

Supplementary Material

Zeolitic Imidazole Framework (ZIF)–Sponge Composite for Highly Efficient U(VI) Elimination

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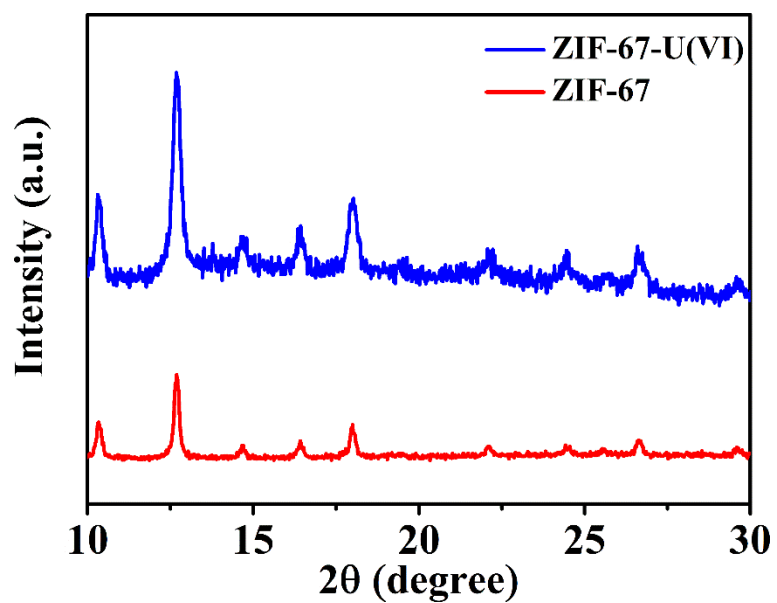


Figure S1 XRD patterns of obtained ZIF-67 material.

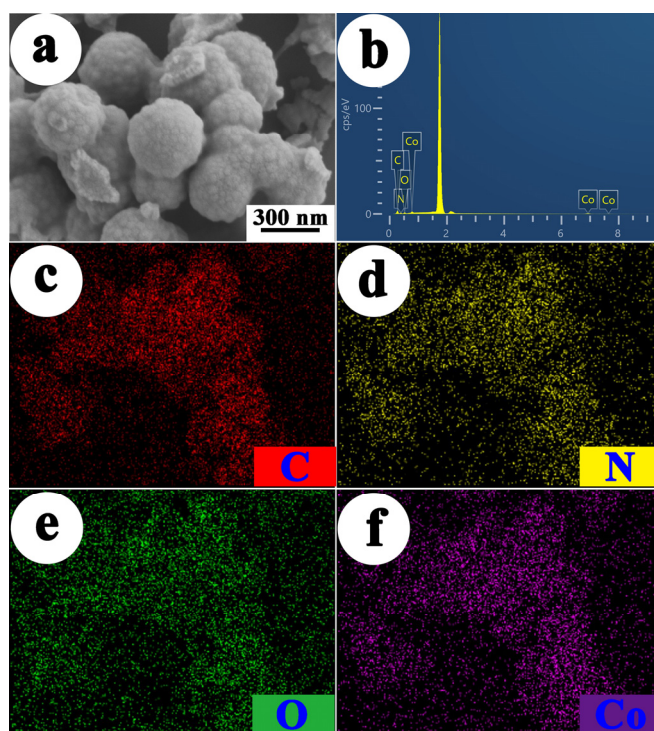


Figure S2 (a) SEM image of the ZIF-67, (b) Corresponding EDS examination, (c–f) Elemental mapping images of ZIF-67.

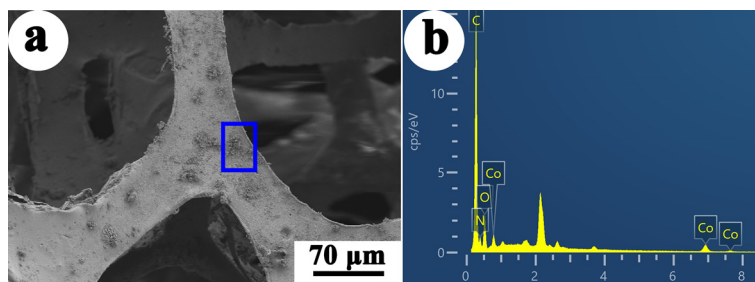


Figure S3 (a) SEM image of the ZIF-67-PU, (b) Corresponding EDS examination of ZIF-67-PU.

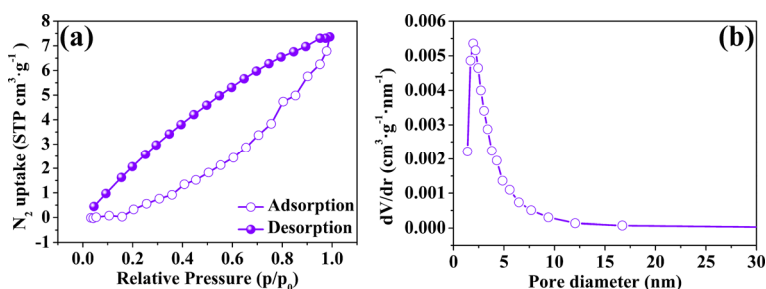


Figure S4 (a) N_2 adsorption-desorption isotherms PU, (b) pore size distribution plot of PU calculated using the BJH method.

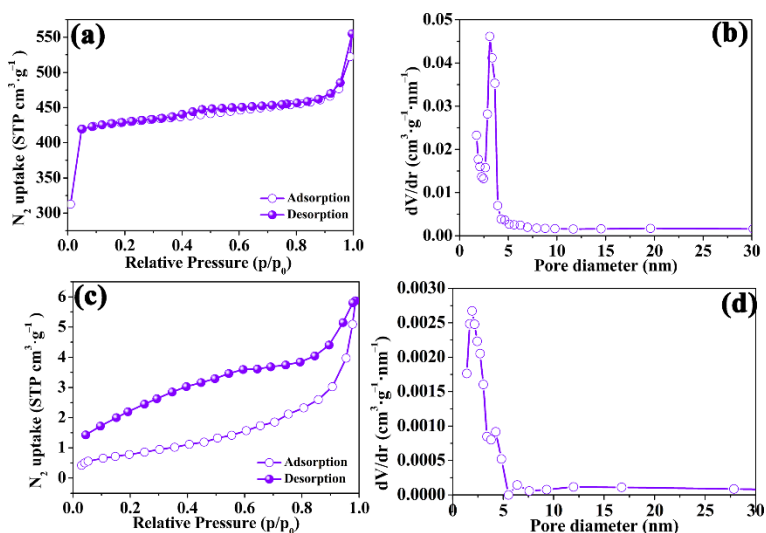


Figure S5 (a) and (c) N_2 adsorption-desorption isotherms of ZIF-67 nanoparticles and ZIF-67-PU after U(VI) adsorption, respectively, (b) and (d) pore size distribution plots of ZIF-67 nanoparticles and ZIF-67-PU after U(VI) adsorption, respectively, calculated using the BJH method.

Table S1 Equations and nomenclatures of these kinetic models (q_e and q_t refer to the amounts of U(VI) adsorbed at equilibrium and designed time t , respectively).

Equations	nomenclatures	
$q_t = q_e(1 - e^{-k_1 t})$	k_1 (min^{-1})	pseudo-first order rate constant
$\frac{t}{q_t} = \frac{1}{2k_2 q_e^2} + \frac{1}{q_e} t$	k_2 ($\text{g} \cdot \text{mg}^{-1} \cdot \text{min}^{-1}$)	pseudo-second order rate constant
	k_i ($\text{mg} \cdot \text{g}^{-1} \cdot \text{min}^{1/2}$)	intra-particle diffusion constant
$q_t = k_i t^{1/2} + C$	C	intercept in the intra-particle diffusion model

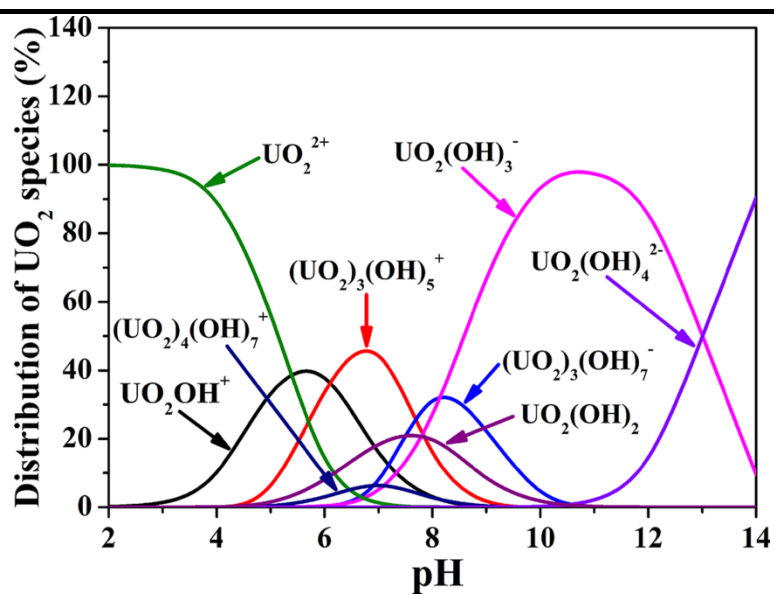


Figure S6 Distribution of aqueous U(VI) species as a function of the pH values.

Table S2 The percent content of U(VI) species under different pH values.

Species	pH=3	pH=4	pH=5	pH=6	pH=7
UO_2^{2+}	99.37%	93.99%	58.97%	7.0%	0.2%
UO_2OH^+	0.63%	37.20%	44.15%	36.64%	12.66%
$(\text{UO}_2)_3(\text{OH})_5^+$			0.47%	36.64%	54.50%
$(\text{UO}_2)_4(\text{OH})_7^+$				2.47%	8.37%
$\text{UO}_2(\text{OH})_2$			0.59%	6.70%	20.06%
$(\text{UO}_2)_3(\text{OH})_7^-$					2.07%
$\text{UO}_2(\text{OH})_3^-$				0.07%	2.00%
Species	pH=8	pH=9	pH=10	pH=11	pH=12
UO_2^{2+}					
UO_2OH^+	1.44%	0.044%			
$(\text{UO}_2)_3(\text{OH})_5^+$	10.59	0.061%			
$(\text{UO}_2)_4(\text{OH})_7^+$	2.13%				
$\text{UO}_2(\text{OH})_2$	22.81%	6.98%	0.98%		
$(\text{UO}_2)_3(\text{OH})_7^-$	40.23%	23.77%	1.27%		
$\text{UO}_2(\text{OH})_3^-$	22.80%	69.82%	97.65%	98.90%	90.91%

Table S3 The concentration of Co released during the adsorption process with initial adsorbent concentration of $m/V = 0.5 \text{ g}\cdot\text{L}^{-1}$.

$C_{\text{Co(U(VI))}} (\text{mg}\cdot\text{L}^{-1})$	$C_{\text{Co}} (\text{g/L})/\text{ZIF-67}$	$C_{\text{Co}} (\text{m}\cdot\text{L}^{-1})/\text{ZIF-67-PU}$
------------------------------------------------------	--------------------------------------------	---------------------------------------------------------------

21	0.46×10^{-2}	0.41×10^{-2}
27	0.53×10^{-2}	0.47×10^{-2}
33	0.56×10^{-2}	0.53×10^{-2}
39	0.78×10^{-2}	0.65×10^{-2}
45	0.87×10^{-2}	0.70×10^{-2}

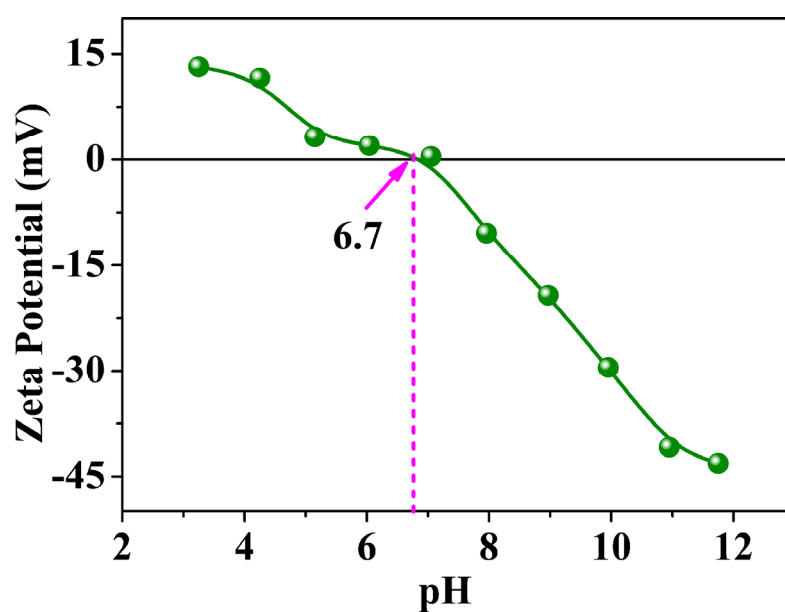


Figure S7 Zeta potential of the obtained MOFs materials.

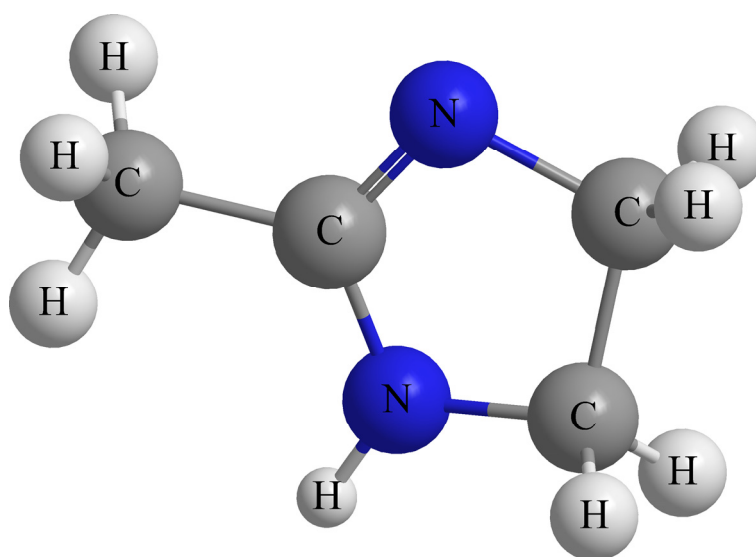


Figure S8 Molecular structure of MeimiH.