Supporting Information

Multi-Step Encapsulation of Chemotherapy and Gene Silencing Agents in Functionalized Mesoporous Silica Nanoparticles

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AUTHOR INFORMATION

The authors declare no competing financial interest.

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Supporting Video 1. Intravital microscopy video of cyclodextrin-grafted polyethylenimine-mesoporous silica nanoparticles (CP-MSNP) loaded with doxorubicin (DOX) and small interfering RNA (siRNA)^{FAM} (yellow) in an MDA-MB-231 orthotopic breast cancer tumor. The video was captured 0.5 h post-injection of particles (siRNA, 15 μg). Tumor blood vessels are shown in blue (bovine serum albumin Alexa Fluor 647 conjugate).

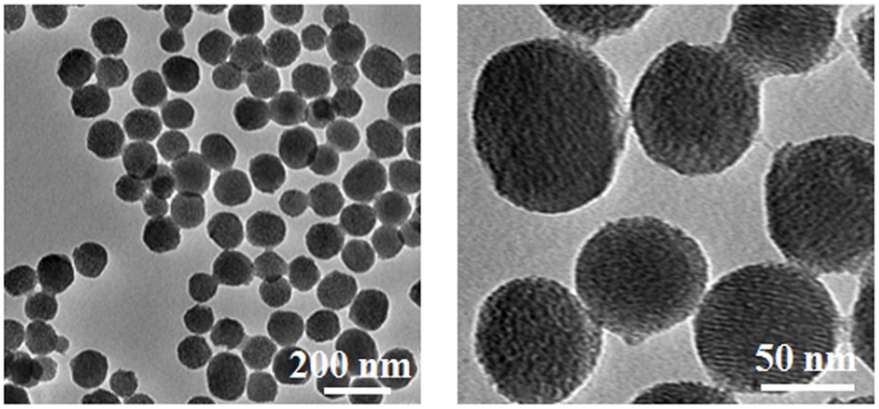

Figure S1. Transmission electron microscopy (TEM) images of mesoporous silica nanoparticles MSNP-OH.

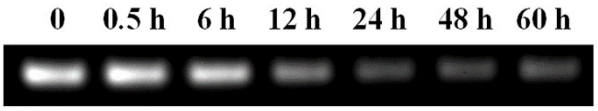

Figure S2. CP-MSNP@DOX-mediated protection of small interfering RNA (siRNA) in serum. Particles were incubated with 50% fetal bovine serum (FBS) at 37 °C for 30 min, 6 h, 12 h, 24 h, 48 h, or 60 h. Samples were run on a 2% agarose gel and stained with ethidium bromide. siRNA, 200 ng.

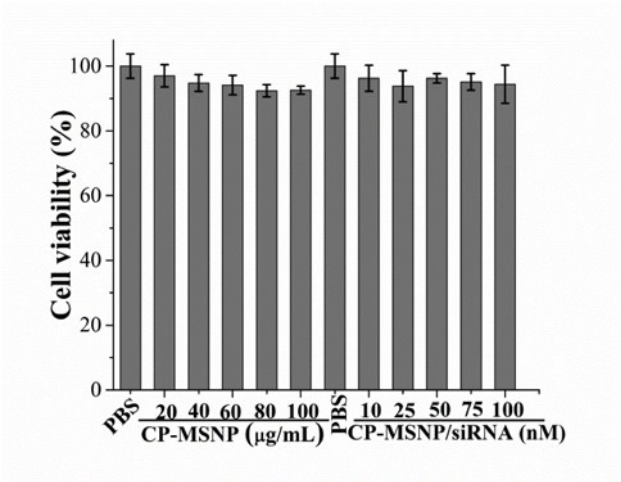

Figure S3. Viability of MDA-MB-231 breast cancer cells exposed CP-MSNP (20-100 μg/mL) and CP-MSNP/scrambled siRNA (10-100 nM) for 72 h. Results are presented as mean ± s.d. of triplicates. PBS, phosphate buffered saline.

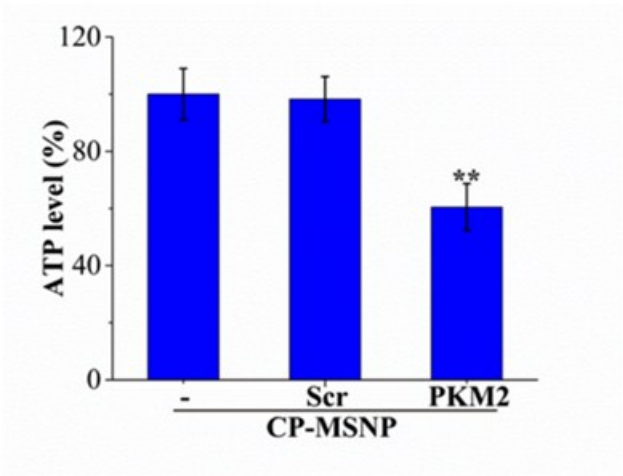

Figure S4. Levels of adenosine triphosphate (ATP) in MDA-MB-231 cells exposed CP-MSNP and CP-MSNP/siRNA for 48 h. Scrambled siRNA (Scr) and pyruvate kinase M2 siRNA (PKM2) were used at a dose of 50 nM. Results are presented as mean ± s.d. of triplicates.

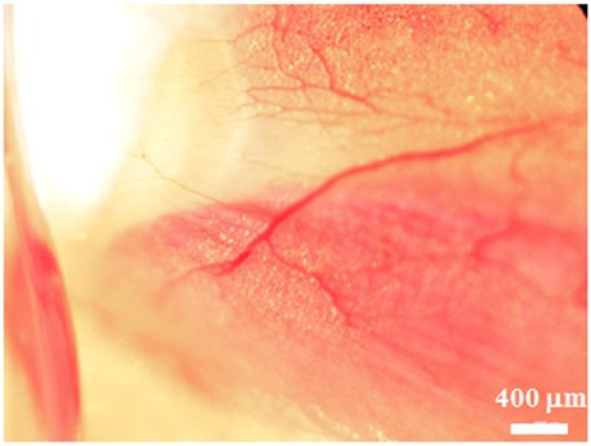

Figure S5. Intravital microscopy image of tumor blood vessels in an MDA-MB-231 orthotopic breast cancer model.

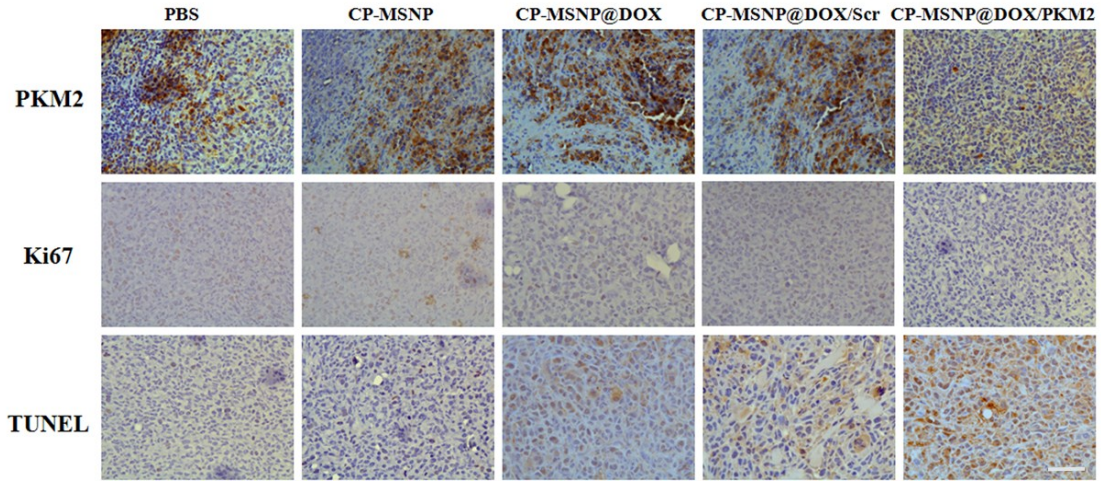

Figure S6. Immunohistochemical staining of PKM2, Ki67, and terminal deoxynucleotidyl transferase mediated dUTP nick end-labeling (TUNEL) in orthotopic MDA-MB-231 breast cancer tumors from athymic nude mice. Mice received weekly intravenous injections of particles for four weeks. Scale bar, 100 μm.

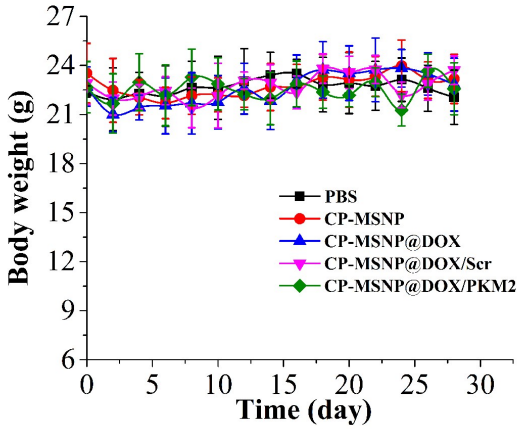

Figure S7. Body weights of mice bearing orthotopic MDA-MB-231 breast cancer tumors. Mice received weekly intravenous injections of PBS, CP-MSNP, CP-MSNP@DOX, CP-MSNP@DOX/Scr, or CP-MSNP@DOX/PKM2 for four weeks. Results are presented as mean ± s.d. (n = 3).

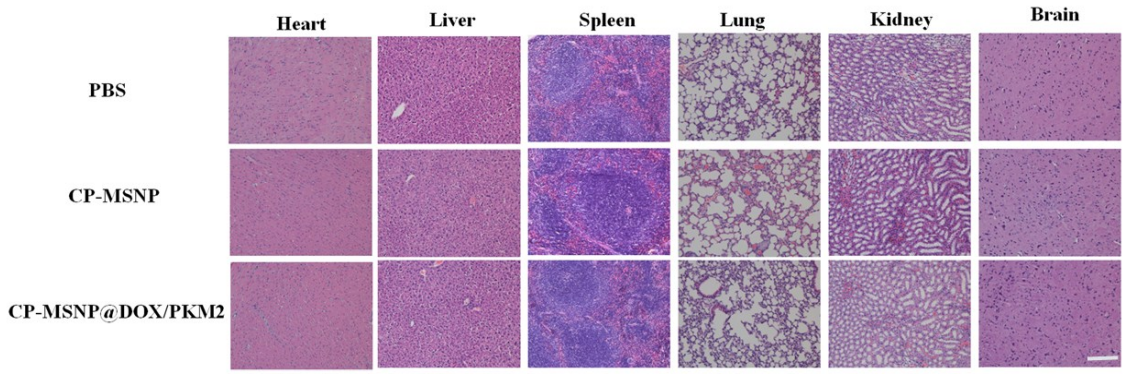

Figure S8. Hematoxylin and eosin (H&E) staining of major organs (heart, liver, spleen, kidney, lungs, and brain). Athymic nude mice bearing orthotopic MDA-MB-231 breast cancer tumors received weekly intravenous injections of CP-MSNP or CP-MSNP@DOX/PKM2 siRNA for four weeks. Scale bar, 100 μm.