Supporting information of

Ion-Imprinted Guanidine-functionalized Zeolite Molecular Sieve Enhances the Adsorption Selectivity and Antibacterial Properties for Uranium Extraction

Yi Zhao, † Junwen Li, † Sijin Wu, † Haiming Cheng *,†, ‡

(†*Key Laboratory of Leather Chemistry and Engineering of Ministry of Education, Sichuan University, Chengdu, 610065;*

‡*National Engineering Laboratory for Clean Technology of Leather Manufacture, Sichuan University, Chengdu, 610065*)

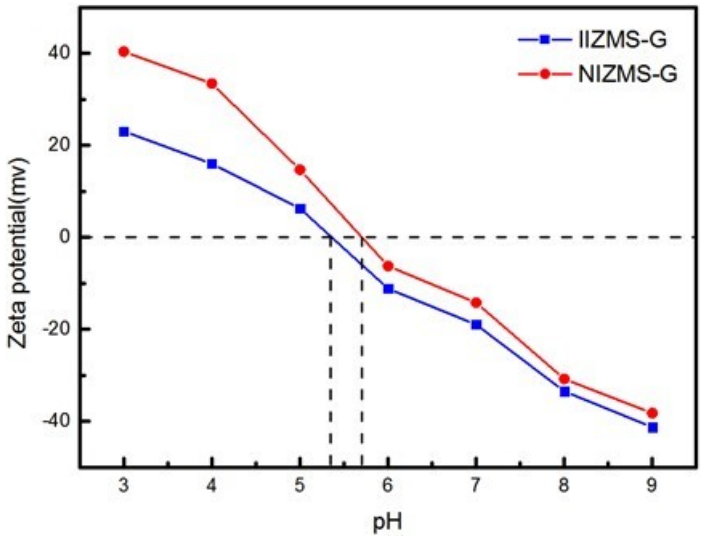


Figure S1. Zeta potential tests of IIZMS-G.

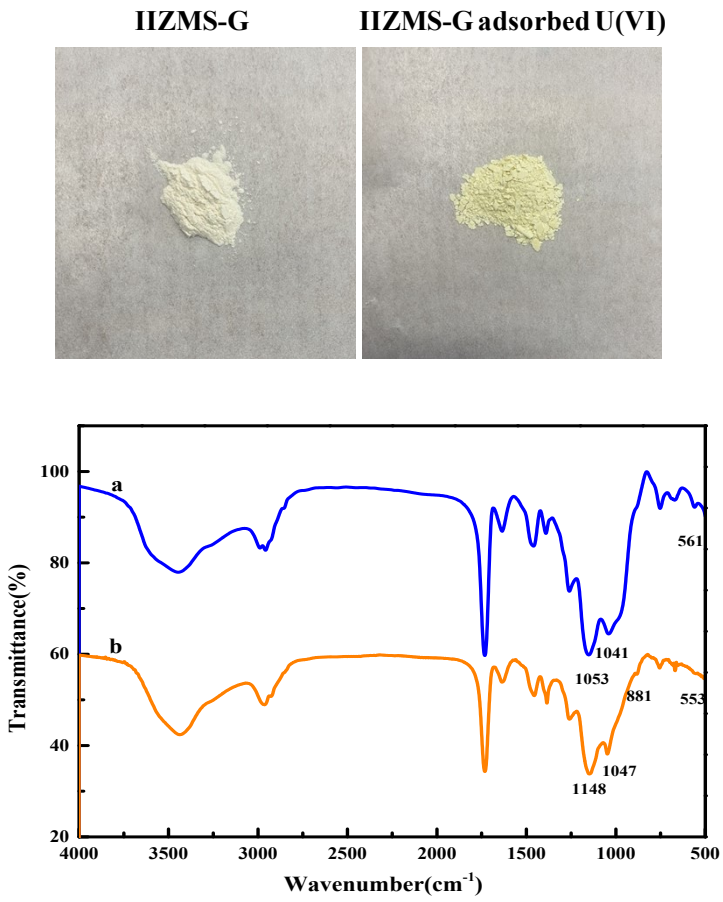
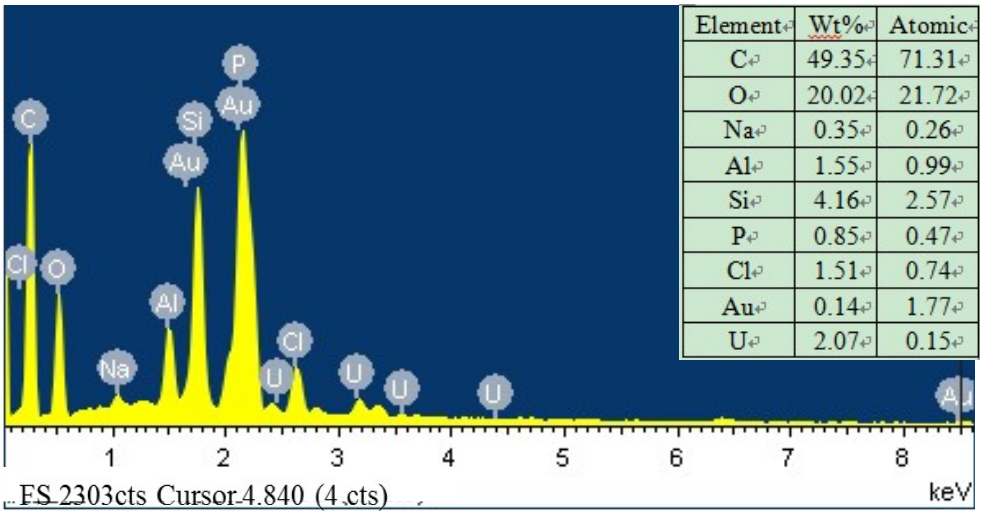


Figure S2. Images of the prepared IIZMS-G and IIZMS-G adsorbed of uranium. FT-IR spectra of IIZMS-G before (a) and after (b) adsorption of uranium.



Element	Wt%	Atomic
C	49.35	71.31
O	20.02	21.72
Na	0.35	0.26
Al	1.55	0.99
Si	4.16	2.57
P	0.85	0.47
Cl	1.51	0.74
Au	0.14	1.77
U	2.07	0.15

Figure S3. The EDS spectrum of IIZMS-G after uranium adsorption.

Adsorption kinetics

To determine the kinetic of uranium adsorption on IIZMS-G, the kinetics experimental data are simulated by using pseudo-first-order, pseudo-second-order.

The linear form of pseudo-first-order and pseudo-second-order models can be represented by following equations:

$$\frac{1}{qt} = \frac{k_1}{q_e t} + \frac{1}{q_e} \quad (1)$$

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{1}{q_e} t \quad (2)$$

where k_1 (1/min) and k_2 (mg/(g·min)) are the adsorption rate constants, q_e and q_t are the adsorption capacity (mg/g) at equilibrium and time t (min), respectively.

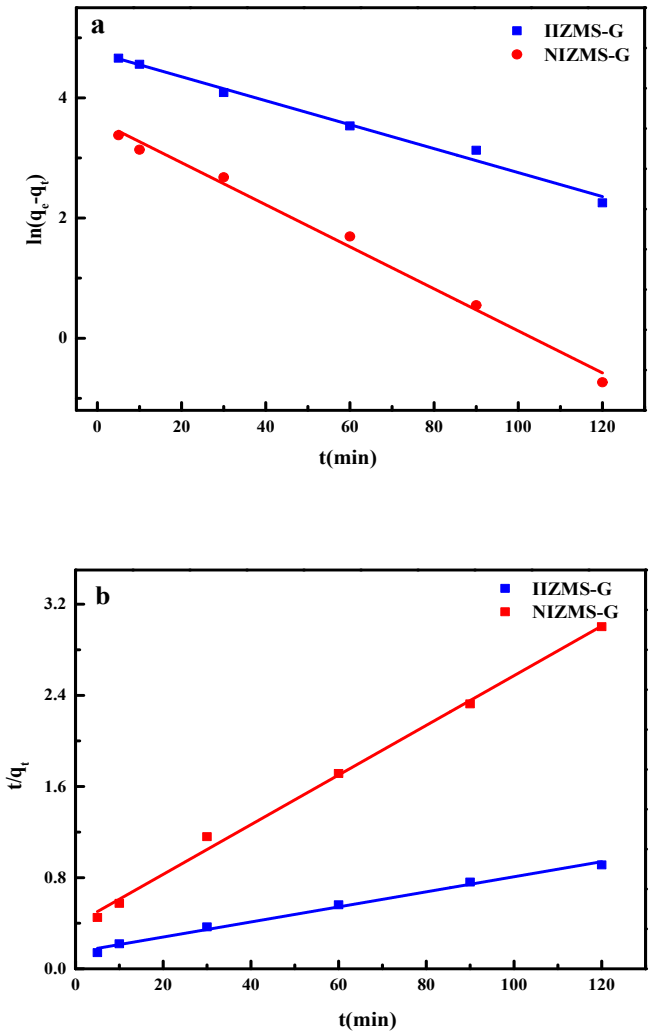


Figure S4.(a) pseudo-first-order, (b) pseudo-second-order and model kinetic plots of adsorption U(VI) onto IIZMS-G and NIZMS-G. Conditions: pH = 5.5, T =20°C, C_0 = 50 mg/L.

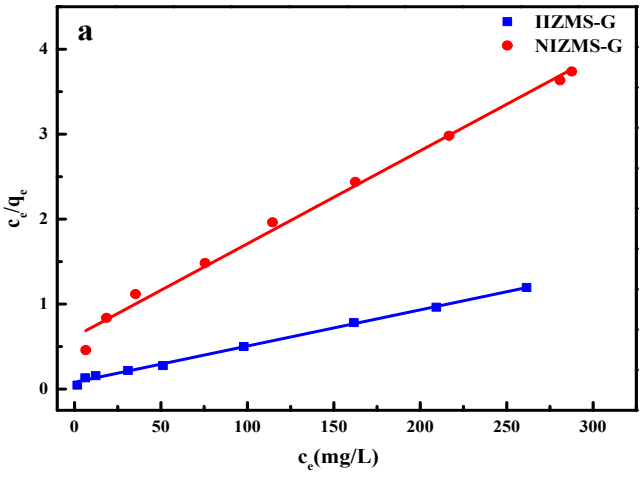
Adsorption isotherms

In order to elucidate the nature of the adsorption process and adsorption mechanism, the data is evaluated by two well-designed isotherm models, including Langmuir model and Freundlich model.The equation used for the analysis was given by Eq. (3) and Eq. (4).

$$\frac{c_e}{q_e} = \frac{c_e}{q_m} + \frac{1}{K_L q_m} \tag{3}$$

$$lnq_e = lnK_F + \frac{lnc_e}{n} \tag{4}$$

where q_e(mg/g) is the amount of U(VI) adsorbed on the surface of IIZMS-G, C_e(mg/L) is the content of U(VI) present in the solution, and q_m(mg/g) is the adsorption capacity, K_L(L/g) is the Freundlich constant, K_F(mg/g) is the Freundlich constant, and n is the adsorption intensity.



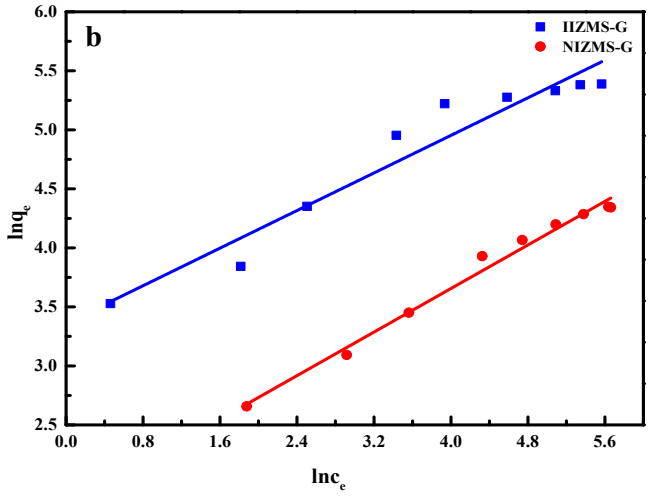


Figure S5. Absorption isotherms: (a) Langmuir model; (b) Freundlich model. Conditions: pH = 5.5, T = 20 ℃, t = 300 min.