Supporting Information

Phase-shifted PFH@PLGA/Fe_3O_4 Nanocapsules for MRI/US Imaging and Photothermal Therapy with Near-infrared Irradiation

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Table S1. The corresponding amount of Fe_3O_4 and mean signal intensity of MRI for groups of deionized water, pure nanoparticles and the PFH@PLGA/Fe_3O_4 nanocapsules with different iron concentration. Six replicates are measured for each sample. Data are presented as mean ± standard deviation.

Samples		Fe_3O_4 concentration	Signal intensity(SI)
Group I	Deionized water	0μg/mL	1988.55±12.25#
Group II	Pure PLGA	0μg/mL	1352.85±19.51*
Group III	PFH@PLGA/Fe_3O_4	0.64±0.09μg/mL	1244.23±25.64*#
Group IV	PFH@PLGA/Fe_3O_4	1.39±0.09μg/mL	1125.23±12.22*#
Group V	PFH@PLGA/Fe_3O_4	2.66±0.30μg/mL	1067.54±16.33*#
Group VI	PFH@PLGA/Fe_3O_4	5.78±0.68μg/mL	843.65±14.67*#
Group VII	PFH@PLGA/Fe_3O_4	10.76±1.26μg/mL	562.99±8.57*#
Group VIII	PFH@PLGA/Fe_3O_4	21.49±0.75μg/mL	395.58±8.73*#
Group IX	PFH@PLGA/Fe_3O_4	30.00±1.27μg/mL	202.17±4.46*#
Group X	PFH@PLGA/Fe_3O_4	55.55±1.24μg/mL	48.99±2.02*#
Group XI	PFH@PLGA/Fe_3O_4	117.11±2.10μg/mL	39.76±1.21*#
Group XII	PFH@PLGA/Fe_3O_4	247.30±1.68μg/mL	33.56±1.20*#

* indicated $p < 0.05$ compared with the Deionized water group.

indicated $p < 0.05$ compared with the Pure Nanoparticles group.

Table S2. Different temperature of nude mouse tumor tissue changes with the extended time in different groups at the fixed height of 15cm. Group I: Pure PLGA nanoparticles. Group II: PFH@PLGA nanocapsules; Group III: Fe_3O_4@PLGA nanocapsules; Group IV: PFH@PLGA/Fe_3O_4 nanocapsules;

Time/Group	PLGA	PFH@PLGA	Fe_3O_4@PLGA	PFH@PLGA/Fe_3O_4
0min	31±0°C	31±0°C	31±0°C	31±0°C
1min	31.96±0.56°C	31.81±0.34°C	35.57±1.05°C	36.24±1.1°C
2min	32.66±0.77°C	33.85±0.72°C	40.12±1.35°C	41.26±2.72°C
3min	33.32±0.63°C	34.68±0.78°C	44.7±1.57°C	45.35±1.92°C
4min	33.48±0.82°C	35.1±1.06°C	47.13±2.36°C	49.01±2.45°C
5min	34.56±0.91°C	36.12±1.36°C	50.41±2.57°C	51.18±1.91°C
6min	35.5±0.65°C	36.7±0.86°C	51.56±2.82°C	53.17±1.81°C
7min	35.92±1.02°C	37.65±0.89°C	53.04±3.42°C	55.1±1.48°C
8min	37.58±1.35°C	38.29±0.75°C	55.45±2.56°C	56.76±2.1°C
9min	37.84±1.03°C	38.76±0.92°C	57.36±1.32°C	57.76±1.25°C
10min	38.79±0.74°C	39.05±0.8°C	57.64±1.37°C	58.81±0.9°C
11min	39.44±1.38°C	39.15±0.85°C	59.42±0.85°C	59.83±1.55°C
12min	40.15±1.5°C	40.66±1.47°C	60.76±0.74°C	60.19±1.39°C

Table S3. Temperature is increased as the extension of the irradiation time at the fixed depth (3cm, 6cm, 9cm, 12cm, 15cm, 18cm) and decreased along with the increment of the irradiation depth at the fixed irradiation time (1min, 2min, 3min, 4min, 5min,6min).

Time/Height	3cm	6cm	9cm	12cm	15cm	18cm
0min	37±0°C	37±0°C	37±0°C	37±0°C	37±0°C	37±0°C
1min	56.38±1.46°C	53.88±1.44°C	52.34±1.82°C	51.78±1.09°C	50.7±1.62°C	44.4±1.93°C
2min	61.48±1.59°C	59.04±1.4°C	55.06±2.07°C	55.54±1.84°C	53.54±1.63°C	49.62±1.36°C
3min	64.66±1.27°C	62.74±0.87°C	59.68±0.93°C	58.18±1.33°C	56.22±1.39°C	50.88±0.90°C
4min	65.5±1.49°C	63.28±1.57°C	61.28±1.65°C	60.52±1.22°C	57.1±1.41°C	52.34±1.40°C
5min	66.46±1.42°C	64.44±1.69°C	62.52±0.58°C	61.56±1.32°C	57.8±1.52°C	53.4±1.64°C
6min	68.2±0.64°C	66.26±0.69°C	63.44±1.48°C	62.56±1.44°C	59.84±1.30°C	54.84±1.05°C

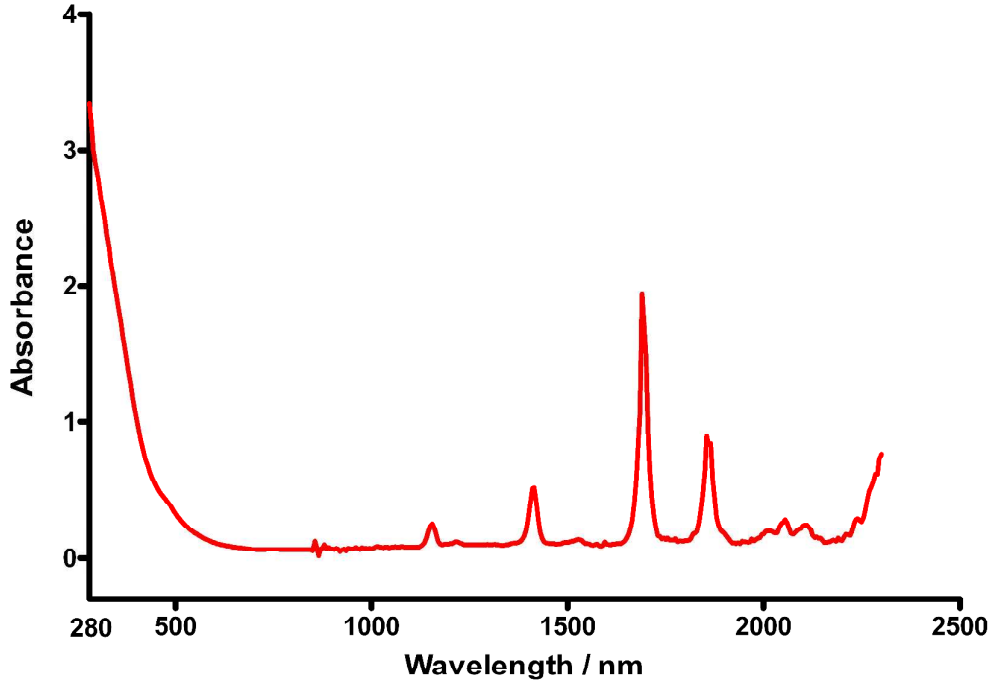

Figure S1. UV–Vis–NIR absorbance spectra of PFH@PLGA/Fe_3O_4 solutions. PFH@PLGA/Fe_3O_4 nanocapsules exhibit a broad absorption ranging from UV to NIR region which was shown in the absorption spectra.

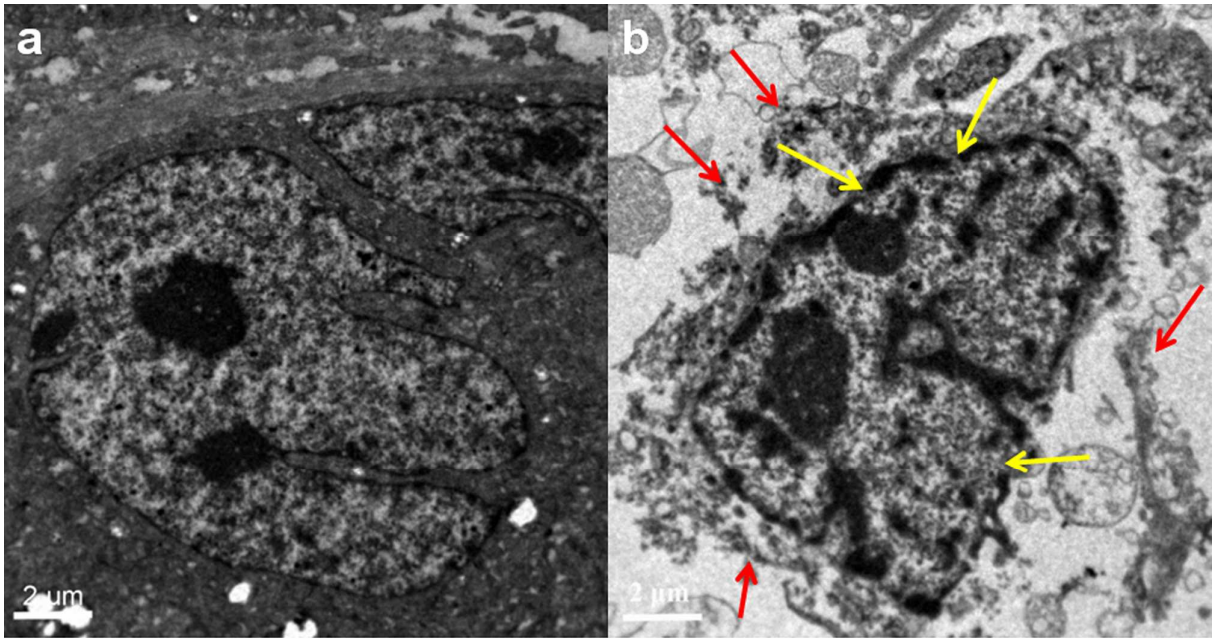

Figure S2. (a) TEM analysis of cells in group I. Cell structure was normal and clear, and cell and nuclear membranes were intact. **(**b) TEM analysis of cells in group VI. Most cell membranes ruptured, nuclear membranes disintegrated (karyorrhexis) (yellow arrows), some cytoplasm dissolved (red arrows), and organelles disappeared. Magnification, ×6000, Scale bar: 2 μm.