

Electronic Supplementary Information (ESI)

High drug loading and pH-responsive targeted nanocarriers from alginate-modified SPIONs for anti-tumor chemotherapy

*Na Peng,^{a,c} Bo Wu,^a Lei Wang,^a Weiyang He,^a Ziye Ai,^a Xingjian Zhang,^a Yanfeng
Wang,^a Lin Fan^a and Qifa Ye ^{*a,b}*

^a Wuhan University, Zhongnan Hospital of Wuhan University, Institute of Hepatobiliary Disease of Wuhan University, Transplant Center of Wuhan University, Hubei Key Laboratory of Medical Technology on Transplantation, Wuhan Hubei, 430071

^b The 3rd Xiangya Hospital of Central South University, Research Center of National Health Ministry on Transplantation Medicine Engineering and Technology, Changsha, 410013

^c Guangzhou Sugarcane Industry Research Institute, Guangzhou, 510316

SEM imaging

A droplet of SPION-4 or DOX-loaded SPION-4 solution was separately dropped onto glass slides and dried overnight. After being sputter-coated with gold, the samples were visualized on a Quanta 200 (FEI, Netherlands).

TEM imaging

For TEM imaging, HepG2 cells were incubated with DOX-loaded SPION-4 according to $2 \mu\text{g mL}^{-1}$ DOX for 24 h in the presence of an additional magnet in 1 mL of DMEM containing 10% FBS. Then, removing the culture medium and the cells were pre-fixed with 2.5% glutaraldehyde in PBS (0.1 M, pH7.4) for 25 min at room temperature. Then, the cells were shaved off and collected in 1.5 mL tube. Micrographs were obtained with a FEI Tecnai G² 20 TWIN Transmission Electron Microscope.

Table S1 Properties of modified SPIONs and DOX-loaded nanocarriers

Sample	DOX-free nanocarriers			DOX-loaded nanocarriers			
	Size (nm)	PDI	Zeta (mV)	Size (nm)	PDI	Zeta (mV)	DLC (%)
SPION-1	-	-	-12.0	-	-	-	-
SPION-2	19.6	0.391	+21.4	23.1	0.306	-	7.58
SPION-3	-	-	-17.2	-	-	-	-
SPION-4	91.3	0.246	-16.9	135.2	0.245	-7.6	48.98

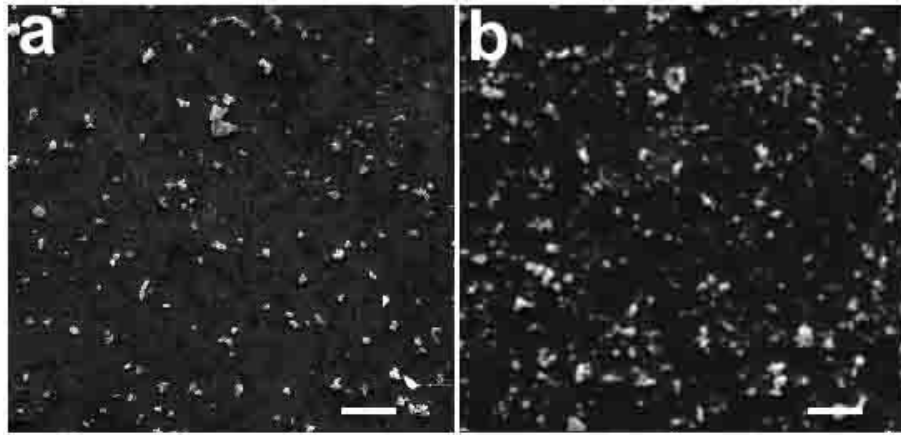


Figure S1 SEM images of SPION-4 (a) and DOX-loaded SPION-4 (b). Scale bar is 1 μm .

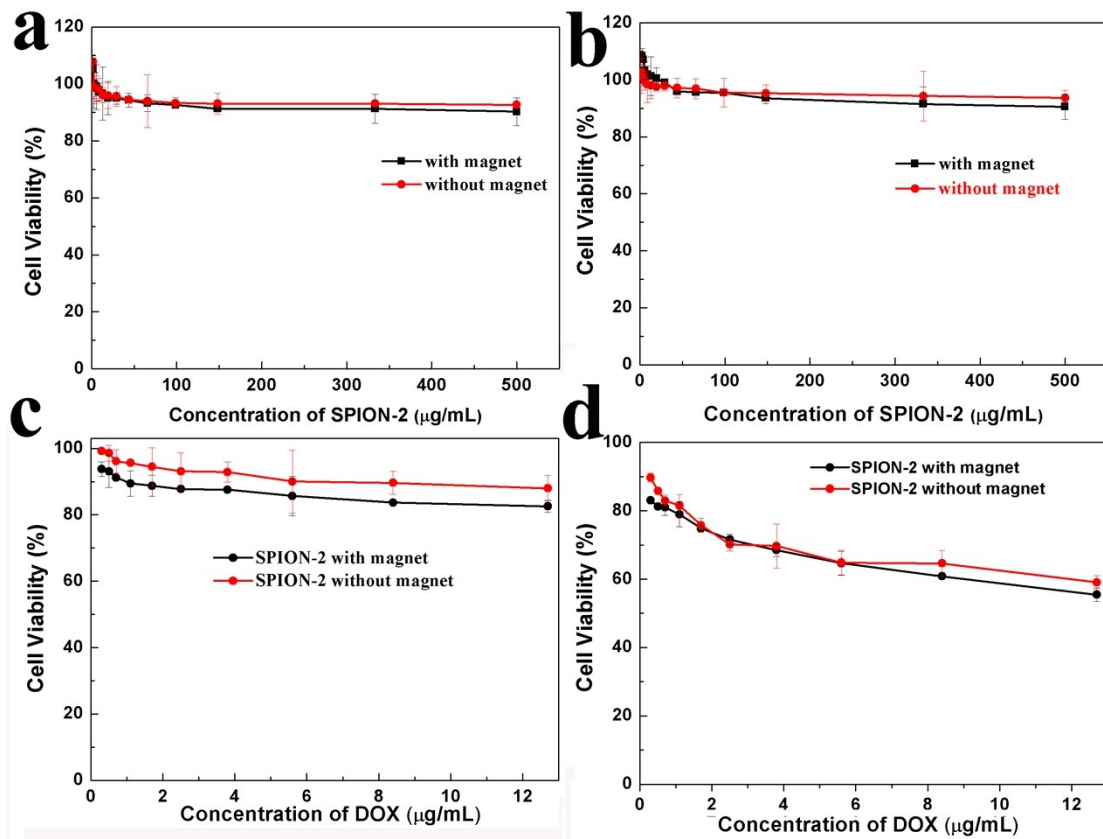


Figure S2 MTT assay of SPION-2 against HepG2 cells (a) and LO2 cells (b) after incubation for 48 h (without or with magnet). *In vitro* cytotoxicity studies of free DOX and DOX-loaded SPION-2 in the absence or presence of magnet against HepG2 cells (c) and LO2 cells (d) after incubation for 48 h. The standard deviation for each data point was averaged over four samples.

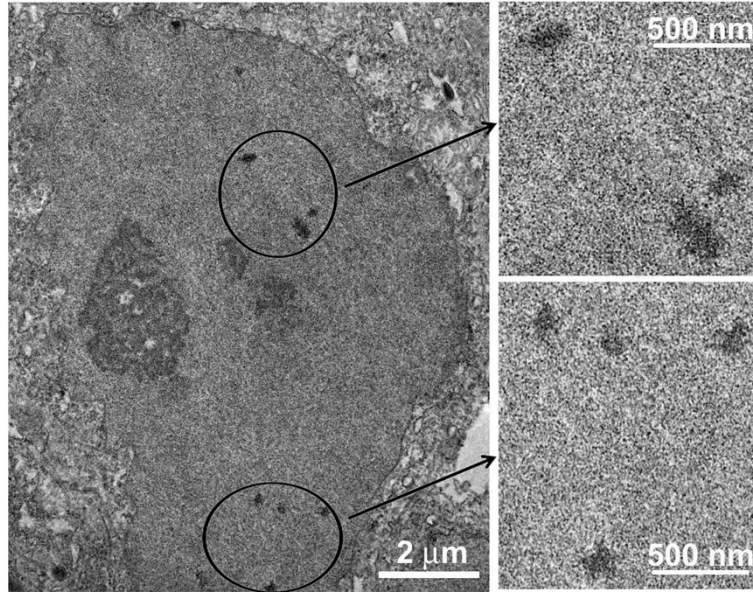


Figure S3 TEM images of HepG2 cells after incubation with DOX-loaded SPION-4 for 24 h with an additional magnetic field. The internalized nanoparticles trapped inside the nucleus are viewed from an enlarged rectangular area.