Supporting information of

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

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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.

**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:

\[
\frac{1}{q_t} = \frac{k_1}{q_e} + \frac{1}{q_e} \\
(1)
\]

\[
\frac{t}{q_t} = \frac{1}{k_2 q_e^2} + \frac{1}{q_e} \\
(2)
\]

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, \( T = 20^\circ C \), \( C_0 = 50 \text{ mg/L} \).
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).

\[
\frac{c_e}{q_e} = \frac{c_e}{q_m} + \frac{1}{K_L q_m}
\]  

(3)

\[
lnq_e = lnK_F + \frac{lnC_e}{n}
\]

(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 °C, t = 300 min.