

Supporting Information

Intracellular pH-Triggered, Targeted Drug Delivery to Cancer Cells by Multifunctional Envelope-Type Mesoporous Silica Nanocontainers

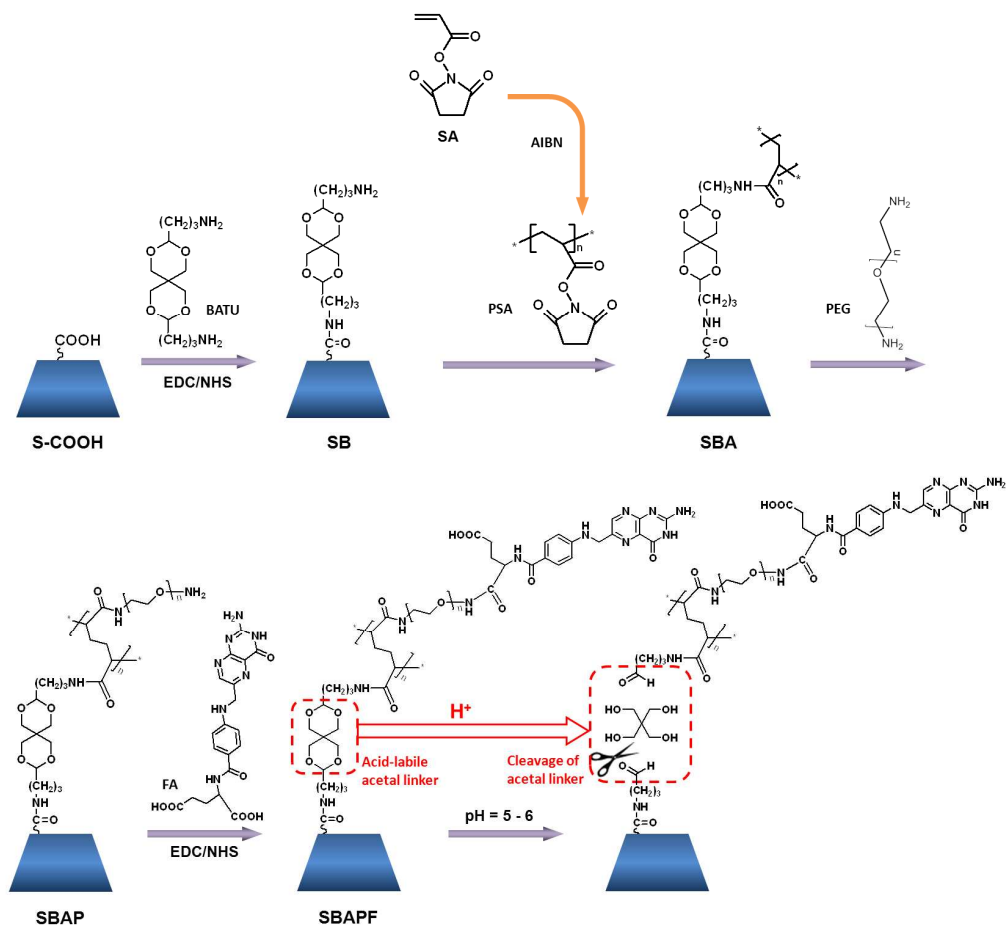
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Scheme S1. Schematic outline of synthesis of SBAPF.

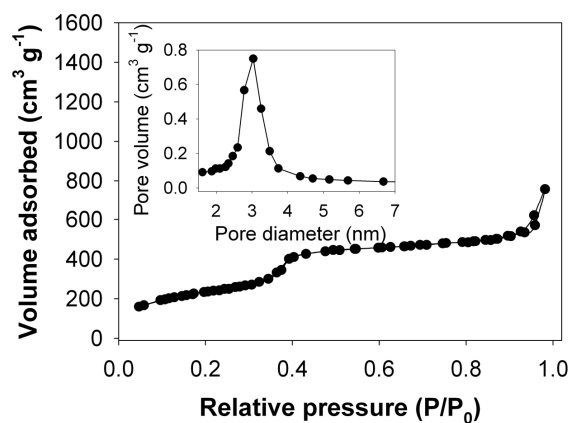


Figure S1. N₂ adsorption-desorption isotherm and pore size distribution curve (inset) of S-COOH.

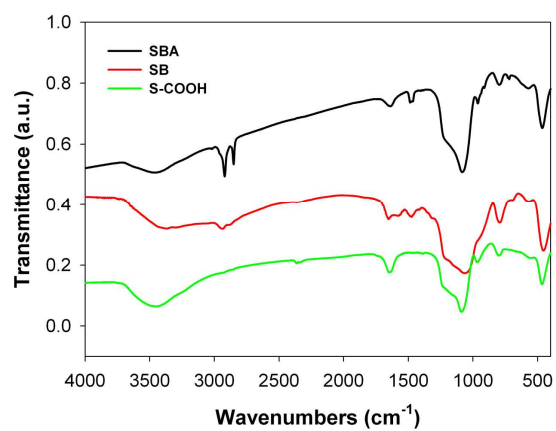


Figure S2. The FT-IR spectra of S-COOH, SB, and SBA.

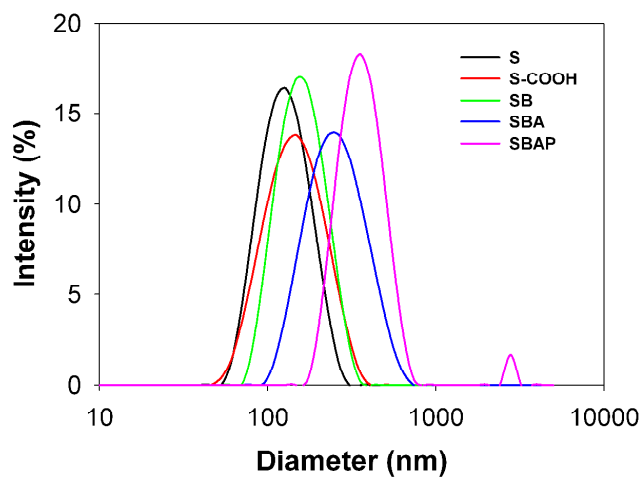


Figure S3. DLS measurements of different nanoparticles in water.

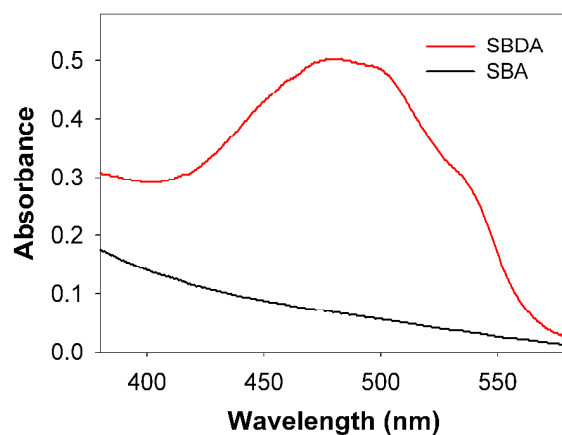


Figure S4. UV-vis spectra of SBA and SBDA in aqueous solution.

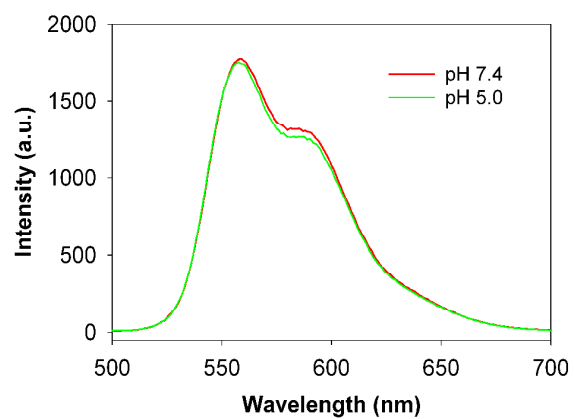


Figure S5. Fluorescence intensity ($\lambda_{\text{ex}} = 488 \text{ nm}$) of free DOX in PBS ($50 \mu\text{M}$, pH = 7.4) remains unchanged after treatment with PBS buffer solution (pH = 5.0), indicating the stability of DOX's fluorescence under the different pH conditions.

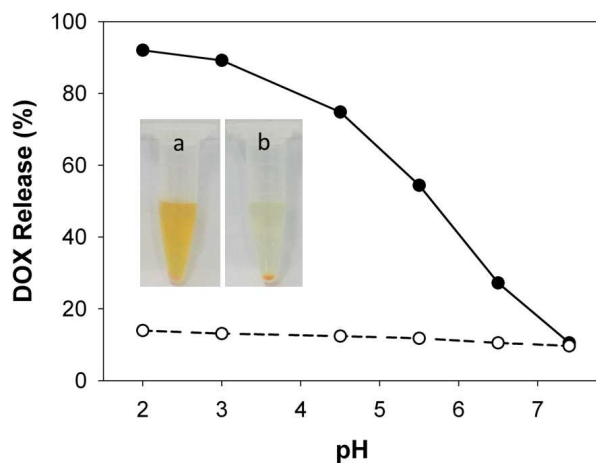


Figure S6. pH dependence of the percentage of released DOX from SBDA (black circles) and SUDA (open circles). Inset: Digital photographs showing the DOX release from the SBDA (a) and SUDA (b) in acetate buffer solution (pH 3.0) for 180 min, respectively.

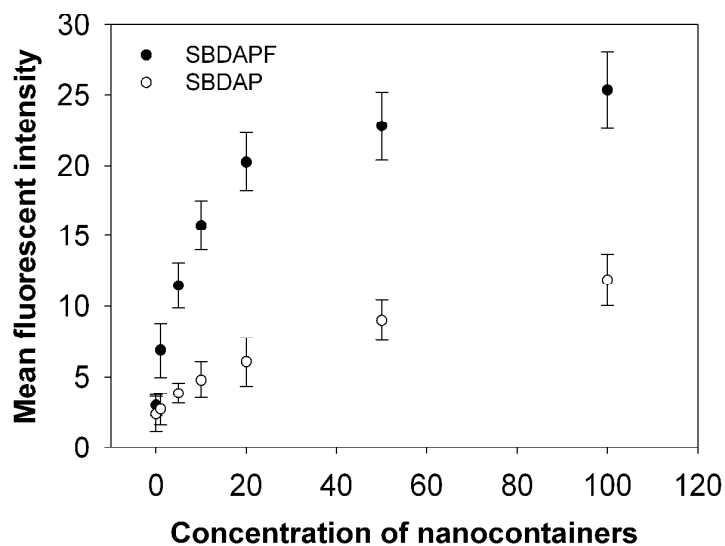


Figure S7. Flow cytometric comparison of the binding of SBDAPF and SBDAP with different concentrations to the target HepG2 cells.

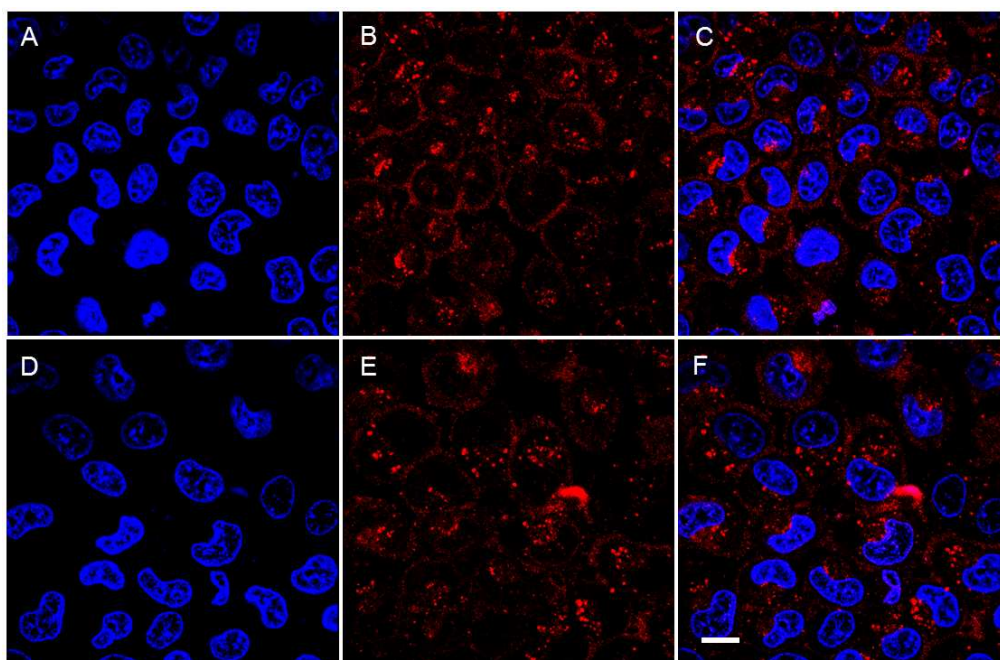


Figure S8. CLSM images of HepG2 cells treated by SBDAPF (A-C) and SUDAPF (D-F) for 3 h at 37 °C, respectively. The red was regarded as the fluorescence of DOX (A, D). The nuclei of cells were dyed blue by Hoechst 33342 for visualization (B, E). The confocal fluorescence images were overlapped (C, F). The concentration of nanocontainers used is 50 $\mu\text{g mL}^{-1}$. The scale bar is 10 μm .

Table S1. Zeta-potential of different nanoparticles in water.

Materials	Zeta-potential (mV)
Mesoporous silica (S)	-24.5 \pm 3.2
S-COOH	-36.4 \pm 4.7
SB	21.7 \pm 5.5

Table S2. Hydrodynamic size and polydispersity index of different nanoparticles

Materials	Average hydrodynamic size (nm)	Polydispersity index (PDI)
S	127.5±5.6	0.23
S-COOH	135.7±4.3	0.19
SB	151.0±7.9	0.21
SBA	227.6±11.2	0.25
SBAP	309.2±14.7	0.27