Electronic Supplementary Information

Functional polymeric dialdehyde dextrin network capped mesoporous silica nanoparticles for pH/GSH dual-controlled drug release

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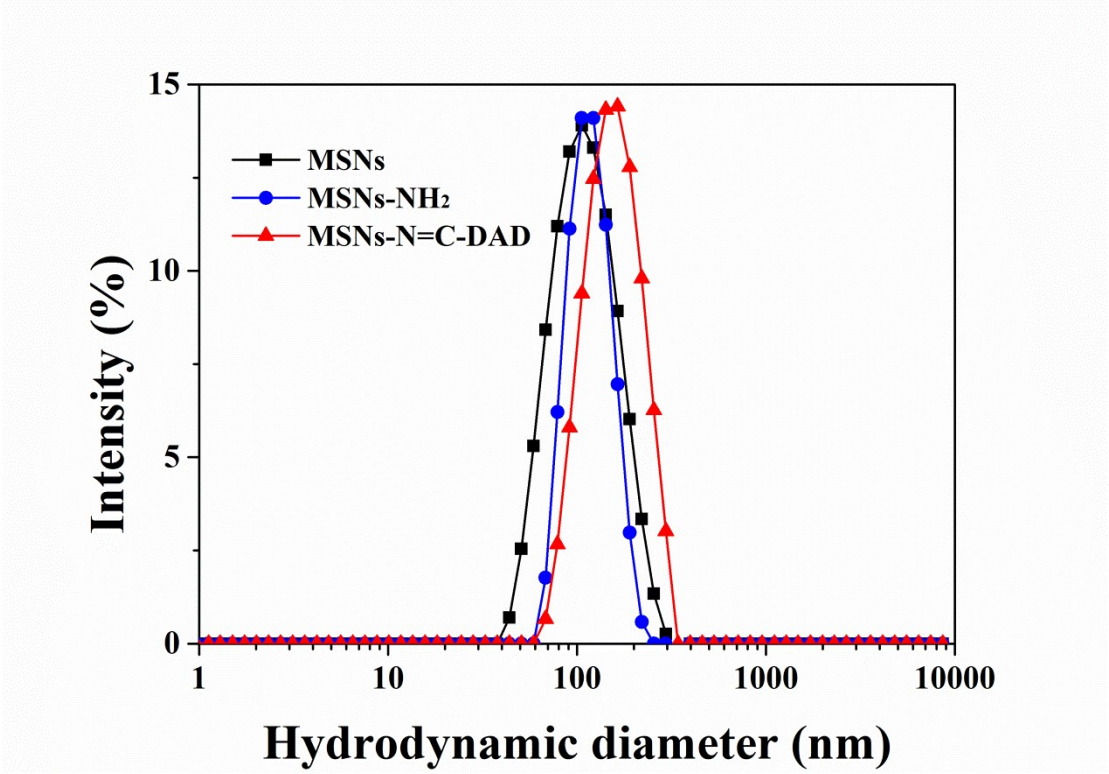

Fig. S1 Hydrodynamic diameter distribution of MSNs, MSNs-NH_2 and MSNs-N=C-DAD.

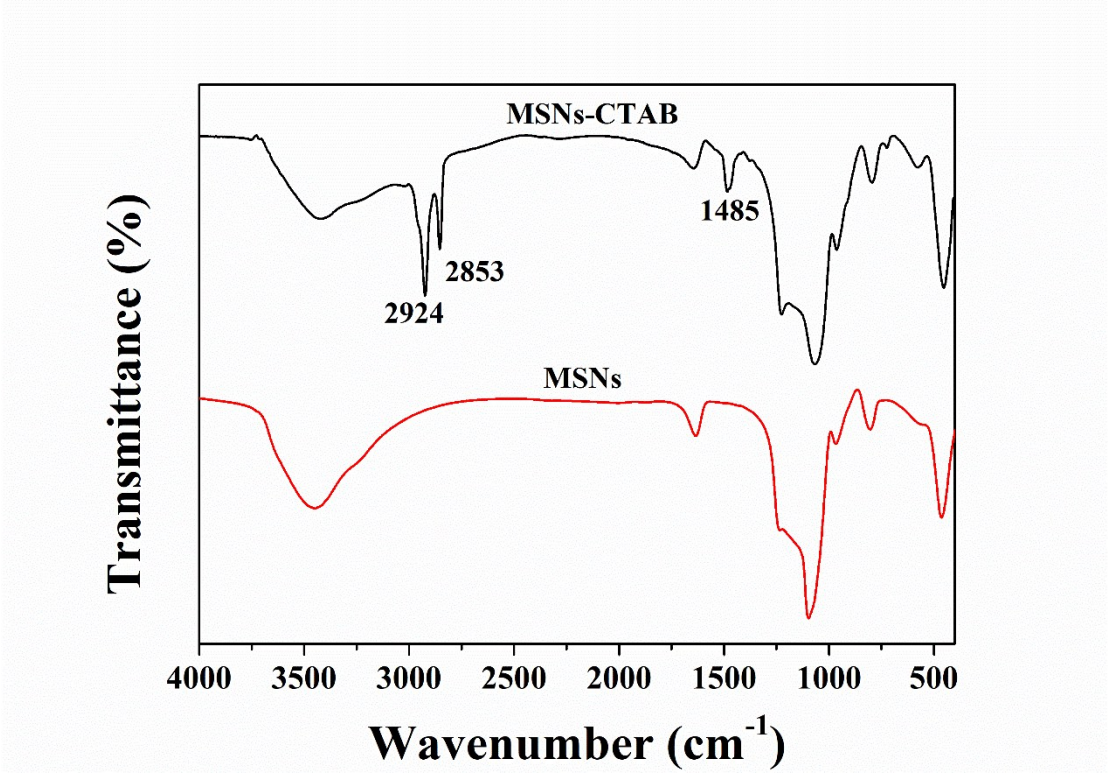

Fig. S2 FTIR spectra of MSNs and MSNs-CTAB. The appearance of peaks appeared at 2924 and 2853 cm^{-1} attributed to the characteristic C–H deformation vibration and the peaks at about 1485 cm^{-1} assigned C–H deformation vibration due to large amount of CTAB in the channels confirmed the structure of MSN-CTAB.

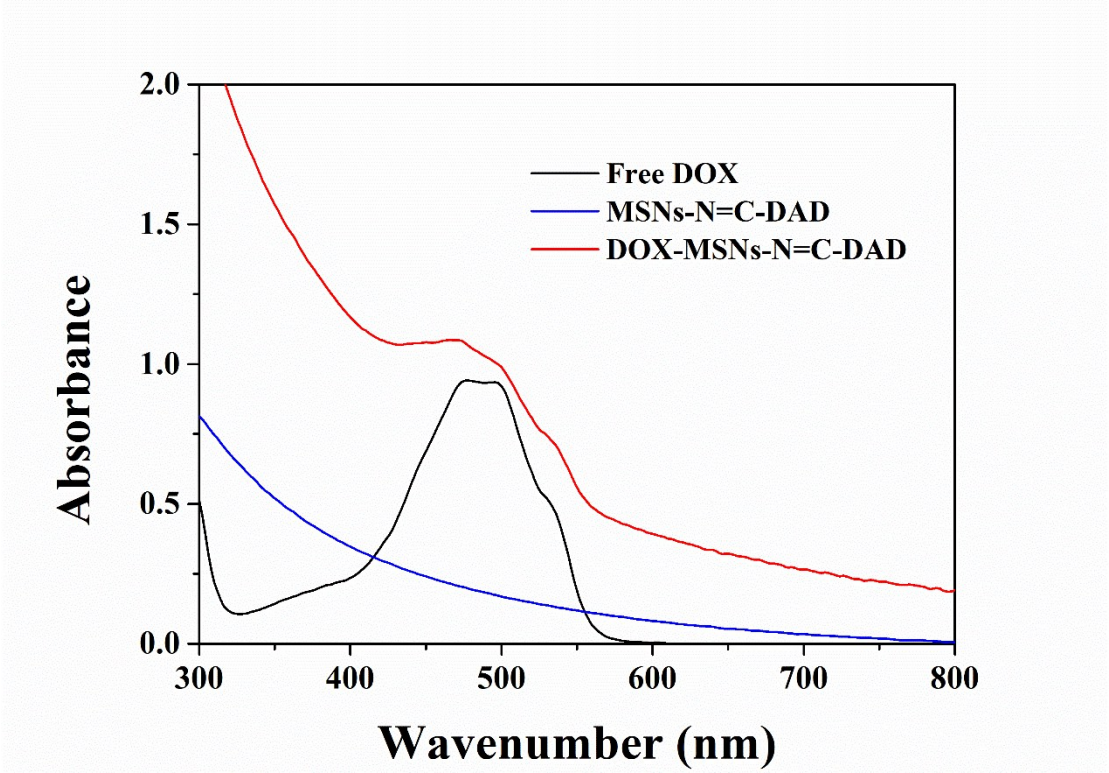

Fig. S3 UV-vis absorption of free DOX, MSNs-N=C-DAD and DOX-MSNs-N=C-DAD.

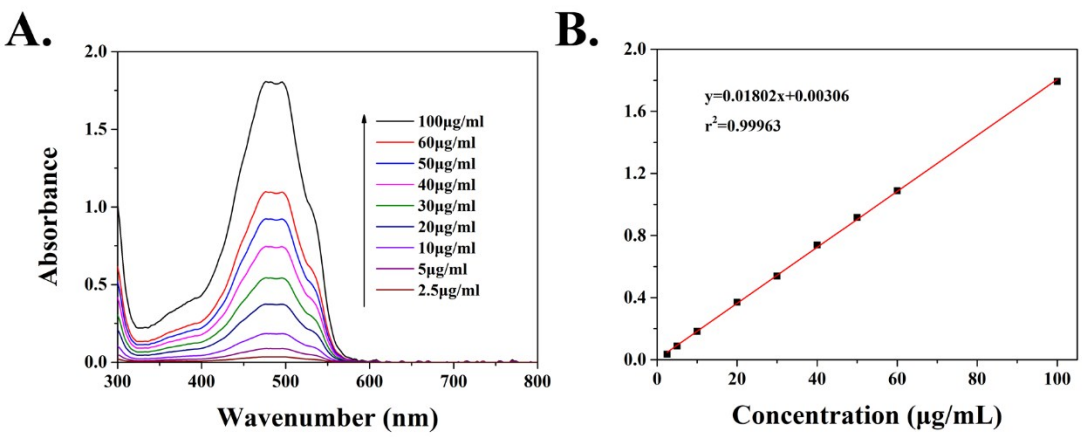

Fig. S4 (A) The absorption spectra of DOX with different concentrations. (B) The standard curve of DOX absorbance value at 480 nm. The obtained standard curve is Y=0.01802X+0.00306 (Y: absorbance value at 480 nm; X: concentration of DOX, R^2=0.99963).

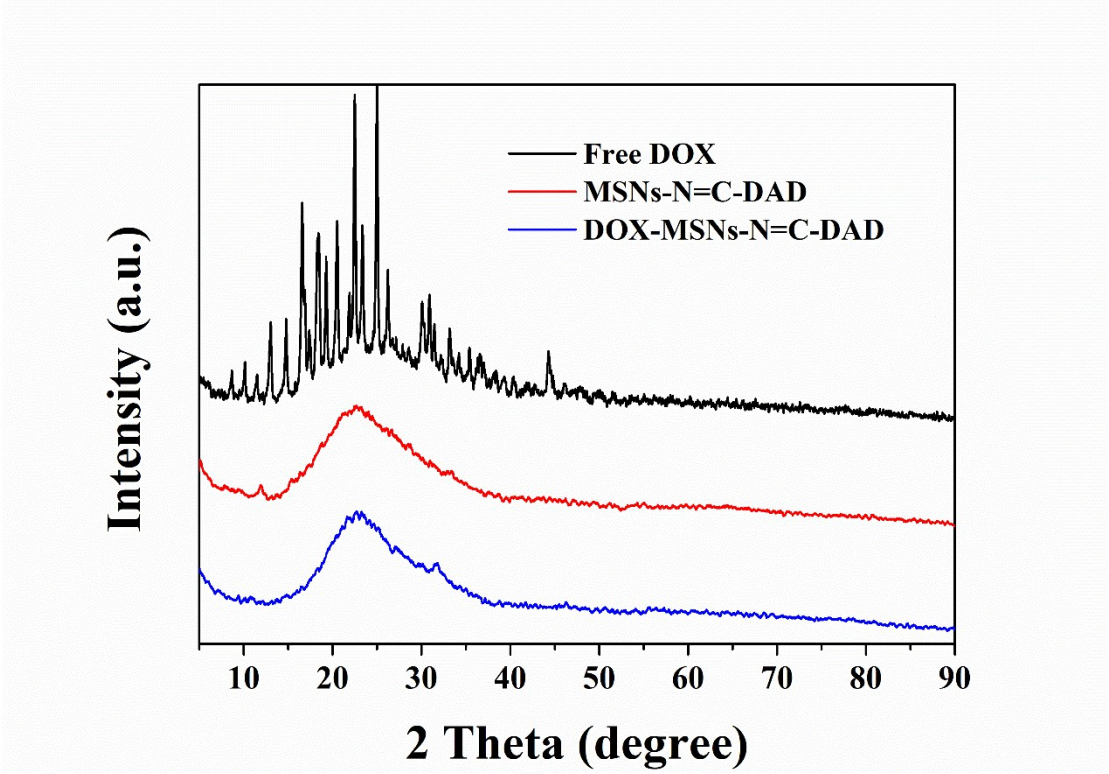

Fig. S5 XRD patterns of free DOX, MSNs-N=C-DAD and DOX-MSNs-N=C-DAD.

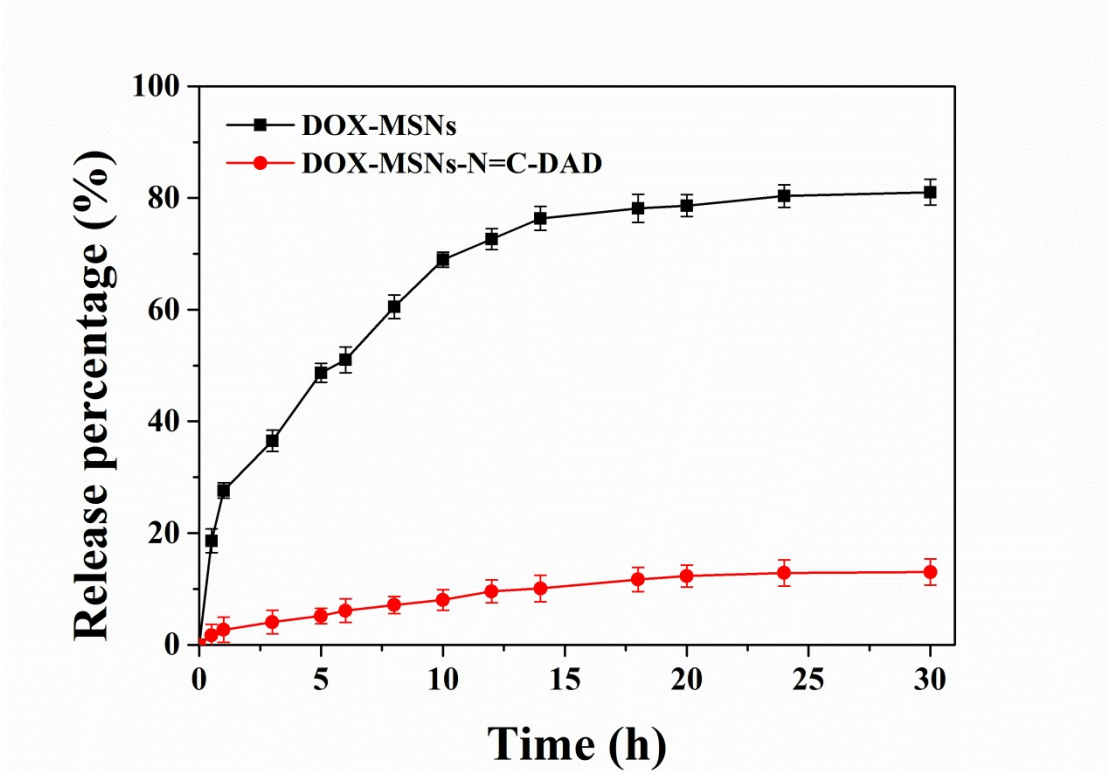

Fig. S6 DOX release from DOX-MSNs and DOX-MSNs-N=C-DAD in PBS (pH=7.4). Data are represented as mean ± SD (n = 3).

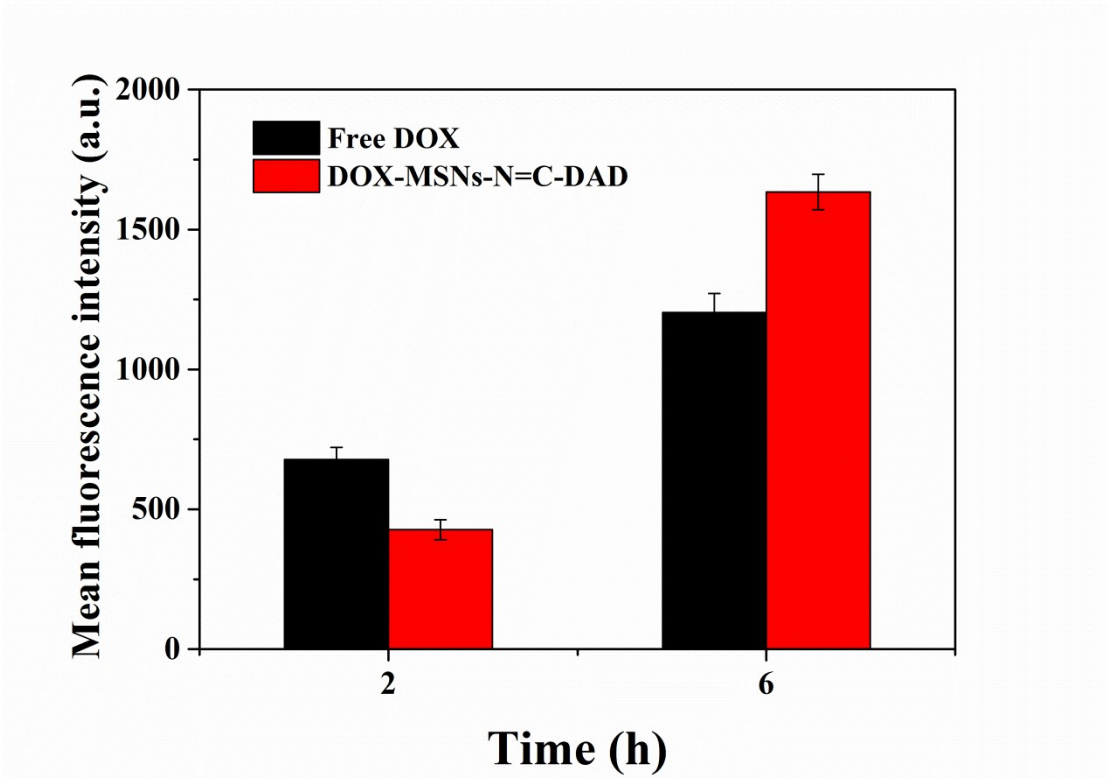

Fig. S7 Quantitative analysis of cellular internalization of nanoparticles into Hela cells through measuring mean fluorescence intensity of DOX fluorescence in the cells at 2 h and 6 h, respectively.

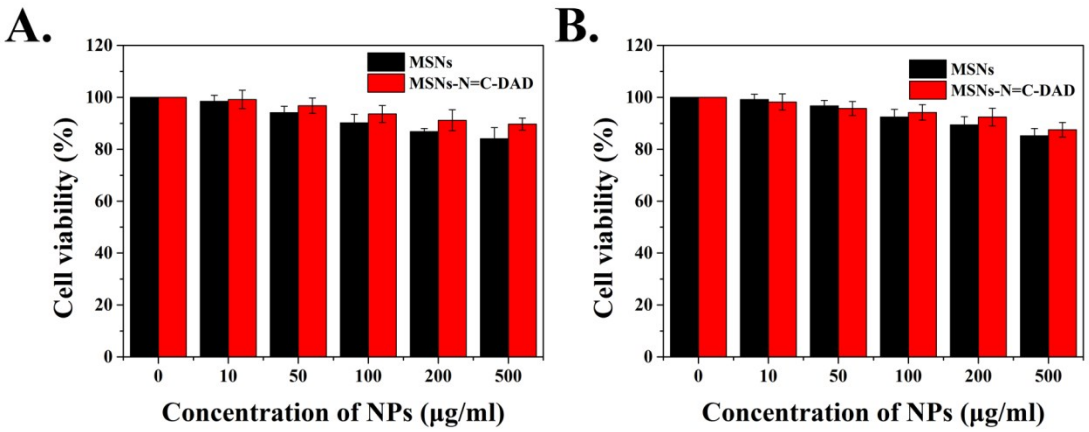

Fig. S8 Cell viability of (A) Hela and (B) L-02 cells treated with MSNs and MSNs-N=C-DAD at different particle concentrations. Data are represented as mean ± SD (n = 6).

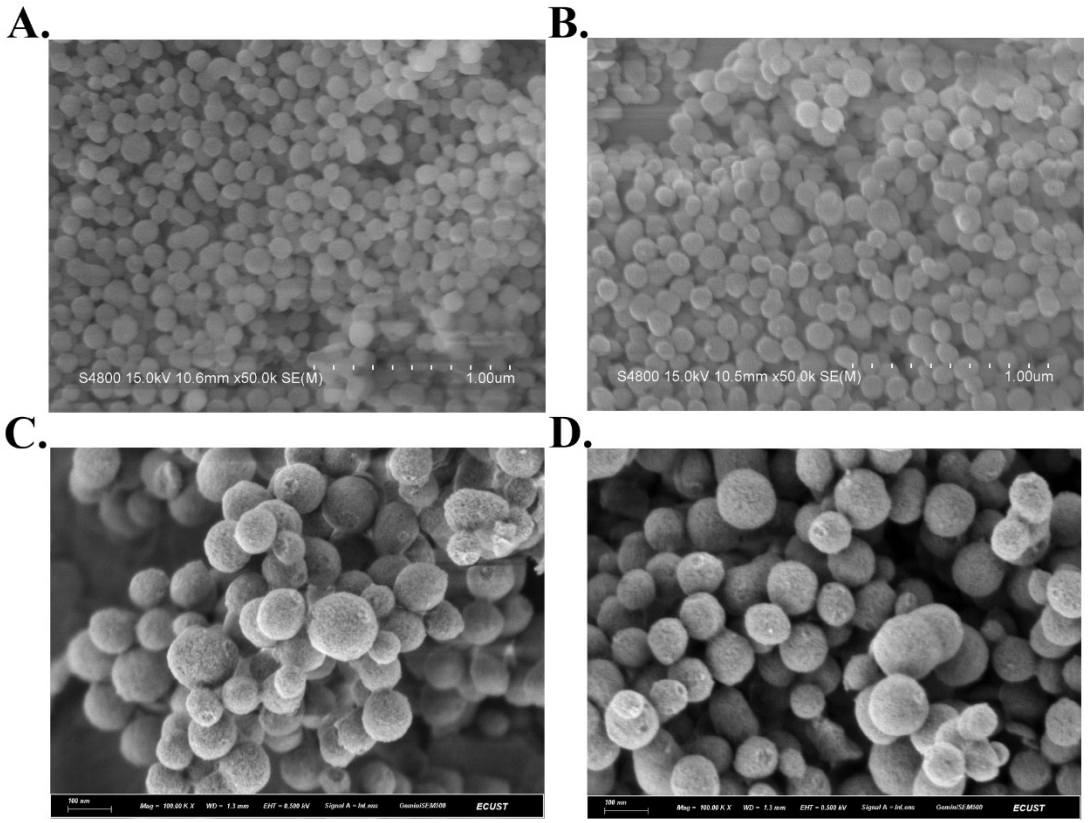

Fig. S9 Low-magnification FESEM images of the (A) MSNs and (B) MSNs-N=C-DAD, and High-magnification FESEM images of the (C) MSNs and (D) MSNs-N=C-DAD.

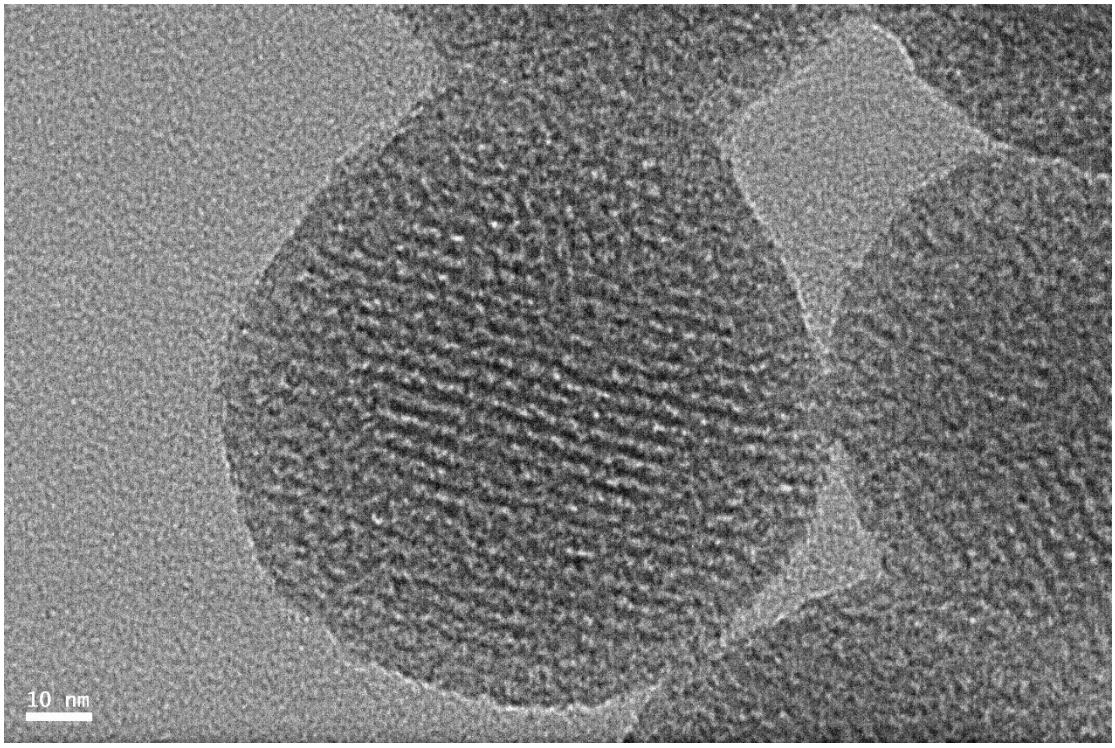

Fig. S10 High-magnification TEM images of the mesochannels of MSNs.

Table S1. The hydrodynamic particle size distributions in water.

Sample	Size (nm)	PDI
MSNs	106	0.231
MSNs-NH_2	112	0.152
MSNs-N=C-DAD	154	0.213

Table S2. Zeta potential results of MSNs before and after grafting with chemicals at each step.

Materials	Zeta Potential (mV)
MSNs	-25
MSNs-NH_2	20
MSNs-N=C-DAD	-6

Table S3. The surface functionalization extent of MSNs was characterized by TGA analysis and the final weight losses for all materials are presented in **Table S3**.

Materials	Final weight loss (wt %)
MSNs	9.38
MSNs-NH_2	19.43
MSNs-N=C-DAD	29.51

Table S4. The N_2 adsorption-desorption parameters of different functionalized MSN nanoparticles.

Sample	S_{BET}(m^2/g)	V_P（cm^3/g）	W_{BJH}（nm）
MSNs	967	0.692	2.87
MSNs-NH_2	504	0.456	2.45
DOX-MSNs-NH_2	423	0.392	1.8
MSNs-N=C-DAD	137	0.198	\
DOX-MSNs-N=C-DAD	78	0.127	\