Supplementary Information

Langmuir (Linear) $$\frac{1}{Q_e} = \frac{1}{Q_{max}} + \frac{1}{b_L Q_{max} C_e} \quad \cdots\cdots\cdots\cdots \text{(S1)}$$

Langmuir (Nonlinear) $$Q_e = \frac{Q_{max} b_L C_e}{1 + b_L C_e} \quad \cdots\cdots\cdots\cdots \text{(S2)}$$

Freundlich (Linear) $$InQ_e = InK_F + \frac{InC_e}{n} \quad \cdots\cdots\cdots\cdots \text{(S3)}$$

Freundlich (Nonlinear) $$Q_e = K_F C_e^{\frac{1}{n}} \quad \cdots\cdots\cdots\cdots \text{(S4)}$$

Temkin $$Q_e = BInA + BInC_e \quad \cdots\cdots\cdots\cdots \text{(S5)}$$

Q_e (mg g^{-1}) is the equilibrium adsorption capacity. Qmax (mg g^{-1}) is observed to the adsorption capacity. b_L (L mg^{-1}) is the Langmuir equilibrium constant. C_e(mg L^{-1}) corresponds to uranium (VI) concentration in the solution when the adsorption reaches equilibrium. K_F and n represent the Freundlich constants of the adsorption capacity and intensity, respectively. A and B are the Temkin isotherm constants.

Pseudo first order (Linear) $$In(Q_{max} - Q_t) = InQ_{max} - K_1 t \quad \cdots\cdots\cdots\cdots \text{(S6)}$$

Pseudo first order (Nonlinear) $$Q_t = Q_{max}(1 - e^{-K_1 t}) \quad \cdots\cdots\cdots\cdots \text{(S7)}$$

Pseudo second order (Linear) $$\frac{t}{Q_t} = \frac{1}{K_1 Q_{max}^2} + \frac{t}{Q_{max}} \quad \cdots\cdots\cdots\cdots \text{(S8)}$$

Pseudo second order (Nonlinear) $$Q_t = \frac{t K_1 Q_{max}^2}{1 + t K_1 Q_{max}} \quad \cdots\cdots\cdots\cdots \text{(S9)}$$

Elovich $$Q_t = \frac{In(\alpha\beta)}{\beta} + \frac{Int}{\beta} \quad \cdots\cdots\cdots\cdots \text{(S10)}$$

Qmax is maximum adsorption capacity. Q_t and K_1 are adsorption capacity at time t and adsorption rate constant, respectively. α (mg g^{-1} min^{-1}) corresponds to the initial adsorption rate, and β (g mg^{-1}) denotes the equilibrium relationship parameter between the surface coverage and the activation energy involved in chemical adsorption.

$$R^2 = \frac{\sum_{(Q_{pred} - \bar{Q}_{exp})^2}}{\sum_{(Q_{pred} - Q_{exp})^2} + \sum_{(Q_{pred} - \bar{Q}_{exp})^2}} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(S11)}$$

$$RMSE = \sqrt{\frac{1}{n-2}} \sum_{i=1}^{i=n} (Q_{exp} - Q_{pred})^2 \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(S12)}$$

Q_{exp} is the symbol of the adsorption capacity gained from experiments. Q_{pred} represents the adsorption capacity from the isotherm or kinetic model. $\bar{Q}_{exp}$ is the average of Q_{exp} and n is the value of experimental observation. Higher R^2 and smaller RMSE signify the better fitting with the data.

$$R_2(\%) = \frac{C_{desorption}}{C_{adsorption}} \times 100\% \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(S13)}$$

$$R_3(\%) = \frac{Q_i}{Q_1} \times 100\% \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \text{(S14)}$$

Q_i and Q_1(mg L^{-1}, i> 1) respectively represent the adsorption capacity of each cycle and the first operation.

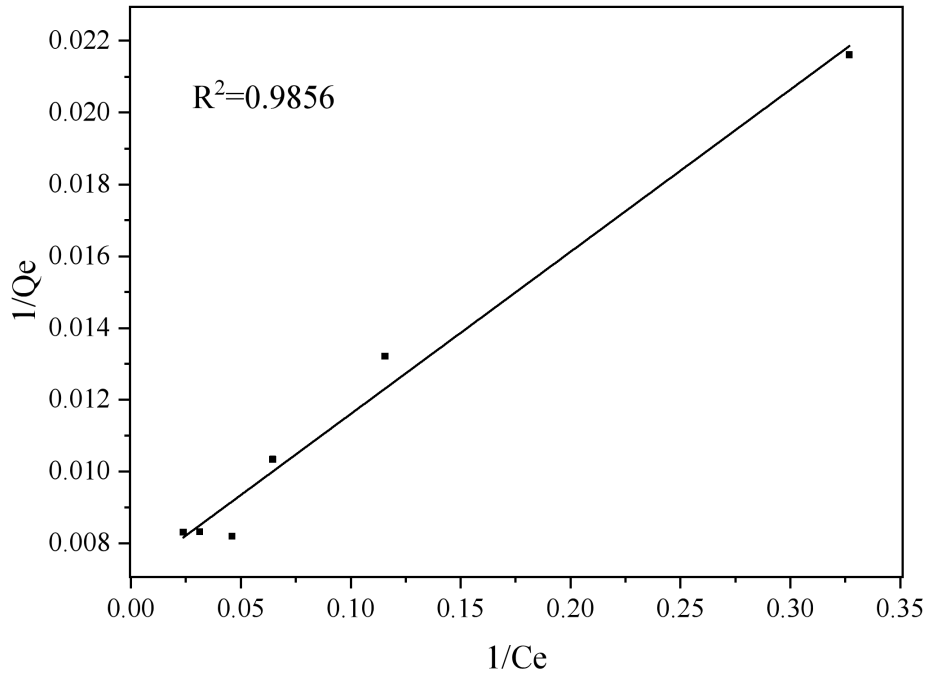

Fig. S1 Langmuir (linear) adsorption isotherm of uranium (VI) adsorption

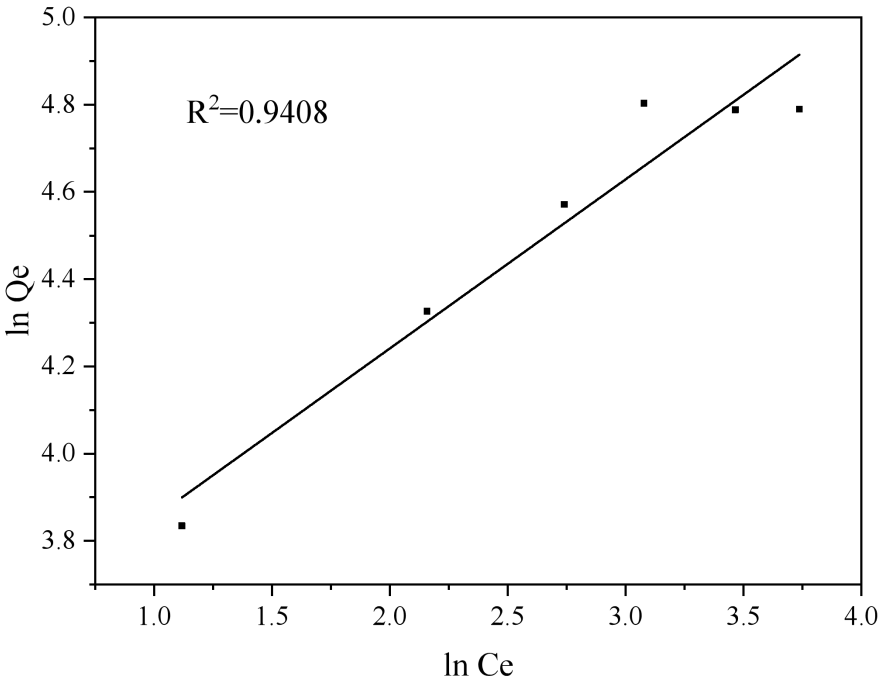

Fig. S2 Freundlich (linear) adsorption isotherm of uranium (VI) adsorption

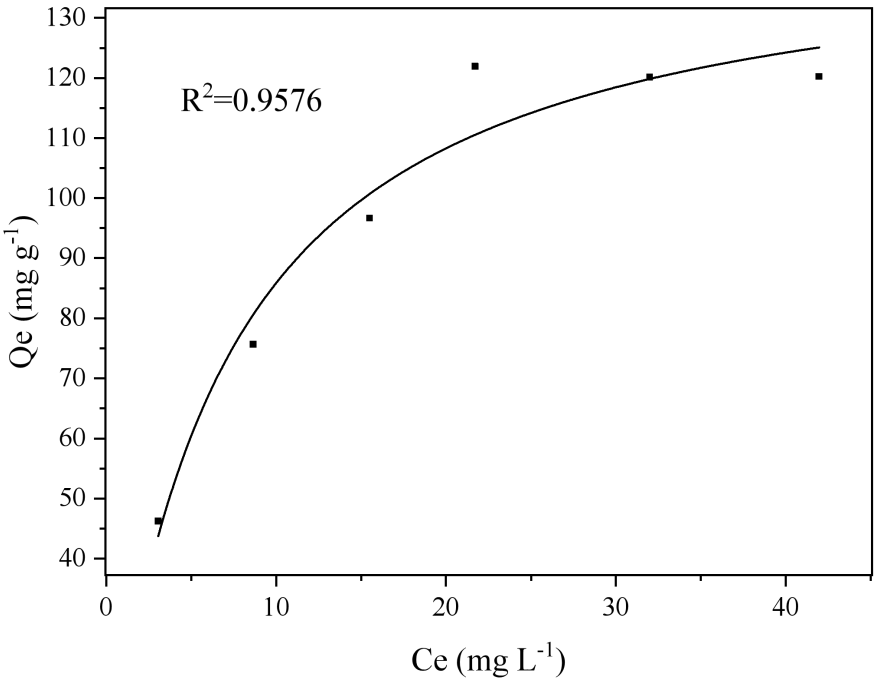

Fig. S3 Langmuir (nonlinear) adsorption isotherm of uranium (VI) adsorption

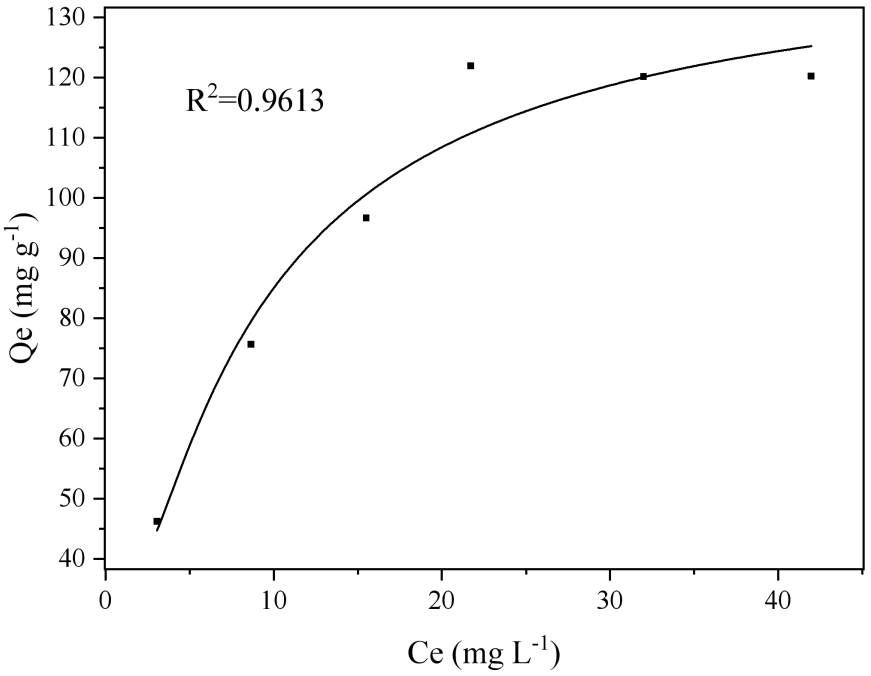

Fig. S4 Freundlich (nonlinear) adsorption isotherm of uranium (VI) adsorption

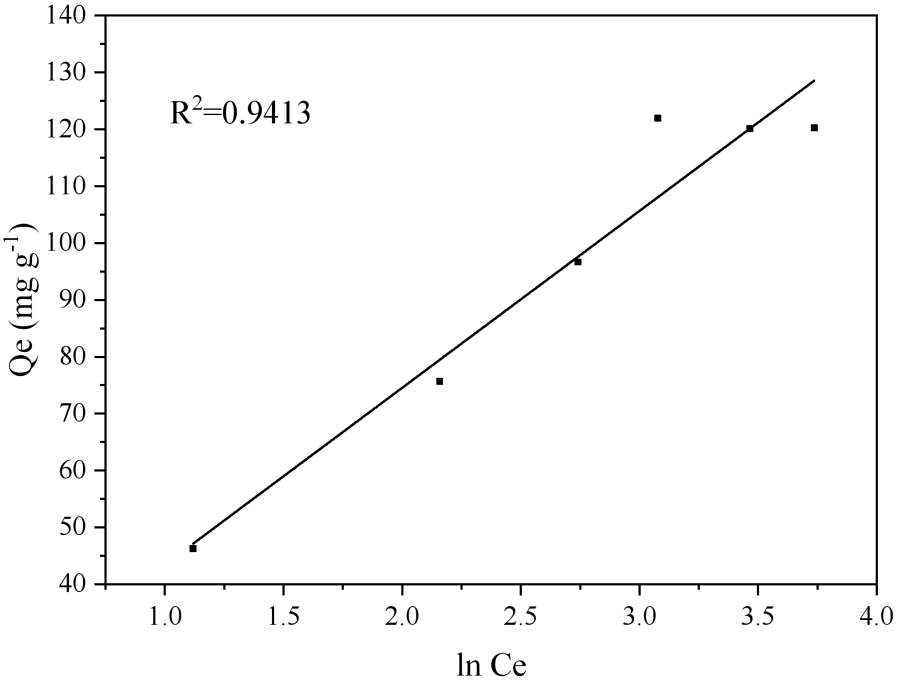

Fig. S5 Temkin adsorption isotherm of uranium (VI) adsorption

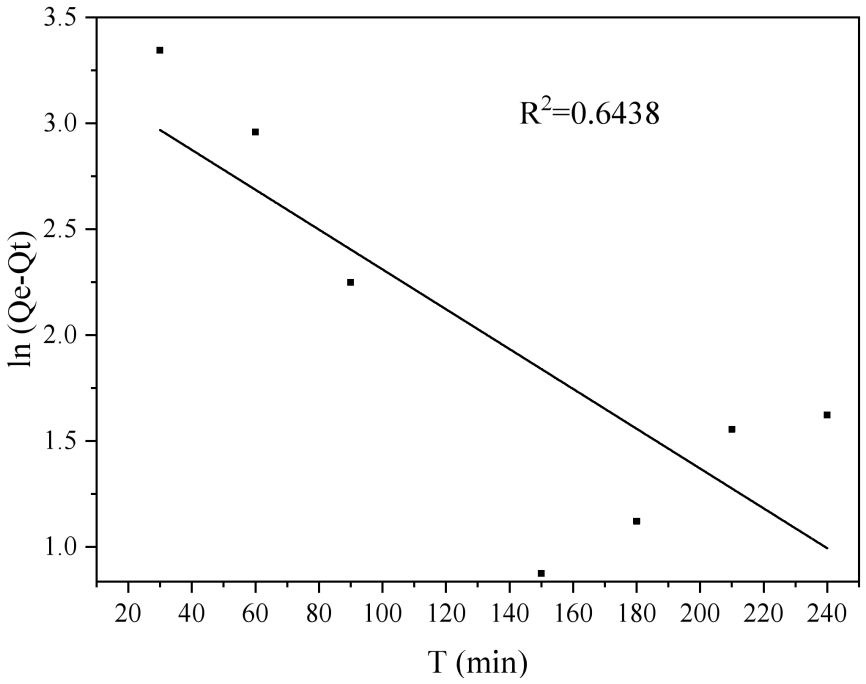

Fig. S6 Pseudo-first-order kinetics model (linear) for uranium (VI) adsorption

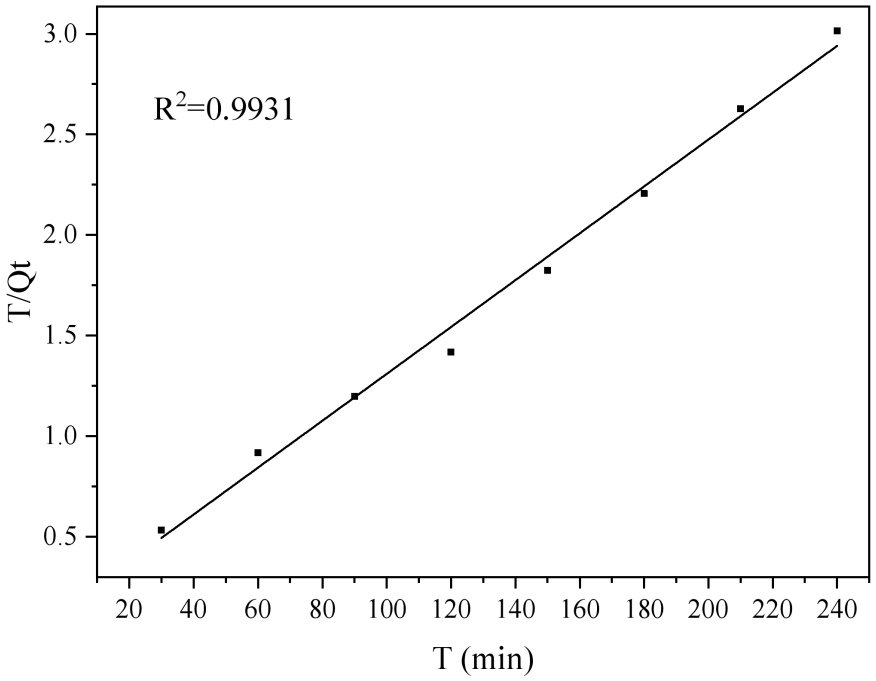

Fig. S7 Pseudo-second-order kinetics model (linear) for uranium (VI) adsorption

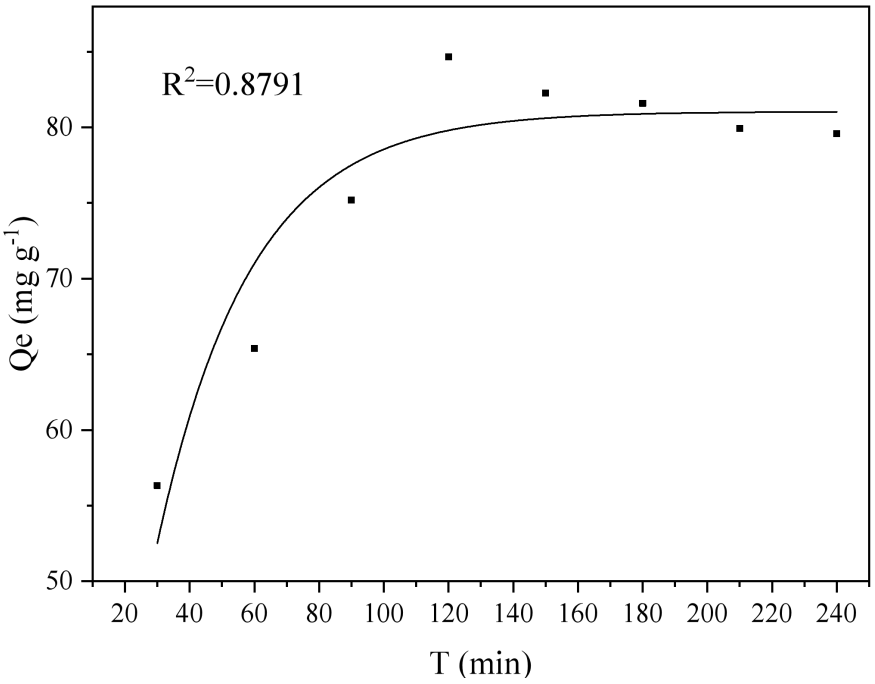

Fig. S8 Pseudo-first-order kinetics model (nonlinear) for uranium (VI) adsorption

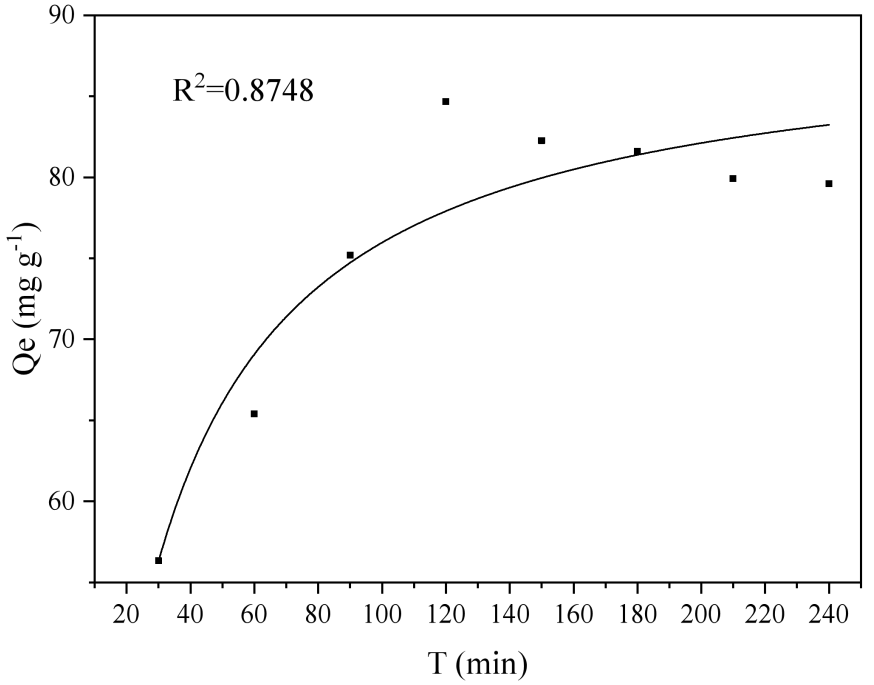

Fig. S9 Pseudo-second-order kinetics model (nonlinear) for uranium (VI) adsorption

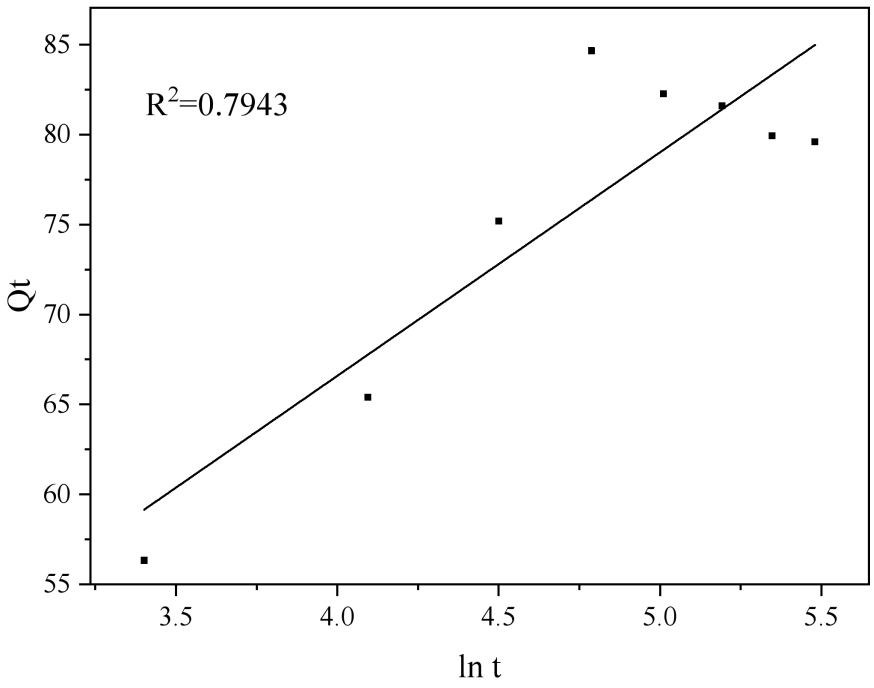

Fig. S10 Elovich kinetics model for uranium (VI) adsorption