Electronic Supplementary Material (ESI) for Nanoscale.

Supporting information

for

Catalase-loaded mesoporous zeolite as implantable nanocapsules for ultrasound-guided oxygen self‐sufficient photodynamic therapy against pancreatic cancer

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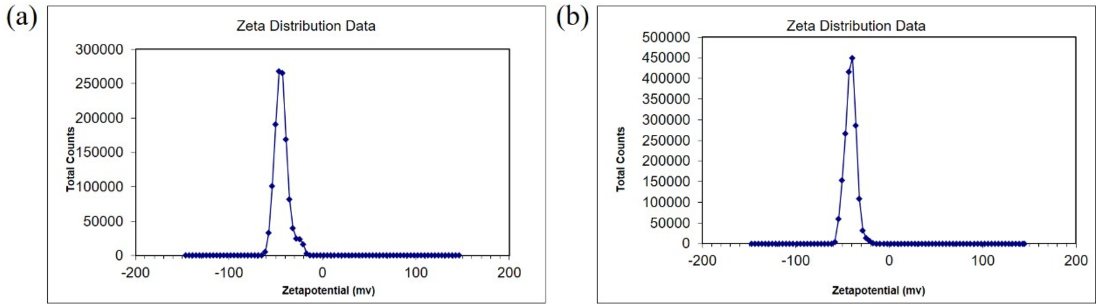

Figure S1. The zeta potential of zeolite-catalase complex and ZCM nanocapsule.

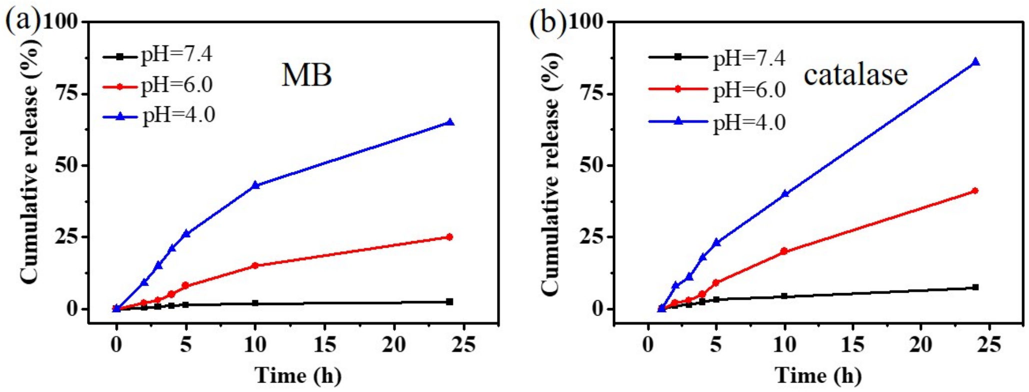

Figure S2 *In vitro* release profile of MB (a) and catalase (b) in different PBS (pH 7.4, pH 6.0 and pH 4.0).

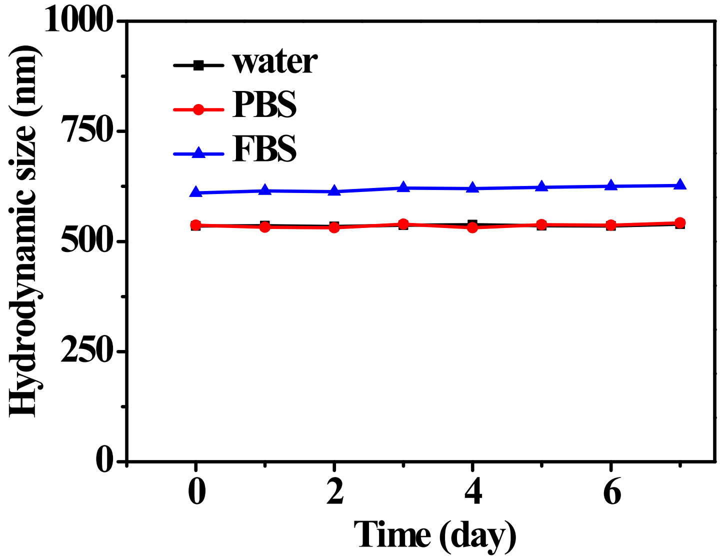

Figure S3 Size stability over time of ZCM nanocapsule stored in water, PBS and FBS (n = 3; mean ± SD). The red line for size in PBS almost overlaps the black one for size in water. The samples were pretreated ultrasonically in water bath before the measure.

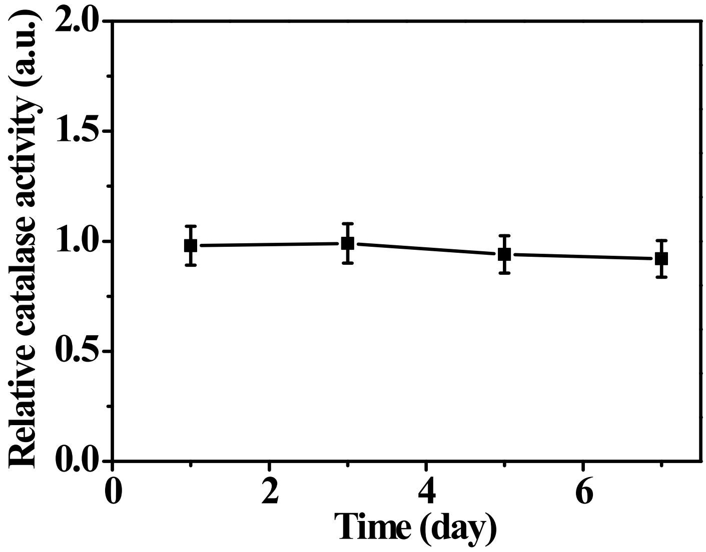

Figure S4 Relative catalase activity of ZCM nanocapsule stored in PBS over time (n = 3; mean ± SD).

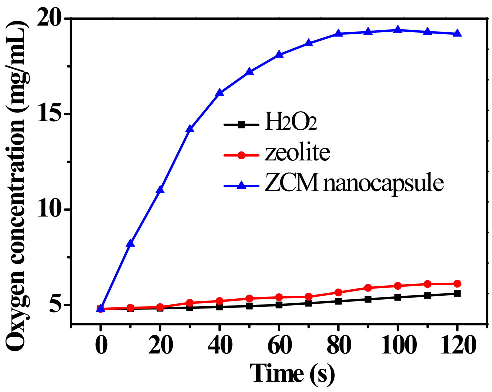

Figure S5 The O_2 concentration change profile in H_2O_2 solutions. C_{H2O2} = 50 μM, ZCM nanocapsule = 50 μg/mL.

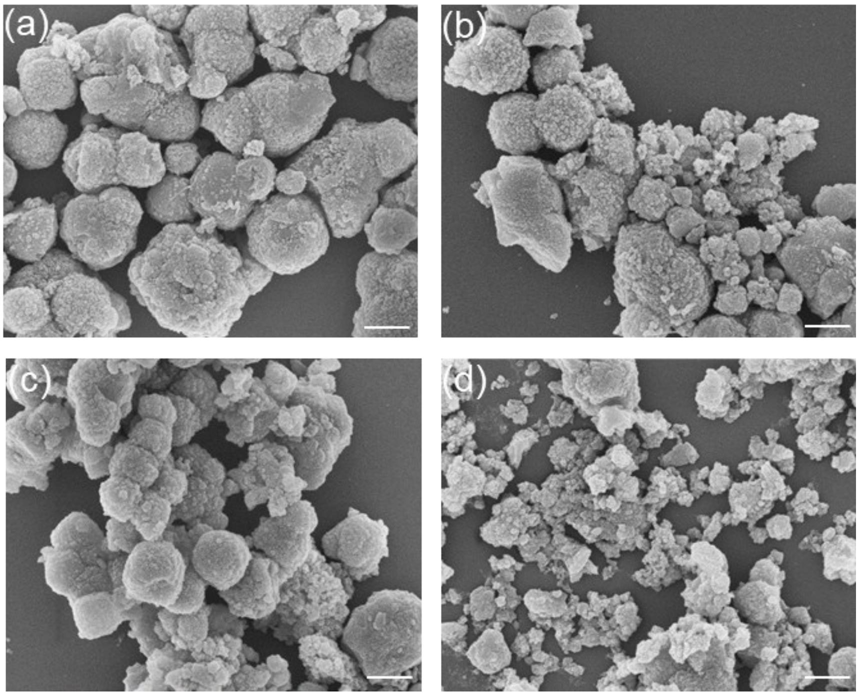

Figure S6 SEM images of ZCM nanocapsule after immersed in (a-b) PBS solution at pH=6.5 mimicking tumor microenvironment for (a) 4 days and (b) 8 days, or in (c-d) PBS solution at pH=5.5 mimicking tumor cell condition for (c) 4 days and (d) 8 days. Scale bar represents 500 nm.

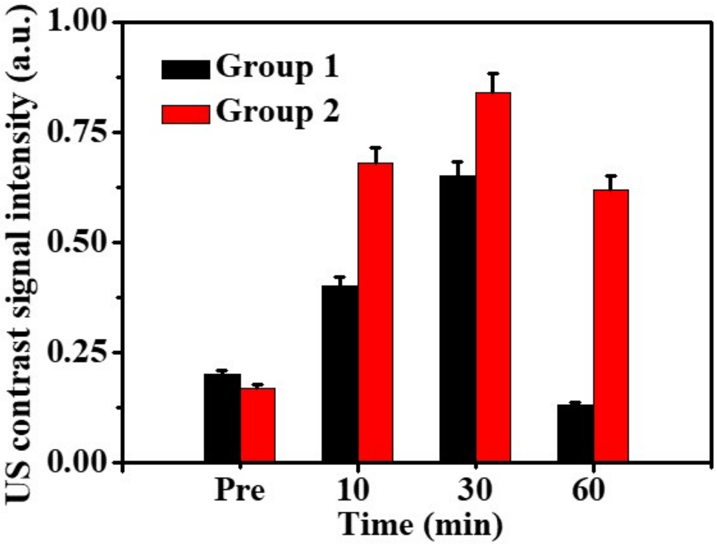

Figure S7 Quantitative assay of US contrast-enhanced contrast in free MB-treated and ZCM nanocapsule-treated groups.

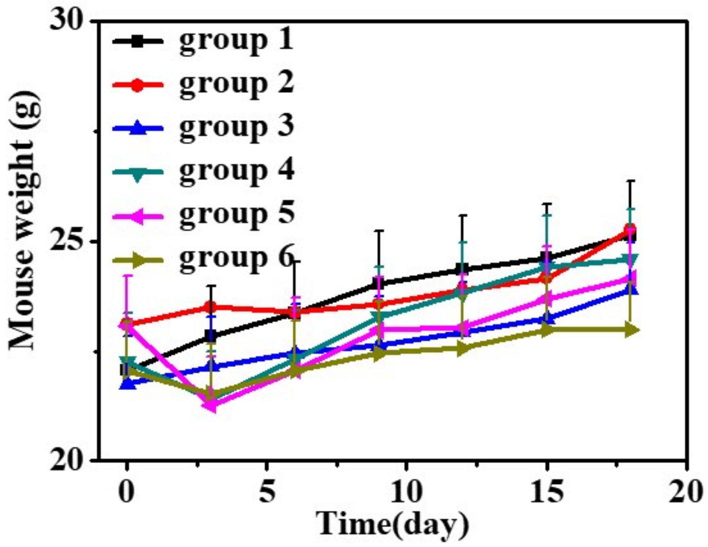

Figure S8 Body weight changes of different treated mice during the 18 day evaluation period. Dates indicate means and standard errors.

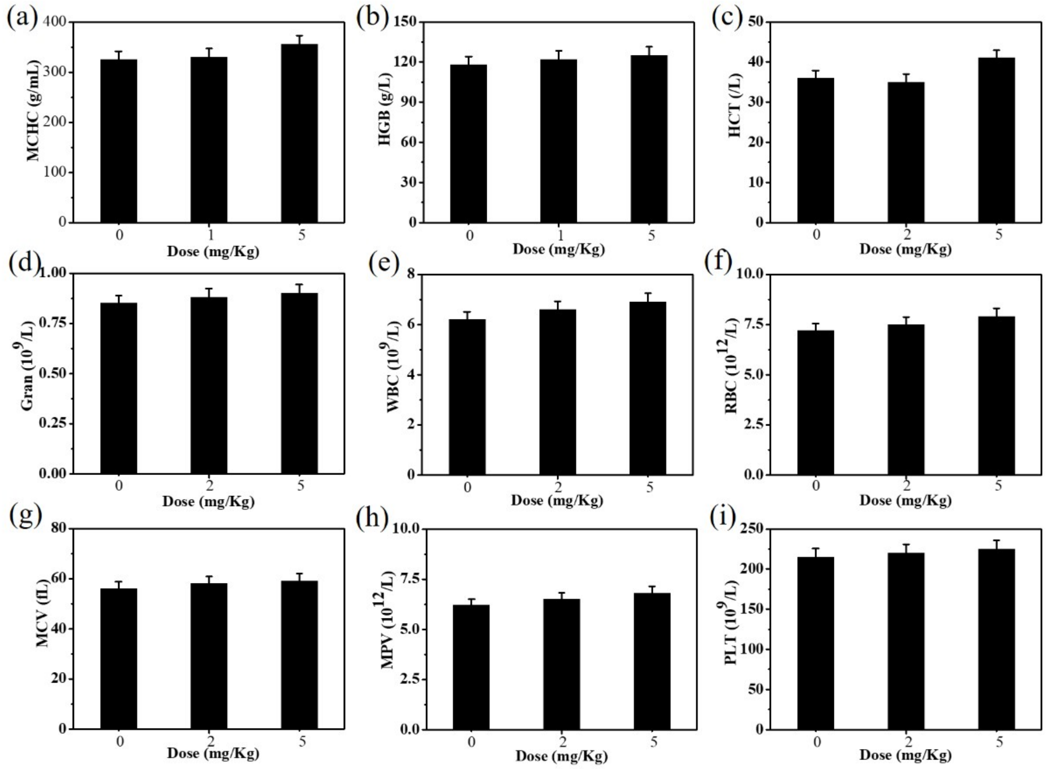

Figure S9 Blood chemistry assay of normal mice 7 d after subcutaneous injection of ZCM nanocapsule at two different doses. (a) Mean corpuscular hemoglobin concentration (MCHC), (b) hemoglobin concentration (HGB), (c) hematocrit (HCT), (d) number of neutrophilic granulocytes (Gran), (e) number of white blood cells (WBC), (f) number of red blood cells (RBC), (g) mean corpuscular volume (MCV), (h) mean platelet volume (MPV), and (i) platelets (PLT).

Table S1 Comparison of catalase activity after loading into different nanocarriers.

Materials	Catalase activity (%)	Ref
TaOx nanoshell	21	1
MONs	20.8	2
Albumin assembly	70	3
ZCM nanocapsule	90	/

1 G. Song, Y. Chen, C. Liang, X. Yi, J. Liu, X. Sun, S. Shen, K. Yang, Z. Liu, Catalase-Loded TaOx Nanoshells as Bio-Nanoreactors Combining High-Z Element and Enzyme Delivery for Enhancing Radiotherapy, *Adv. Mater.*, 2016, **28**, 7143-7148.

2 T. Liu, N. Zhang, Z. Wang, M. Wu, Y. Chen, M. Ma, H. Chen, J. Shi, Endogenous Catalytic Generation of O_2 Bubbles for In Situ Ultrasound-Guided High Intensity Focused Ultrasound Ablation, *ACS Nano*, 2017, **11**, 9093-9102.

3 Q. Chen, J. Chen, C. Liang, L. Feng, Z. Dong, X. Song, G. Song, Z. Liu, Drug-induced co-assembly of albumin/catalase as smart nano-theranostics for deep intra-tumoral penetration, hypoxia relieve, and synergistic combination therapy, *J. Control Release.*, 2017, **263**, 79-89.