

Supporting Information

## **Phase-change materials filled hollow magnetic nanoparticles for cancer therapy and dual modal bioimaging**

*Jinghua Li, Yan Hu, Yanhua Hou, Xinkun Shen, Gaoqiang Xu, Liangliang Dai, Jun Zhou, Yun Liu and Kaiyong Cai\**

Key Laboratory of Biorheological Science and Technology, Ministry of Education

College of Bioengineering

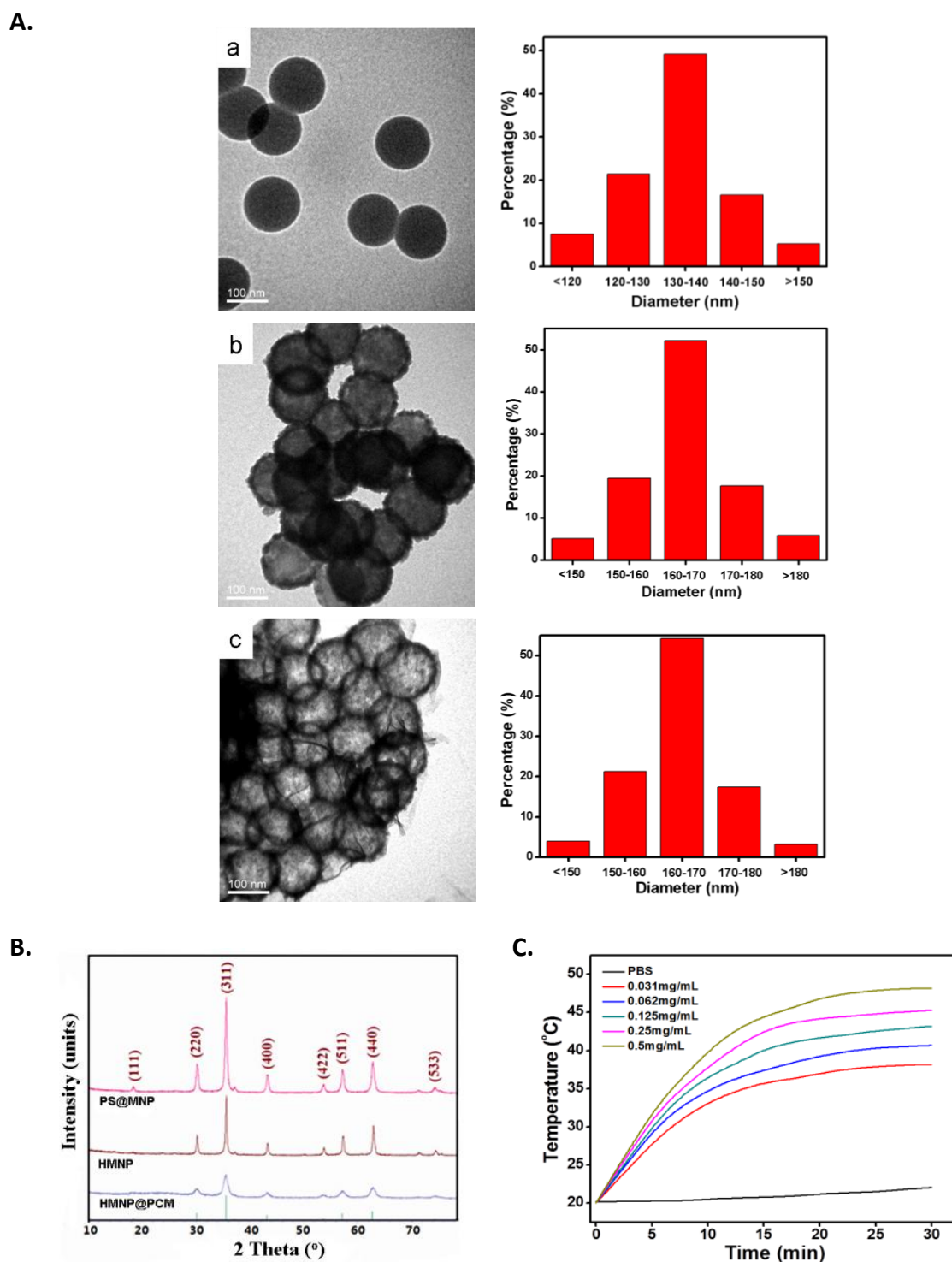
Chongqing University

Chongqing 400030, P. R. China

E-mail: [kaiyong\\_cai@cqu.edu.cn](mailto:kaiyong_cai@cqu.edu.cn)

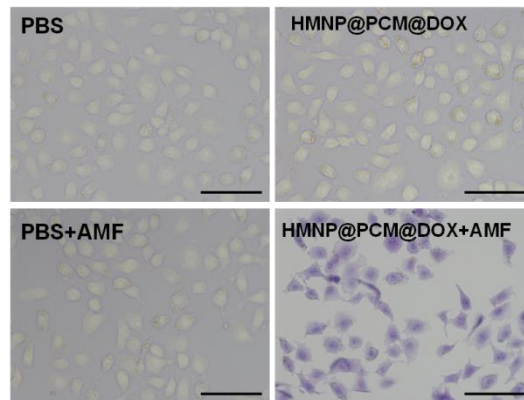
## ***List of Contents***

<b>Figure S1.</b> Physical property characterization -----	S3
<b>Figure S2.</b> Trypan blue staining -----	S4
<b>Figure S3.</b> Cell uptake -----	S5
<b>Figure S4.</b> TUNEL staining -----	S6
<b>Table S1.</b> Elemental analysis -----	S7
<b>Table S2.</b> Zeta-potential measurements-----	S8

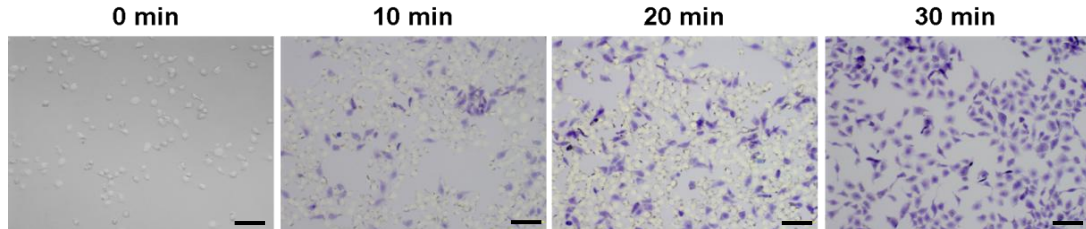


**Figure S1.** Physical property characterization: (A) TEM images and particle size distribution of: a, PS spheres; b, MNP@PS core-shell spheres; c, HMNP hollow spheres; (B) X-ray diffraction patterns of MNP@PS, HMNP and HMNP@PCM; and (C) Temperature change of PBS and HMNP@PCM@DOX solution with different concentrations when exposing to an AMF (300 A, 200 kHz, 4 kW, 30 min).

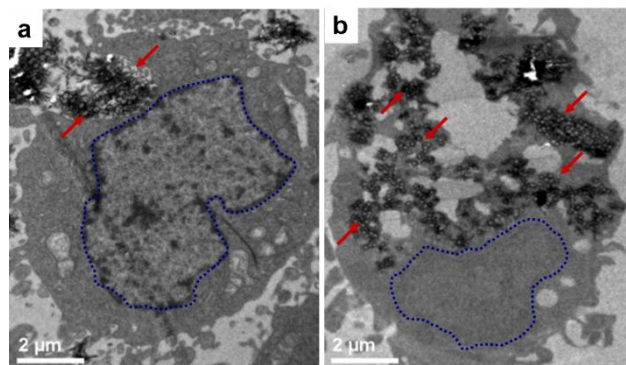
**A.**



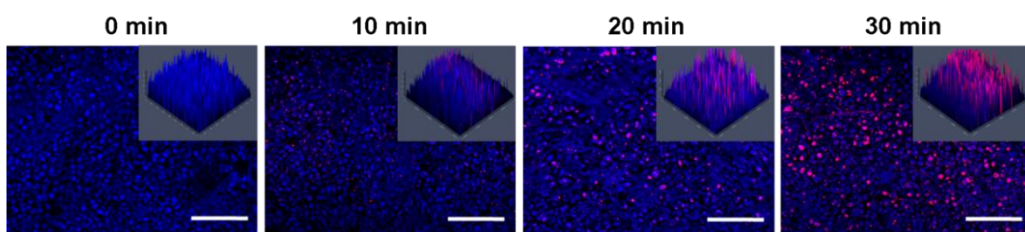
**B.**



**Figure S2.** (A) Optical graphs of HepG2 cells treated with different samples in presence or absence of AMF (300 A, 200 kHz, 4 kW, 30 min, scale bar: 200  $\mu\text{m}$ ); and (B) Time-dependent HepG2 cells treated with HMNP@PCM@DOX nanoparticles. Scale bar: 50  $\mu\text{m}$ . Dead cells were reflected by blue color with trypan blue staining.



**Figure S3.** TEM images of HepG2 cells after incubation with HMNP@PCM@DOX (a: 6 h, b: 12 h). The arrows indicate the endocytosed nanoparticles.



**Figure S4.** Time-dependent cells apoptosis of tumor tissues induced by thermo-chemo combination cancer therapy with TUNEL staining (300 A, 200 kHz, 4 kW, 30 min). Scale bar: 50  $\mu$ m.

**Table S1.** Elemental analysis of the as-synthesized nanoparticles at each step.

<b><i>Materials</i></b>	<b><i>C at.%</i></b>	<b><i>N at.%</i></b>	<b><i>H at.%</i></b>	<b><i>O at.%</i></b>
<b>PS</b>	91.45	0.04	7.57	0.03
<b>MNP@PS</b>	39.51	0.08	4.63	15.29
<b>HMNP</b>	2.26	0.06	1.84	26.27
<b>HMNP@PCM</b>	15.29	0.05	2.73	21.35

**Table S2.** Zeta-potentials of the as-synthesized nanoparticles at each step.

<b><i>Materials</i></b>	<b><math>\zeta</math>-potential (mV)</b>
<b>PS</b>	<b><math>-13.12 \pm 2.54</math></b>
<b>MNP@PS</b>	<b><math>-7.23 \pm 1.76</math></b>
<b>HMNP</b>	<b><math>-2.36 \pm 0.84</math></b>
<b>HMNP@PCM</b>	<b><math>6.29 \pm 1.32</math></b>