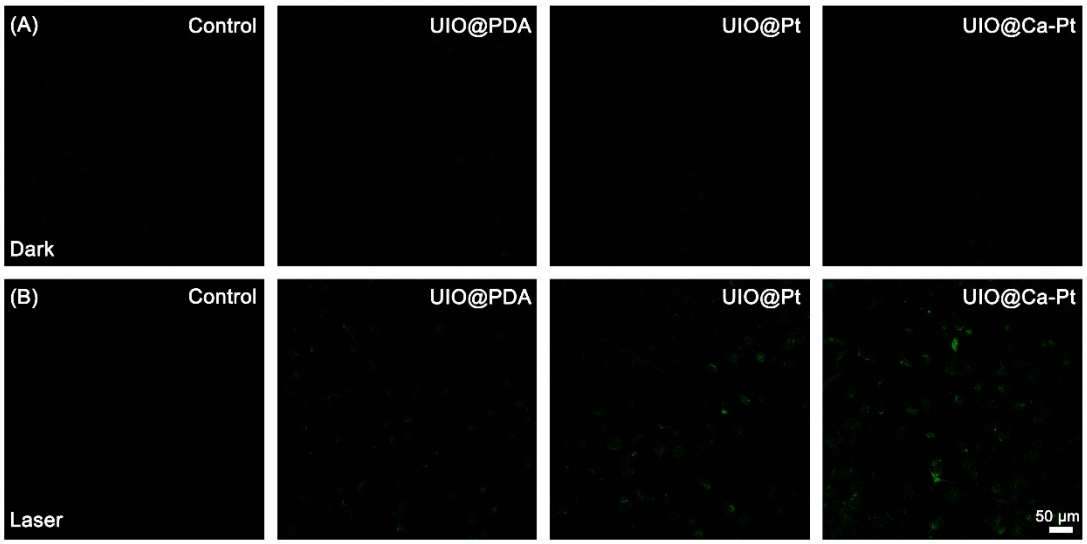


Fig. S16. Intracellular $^1O_2$ (detected with SOSG) detection of CT26 cells incubated with different samples for 4 h and then with (A) or without (B) laser irradiation.

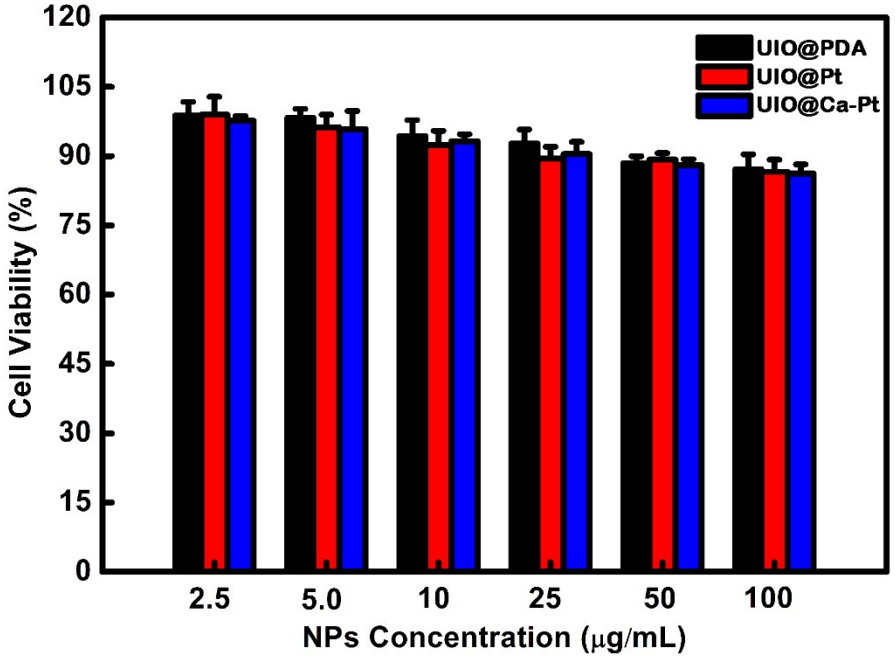


Fig. S17. Cell viability of 293T cells treated with UIO@PDA, UIO@Pt and UIO@Ca-Pt NPs with different concentrations in the dark conditions for 48 h. All results were presented as mean ± SD.

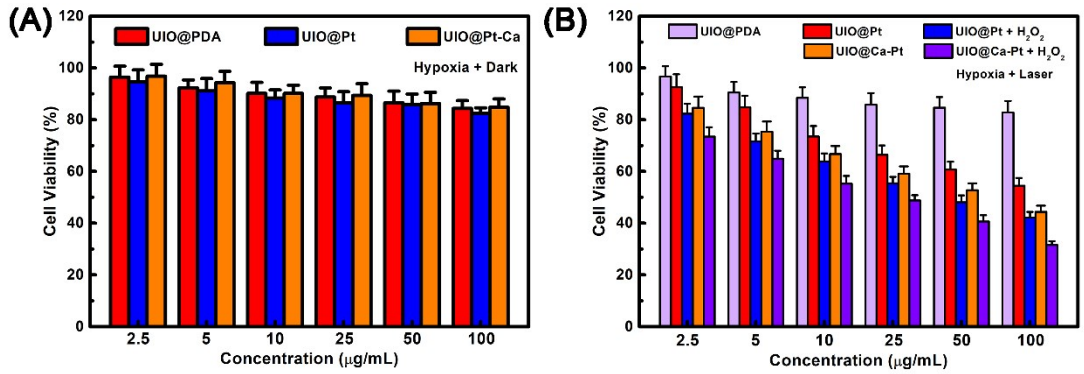


Fig. S18. Cell viability of CT26 cells treated with different samples for 4 h under hypoxia conditions and then with (A) or without (B) laser irradiation. All results were presented as mean ± SD.

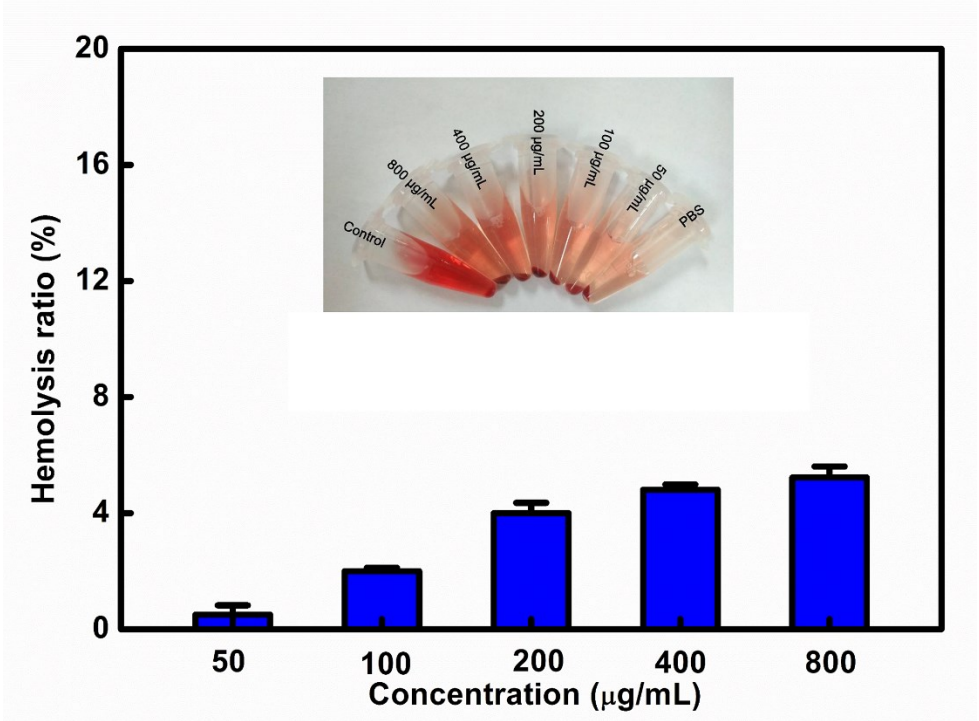


Fig. S19. Hemolysis percentages of UIO@Ca-Pt NPs at different concentrations. All results were presented as mean ± SD.

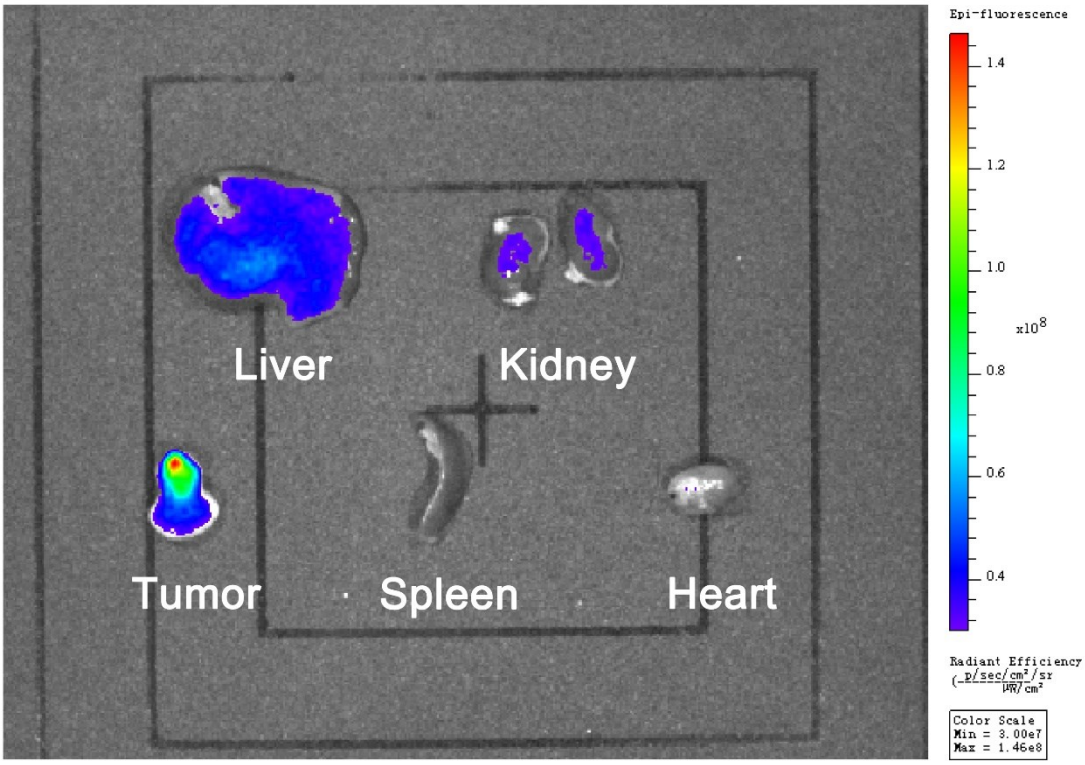


Fig. S20. Ex vivo various organs and tumor images obtained 24 h after caudal vein injection of UIO@Ca-Pt NPs

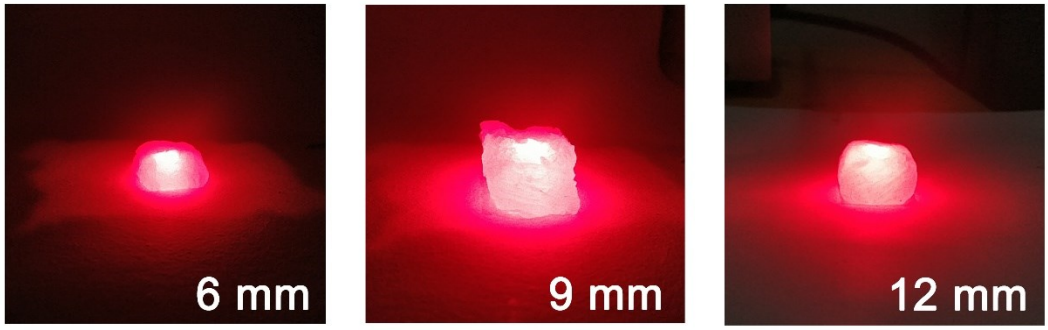


Fig. S21 The digital photos obtained in pork muscle tissue

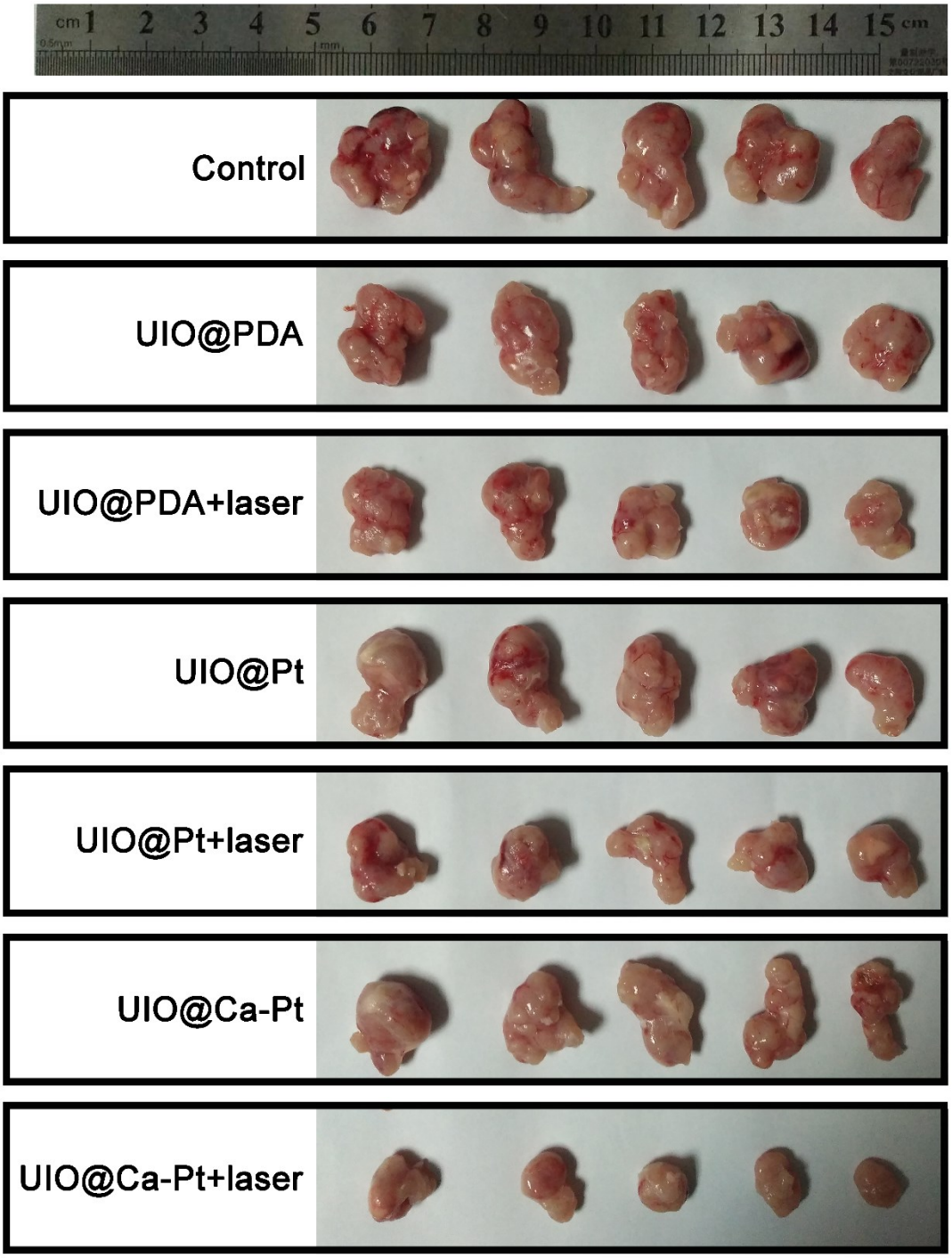


Fig. S22. Relative tumor volume of each group treated with UIO@PDA, UIO@PDA+Laser, UIO@Pt, UIO@Pt +Laser, UIO@Ca-Pt, UIO@Ca-Pt +Laser NPs.

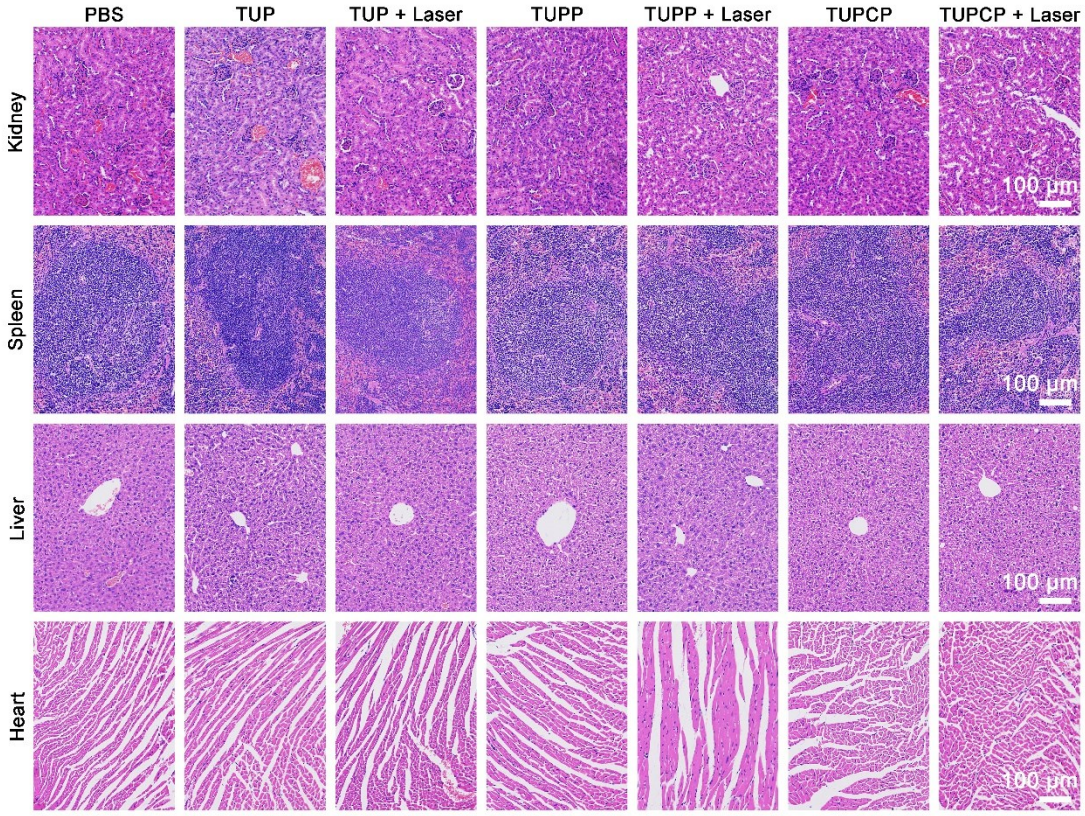


Fig. S23. Histological sections of major organs after treatment with PBS, UIO@PDA, UIO@PDA+Laser, UIO@Pt, UIO@Pt +Laser, UIO@Ca-Pt, UIO@Ca-Pt +Laser NPs for 12 days (× 100).