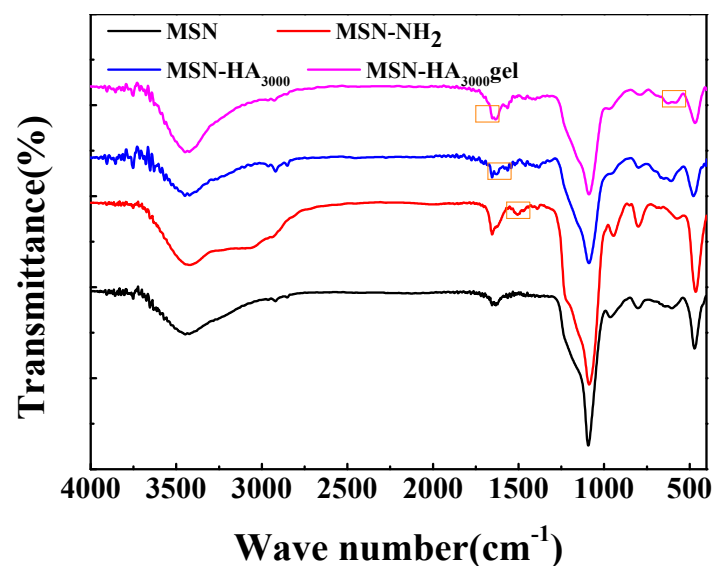
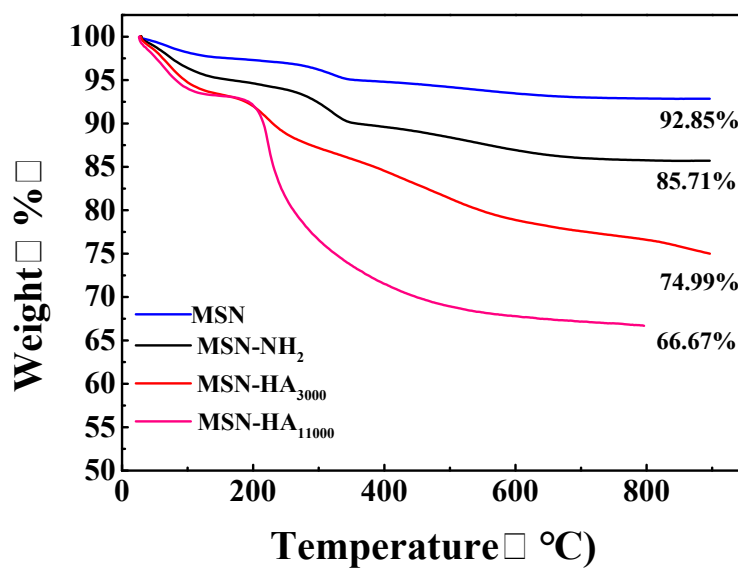


Supporting information



A



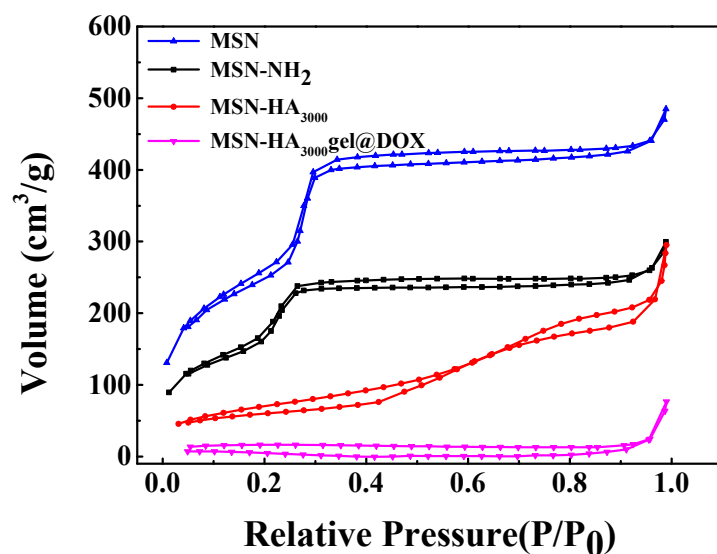
B

Fig.S1 FTIR spectra (A) of MSN, MSN-NH₂ and MSN-HA₃₀₀₀ and TGA curves (B) of MSN-HA₃₀₀₀gel and MSN-HA₁₁₀₀₀gel.

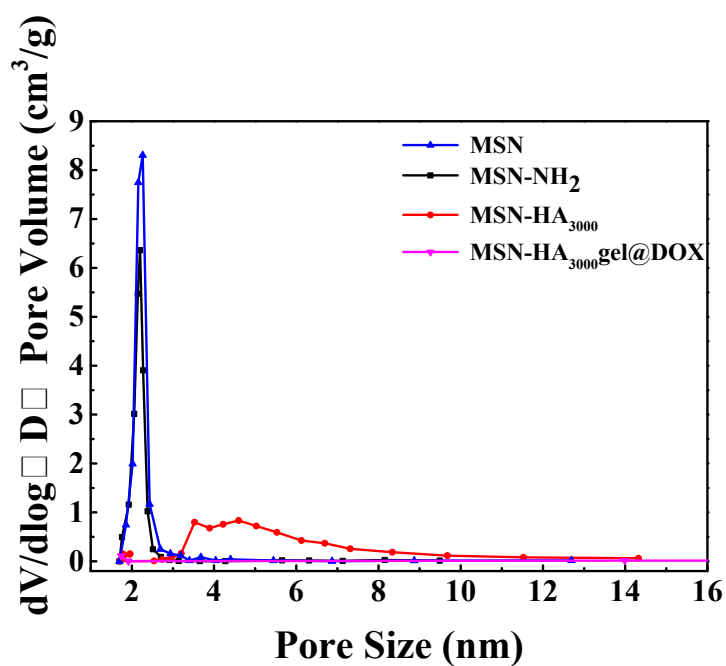
All the four curves in Fig.S1A showed strong broad peaks at 1100 cm⁻¹, which were the stretching vibration peak of Si-O-Si of MSN. Peaks near 1600 cm⁻¹ and 1526 cm⁻¹ appeared in the MSN-NH₂ curve, which were the flexural vibration peak and the stretching vibration peak of the primary amine, indicating that the -NH₂ group was modified onto MSN. The peak at 1625.6 cm⁻¹ on MSN-HA curve was the characteristic

absorption peak of C=O of HA and the characteristic absorption peak of amino group at 1526 cm^{-1} was weakened. The characteristic absorption peaks of the amide I bond at 1655 cm^{-1} and the disulfide bond at 550 cm^{-1} indicate the successful crosslinking and the successful modification of the HApt molecule.

Thermogravimetric analysis in Fig.S1B showed that the residual mass fractions of MSN-NH₂ and MSN were 92.85% and 85.71% respectively, indicating that the grafting mass rate of amino groups was about 7.14%. The residual mass fraction of MSN-HA₃₀₀₀ was 74.99%, indicating that the grafted amount of HA was about 10.72%. Similarly, the grafted HA₁₁₀₀₀ was 19.1%.

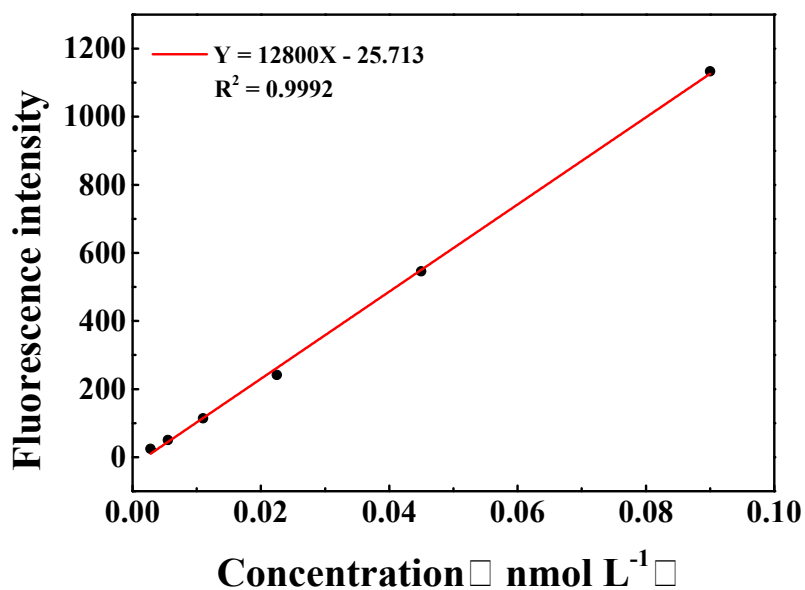


A

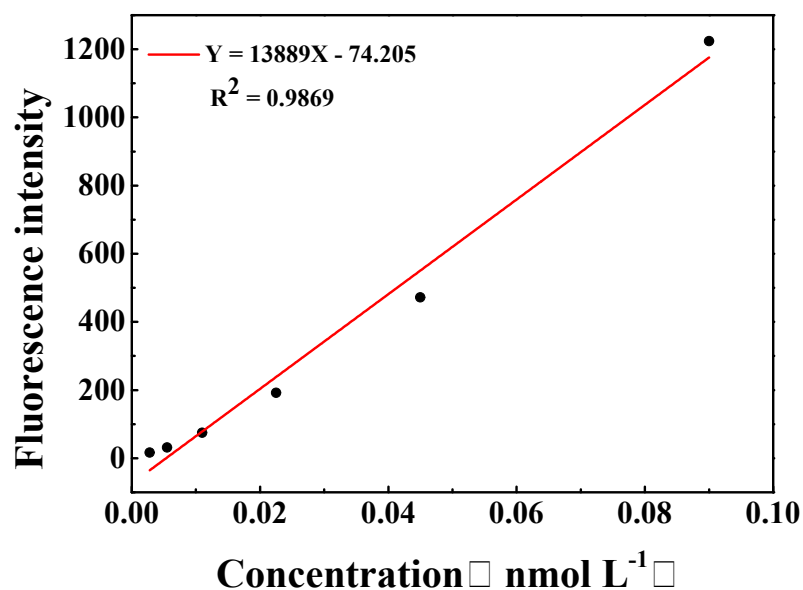


B

Fig.S2 BET nitrogen adsorption/desorption isotherms (A) and BJH pore size distributions (B) for MSN, MSN-NH₂, MSN-HA₃₀₀₀ and MSN-HA₃₀₀₀ gel @DOX.



A



B

Fig.S3 Fluorescence standard curve of Texas red-HApt-SH at pH=7.4(A) and 5.0(B)

Table.S1 Properties of MSN, MSN-NH₂, MSN-HA and MSN-HAgel.

Samples	Diameter (nm)	PDI	ζ-potential (mV)
MSN	200.4±4.2	0.269±0.030	-30.0±0.4
MSN-NH ₂	212.8± 4.0	0.470±0.002	41.6±0.8

MSN-HA ₃₀₀₀	230.9±4.6	0.155±0.015	-15±0.1
MSN-HA ₃₀₀₀ gel	220.0± 6.1	0.670±0.016	-12.8±1.4
MSN	91.8±2.1	0.245±0.025	-32.8±1.1
MSN-NH ₂	101.8± 2.0	0.319±0.012	43.2±2.0
MSN-HA ₁₁₀₀₀	131.2±4.8	0.177±0.011	-31.1±2.1
MSN-HA ₁₁₀₀₀ gel	112.1± 3.0	0.555±0.026	-22.4±3.3

. Table.S2 The average encapsulation efficiency and drug loading efficiency of MSN-HAgel

Samples	Drug-loading content (DLC)	Drug encapsulation efficiency (DEE)
MSN-HA ₃₀₀₀ gel (pH7.4 [#])	24.7	2.2
MSN-HA ₃₀₀₀ gel (pH8.5 [#])	71.6	6.7
MSN-HA ₁₁₀₀₀ gel (pH8.5 [#])	69.3	6.3

[#]: the pH used when DOX loading