Supporting information

The Control of Epidermal Growth Factor Grafted on Mesoporous Silica Nanoparticles for Targeted Delivery

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    a. These authors have made equal contribution to this work.
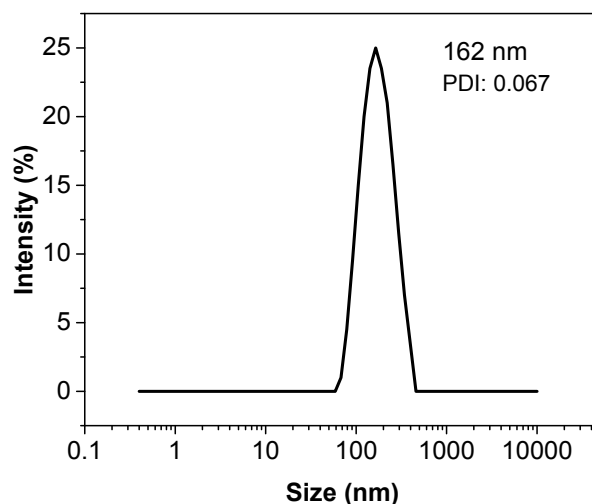
Particle size distribution of HMSNs

Figure S1 DLS curve of HMSNs

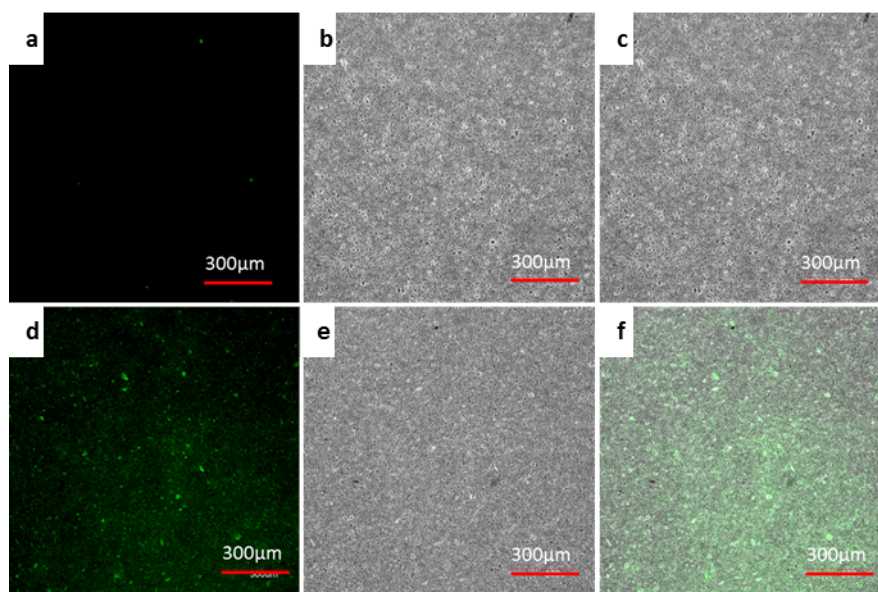**Confocal images of FITC labelled HMSNs and HMSN-COOH-EGF**

Figure S2 Confocal images of (a-c): FITC labelled HMSNs and (d-f): HMSN-COOH-EGF. a, d: FITC channel; b, e: bright field; c: merge of a and b; f: merge of d and e.

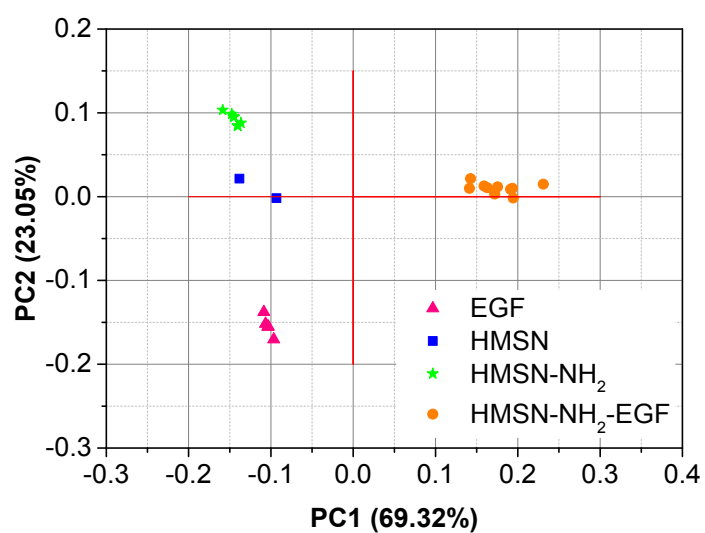**Score plots of EGF, HMSNs, HMSN-NH$_2$ and HMSN-NH$_2$-EGF**

Figure S3 Score plot on PC1 and PC2 of EGF, HMSNs, HMSN-NH$_2$ and HMSN-NH$_2$-EGF
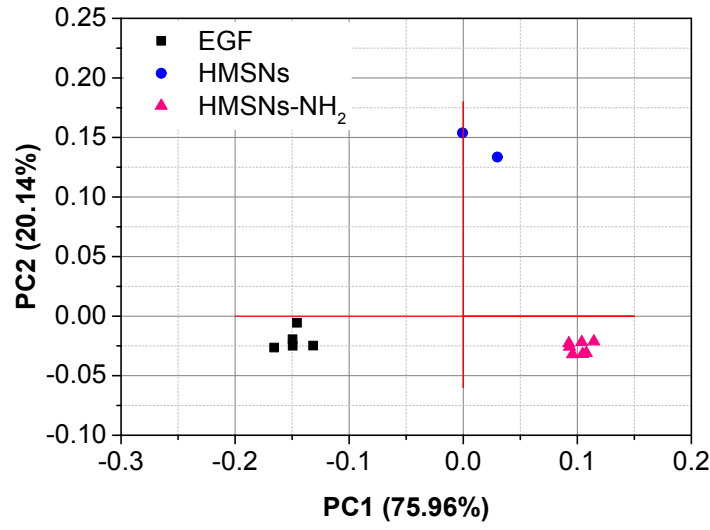
Figure S4 Score plot on PC1 and PC2 of EGF, HMSNs and HMSN-NH$_2$

Quantify the EGF attachments on HMSNs

1. Normalization

The intensities of samples were normalized by Equation (S1) and the results were presented in Table S1

$$I' = \frac{I - Io}{Ie - Io} \tag{S1}$$

where I_e and I_o are detected intensities of pure EGF and HMSNs-NH$_2$, while I and I' are the intensities obtained before and after the normalization.

2. Grafting efficiency of EGF (E)

The efficiency of EGF grafting of each sample was calculated using Equation (S2) and the results were listed in Table S1

$$E = (I_1'\frac{Ie_1}{Ie_1 + Ie_2} + I_2'\frac{Ie_2}{Ie_1 + Ie_2}) \times 100\% \tag{S2}$$

where I_1' and I_2' are normalized intensity of $CH_5N_3^+$ and $C_4H_8N^+$ fragments, respectively, and I_{e1} and I_{e2} are intensity of pure EGF corresponding to $CH_5N_3^+$ and $C_4H_8N^+$ fragments.

3. The quantity of EGF on HMSNs

The EGF concentration (δ) on HMSNs was calculated via Equation (S3) and the data were shown in Table S1

$$\delta = \frac{kC'E}{m} \quad\quad\quad\quad (S3)$$

where k and C' are the volume of EGF solution and the EGF concentration used for the grafting procedure, and m is the mass of HMSNs-NH_2 applied for the experiments.

Table S1 Data for the calculation of EGF concentration on HMSNs

Parameters	I		I'		E (%)	δ $\mu g_{(EGF)}/mg_{(HMSN)}$
	I_1	I_2	I_1	I_2		
Immonium ions	CH_5N_3	C_4H_8N	CH_5N_3	C_4H_8N		
Pure EGF	0.009139	0.014642	1	1	100	-
HMSN-NH_2	0.001005	0.002011	0	0	0	0
HMSN-NH_2-EGF-0.1	0.002669	0.005656	0.2045	0.2885	25.63	0.8008
HMSN-NH_2-EGF-0.2	0.003324	0.006889	0.2851	0.3861	34.73	2.171
HMSN-NH_2-EGF-0.4	0.004477	0.009042	0.4268	0.5566	50.68	6.334
HMSN-NH_2-EGF-0.8	0.006662	0.011858	0.6955	0.7795	74.72	18.68

4. Plot C' to δ

The relationship between the original EGF concentration for grafting (C') and the quantity of EGF on HMSNs (δ) was investigated by plotting C' to δ. The results fitted very well to the model $\delta = 25.75\, C'^{1.52}$ with the R^2 of 0.999 (Figure S5).
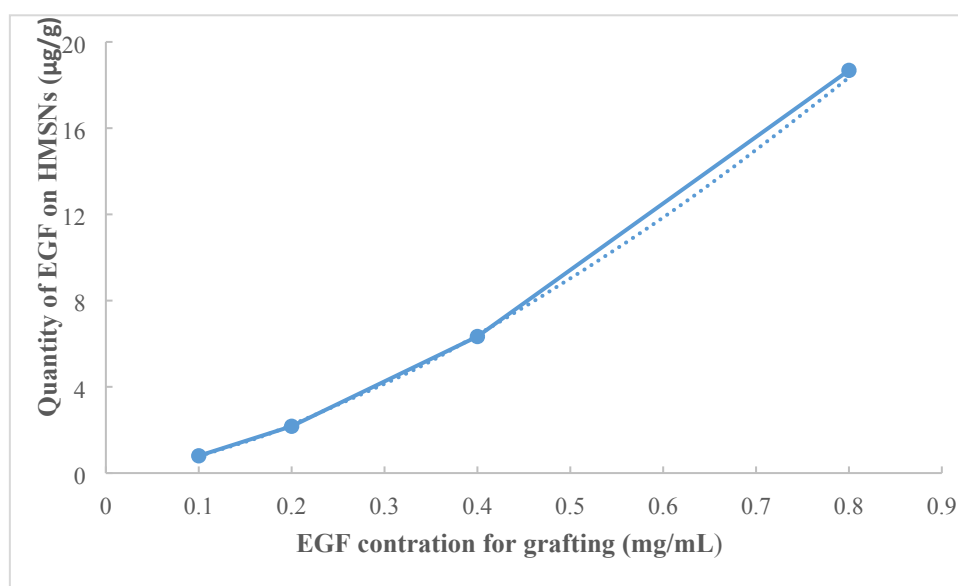
Figure S5 Plot on C' and δ and the fitting model of EGF grafted samples