Supplementary Information for
Ultra-fast capture of U(VI) from aqueous solution by chitosan-based foam with macropores

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SI.1 The molecular ratio of CS-Glns

Table S1 The molecular ratio of CS-Glns

Sample	CS		Gln	
	weight/g	molality/mol Kg^{-1}	weight/g	molality/mol Kg^{-1}
CS-Gln-1	0.5	0.003	0.75	0.00513
CS-Gln-2			0.5	0.003
CS-Gln-3			0.25	0.0017

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SI.2 Structural and morphological characterization

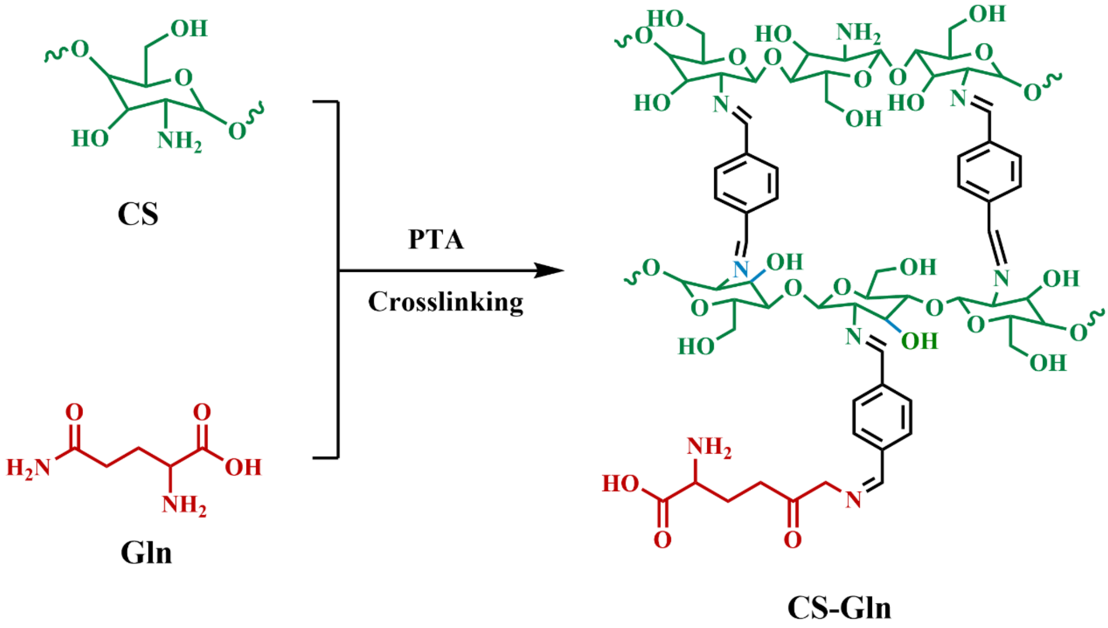

Fig. S1 The potential reaction mechanism of CS-Gln

SI.3 Kinetics studies

The experimental data were fitted by Pseudo-first-order kinetic model (Equ.S1)，Pseudo-second-order kinetic model (Equ.S2). The models equations were as follows:

$$\ln(q_e - q_t) = \ln q_e - k_1 t \quad \text{(S1)}$$

$$\frac{t}{q_t} = \frac{1}{K_2\, q_e^2} + \frac{t}{q_e} \quad \text{(S2)}$$

Herein, q_e (mg/g) and q_t (mg/g) are the adsorption capacities of metal ions at equilibrium and time t (min), respectively; t is the time of adsorption; k_1 (min^{-1}) and k_2 (g $mg^{-1}min^{-1}$) are the adsorption rate constants of pseudo-first-order kinetic, and pseudo-second-order kinetic model, respectively.

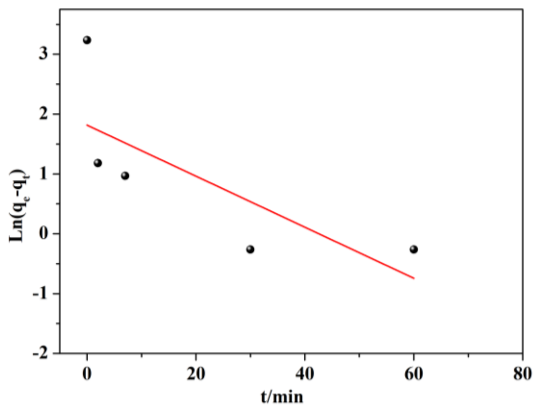

Fig. S2 Line plots of pseudo-first-order models

SI.4 Adsorption isotherms

The Freundlich (Equ.S3), Langmuir (Equ.S4) and Sips (Equ.S5) isothermal adsorption models are used to fit experimental data. The three isothermal model can be expressed as follows:

$$q_e = K_F C_e^{1/n_f} \qquad \text{(S3)}$$

$$q_e = \frac{q_m K_L C_e}{1+K_L C_e} \qquad \text{(S4)}$$

$$q_e = \frac{q_m (K_s C_e)^{1/n_s}}{1+(K_s C_e)^{1/n_s}} \qquad \text{(S5)}$$

q_e and q_m are the equilibrium adsorption capacity and maximum theoretical adsorption capacity (mg/g), respectively; C_e is the concentration of uranium in solution (mg/L) during adsorption equilibrium; K_F (mg/g)/(L/mg)^n) is Freundlich constant, relating to adsorption capacity; n_f is another characteristic constant of Freundlich, relating to adsorption strength; K_L (L/mg) is the Langmuir constant, which indicates the affinity between the adsorbate and the adsorbent; Ks (L/mg) is the Langmuir association constant, n_s refers to Freundlich heterogeneous constant, When it is close to 1.0, the adsorbent surface is more homogeneous. The lager n_s value is, the more heterogeneous the adsorption is.

Table S2 The parameters fitted by Langmuir models

T（K）	Langmuir		
	q_m (mg/g)	K_L (L/mg)	R^2
CS-Gln2	558	0.00266	0.976

SI.5 Characterization and mechanism of UO_2^{2+} adsorption

(a) (b)

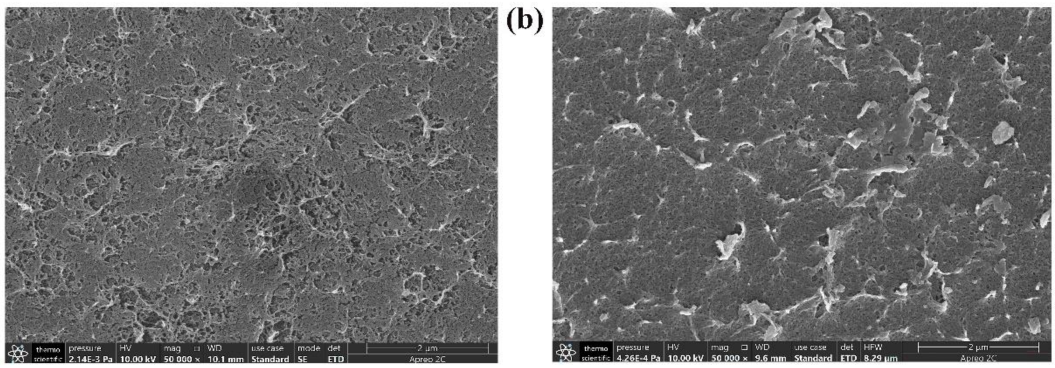

Fig. S3 SEM of CS-Gln2 before (a) and after (b) adsorption uranium

Table S3 Binding energy of U4f, C1s, O1s, N 1s before and after U(VI) uptake

Valence states		Functional group	Before U(VI) adsorption	After U(VI) adsorption
U4f	$U4f_{7/2}$	--	--	390.02
	$U4f_{5/2}$	--	--	379.12
C1s		C-N	284.67	284.87
		C=N	286.51	286.06
		C=C	282.63	282.57
		C=O	283.73	284.09
		C-C	283.19	283.22
N1s		C=N	399.47	400.26
		C-N	398.02	397.93
		$C-NH_2$	397.15	397.21
O1s		C-O	531.99	531.54
		C=O	531.13	531.23
		O-H	530.87	530.07