Supporting Information

Indole-functionalized cross-linked chitosan for effective uptake of uranium(VI) from aqueous solution

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SEM images

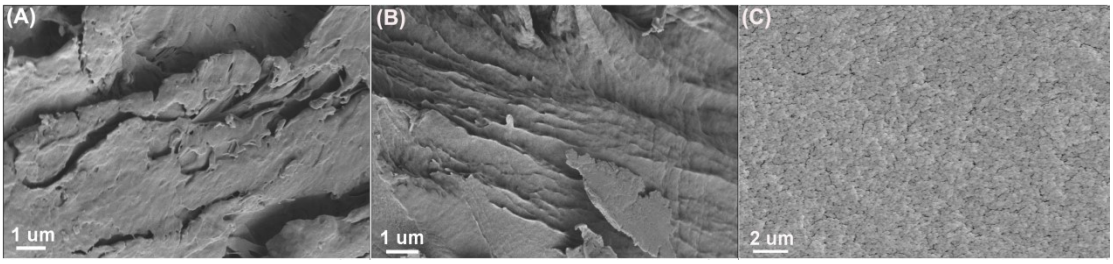

Figure S1 The SEM images of (A) CTS, (B) IAA-CTS and (C) IAA-CTSA.

Kinetic models

The equations of the pseudo-first-order, pseudo-second-order, intraparticle diffusion and Elovich models are described as [1, 2]:

$$\ln\left(q_e - q_t\right) = lnq_t - k_1 t \tag{S1}$$

$$\frac{t}{q_e} = \frac{1}{k_2 q_e^2} + \frac{t}{q_e} \tag{S2}$$

$$q_t = k_{ip} t^{1/2} + c \tag{S3}$$

$$q_t = \frac{ln(\alpha\beta)}{\beta} + \frac{1}{\beta} lnt \tag{S4}$$

where q_t mg g^{-1} is the adsorption capacity at time t (min), k_1 (min^{-1}) and k_2 (g mg^{-1} min^{-1}) refer the pseudo-first-order and pseudo-second-order rate constant, respectively. k_{ip} (mg g^{-1} $min^{-1/2}$) is the constant of intraparticle diffusion kinetic model. In Elovich model β (g mg^{-1}) represents the Elovich constant related to the surface coverage extent and α (mg g^{-1} min^{-1}) is the initial rate of U(VI) adsorption.

Isotherms models

The forms of Langmuir model, Freundlich model and R_L are described as equation S5-S7 [3-5], respectively.

$$\frac{c_e}{q_e} = \frac{c_e}{q_m} + \frac{1}{q_m b} \tag{S5}$$

$$lnq_e = lnk_F + nlnc_e \quad \text{(S6)}$$

$$R_L = \frac{1}{1 + bC_0} \quad \text{(S7)}$$

Where b (L mg^{-1}) is the Langmuir constant. q_{max} is the maximum adsorption capacity. k_F ($mg\ g^{-1}$) refers the multilayer adsorption capacity and n denotes an empirical parameter connected with the intensity of adsorption, respectively.

References

[S1] E. El Hayek, C. Torres, L. Rodriguez-Freire, J. M. Blake, C. L. De Vore, A. J. Brearley, M. N. Spilde, S. Cabaniss, A. S. Ali and J. M. Cerrato, *Environ. Sci. Technol.,* 2018, **52**, 13089-13098.

[S2] K. Z. Elwakeel, A. A. Atia and E. Guibal, *Bioresour. Technol.,* 2014, **160**, 107-114.

[S3] Y. Cai, L. Chen, S. Yang, L. Xu, H. Qin, Z. Liu, L. Chen, X. Wang and S. Wang, *ACS Sustain. Chem. Eng.,* 2019, **7**, 5393-5403.

[S4] T. Huang, Y. Shao, Q. Zhang, Y. Deng, Z. Liang, F. Guo, P. Li and Y. Wang, *ACS Sustain. Chem. Eng.,* 2019, **7**, 8775-8788.

[S5] K. Y. Foo and B. H. Hameed, *Chem. Eng. J.,* 2010, **156**, 2-10.