Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supplementary information

Incorporation of 1-ethyl-3-methyl-imidazolium acetate into UiO-66 as efficient sorbents for carbon dioxide capture

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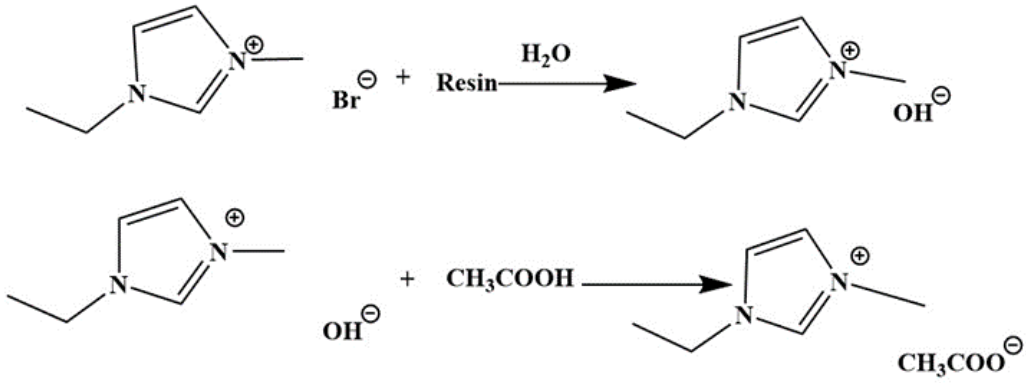

Figure S1. Schematic diagram of the synthesis of [Emim][Ac]

Figure S2. Synthetic method of the[Emim][Ac]@UiO-66.

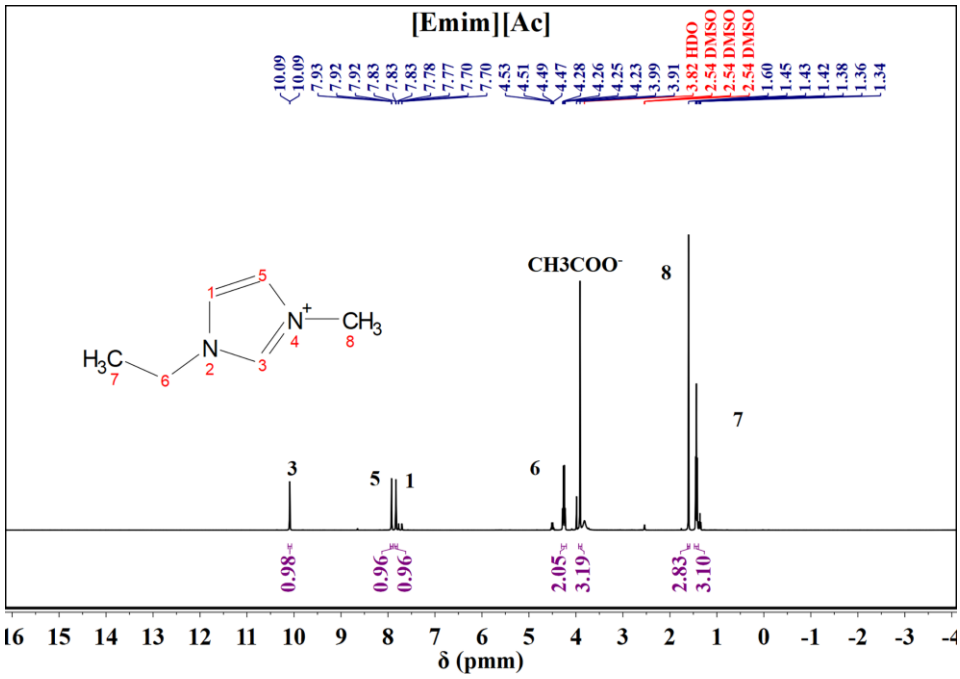

Figure S3. ^{1}HNMR spectrum of [Emim][Ac] in DMSO-d6 (r.t). ^{1}HNMR (400 MHz, DMSO, 298.2K, TMS), δ (ppm): 1.40 (3H, dt), 1.61 (3H, s), 3.96 (3H, d), 4.26 (2H, q), 7.90 (1H, d), 8.01 (1H, d), 10.32 (1H, s,).

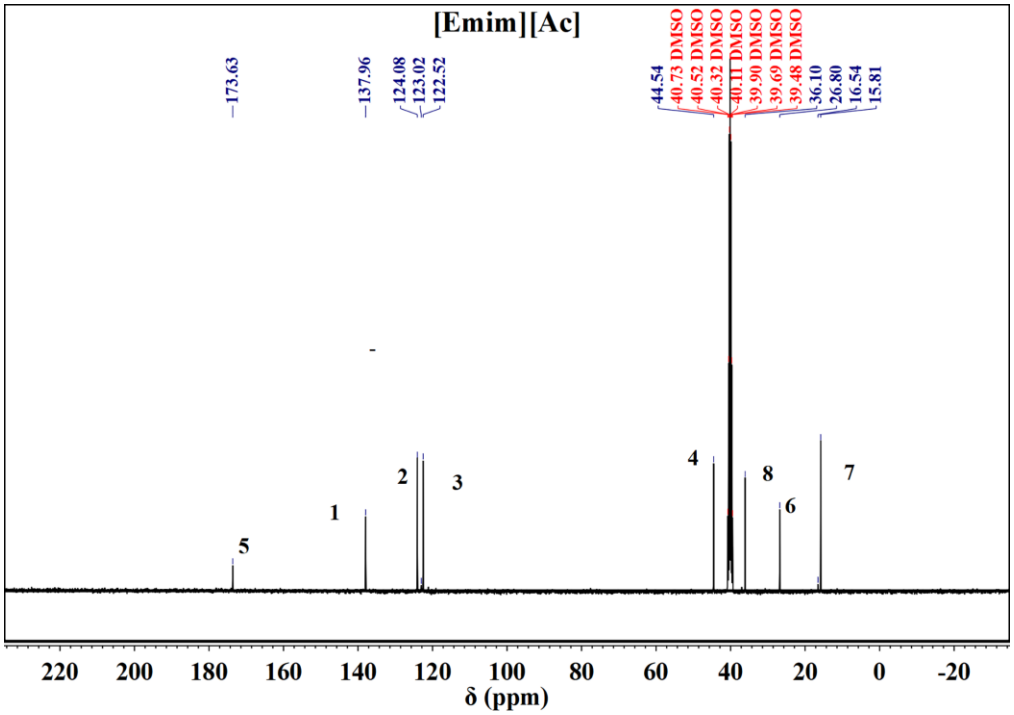

Figure S4. ^{13}CNMR spectrum of [Emim][Ac] in DMSO-d6 (r.t). ^{13}CNMR (101 MHz, DMSO, 298.2K, TMS), δ (ppm): 15.6, 26.6, 35.8, 44.3, 122.4, 123.9, 138.3, 173.7.

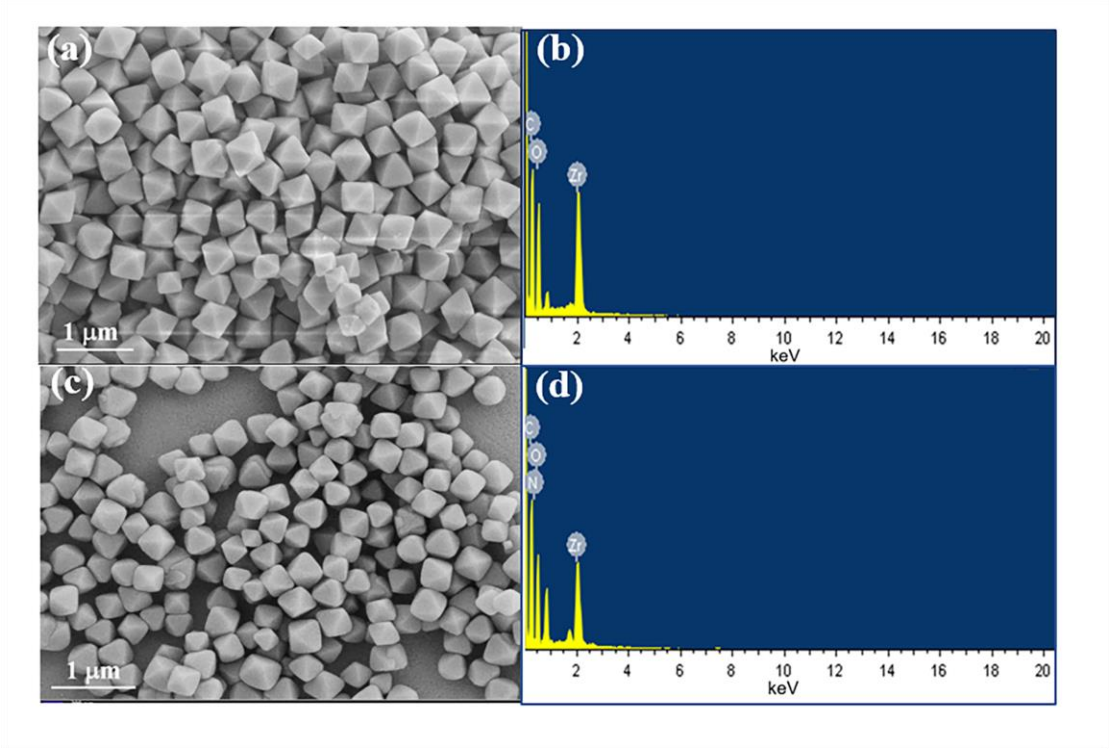

Figure S5. (a) SEM image and (b) EDX spectra of pristine UiO-66, (c) SEM image and (d) EDX spectra of [Emim][Ac]@UiO-66-7.5%.

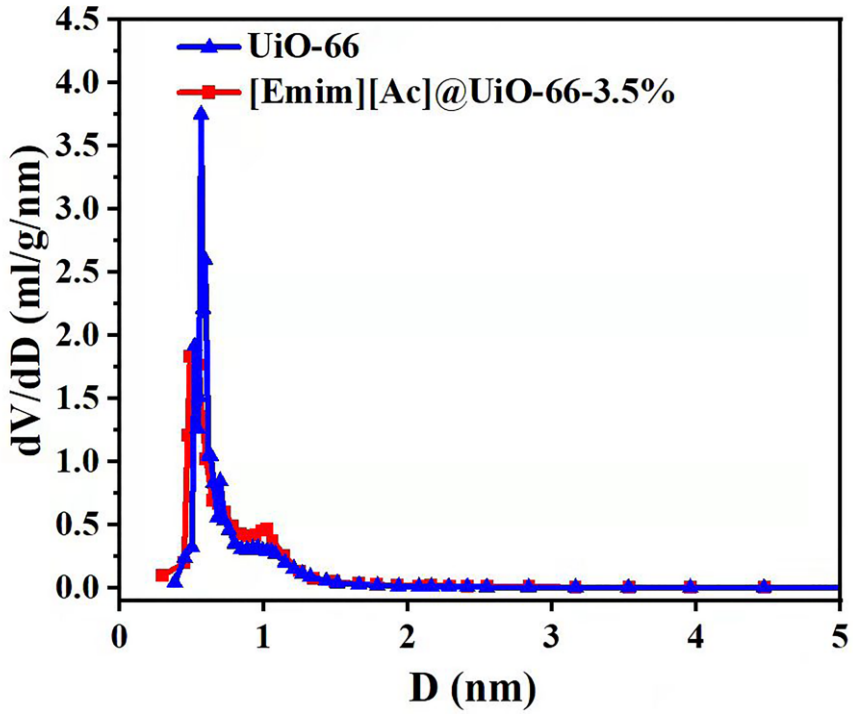

Figure S6. Pore size distribution of UiO-66 and [Emim][Ac]@UiO-66-3.5%.

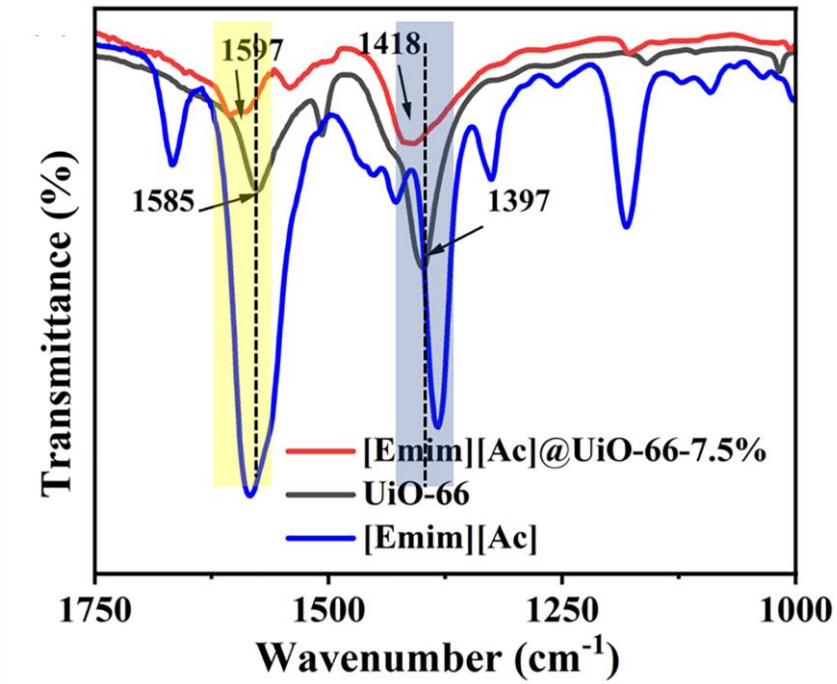

Figure S7. FTIR spectra of UiO-66, [Emim][Ac], and [Emim][Ac]@UiO-66-7.5% on 1000-1700 cm^{-1}.

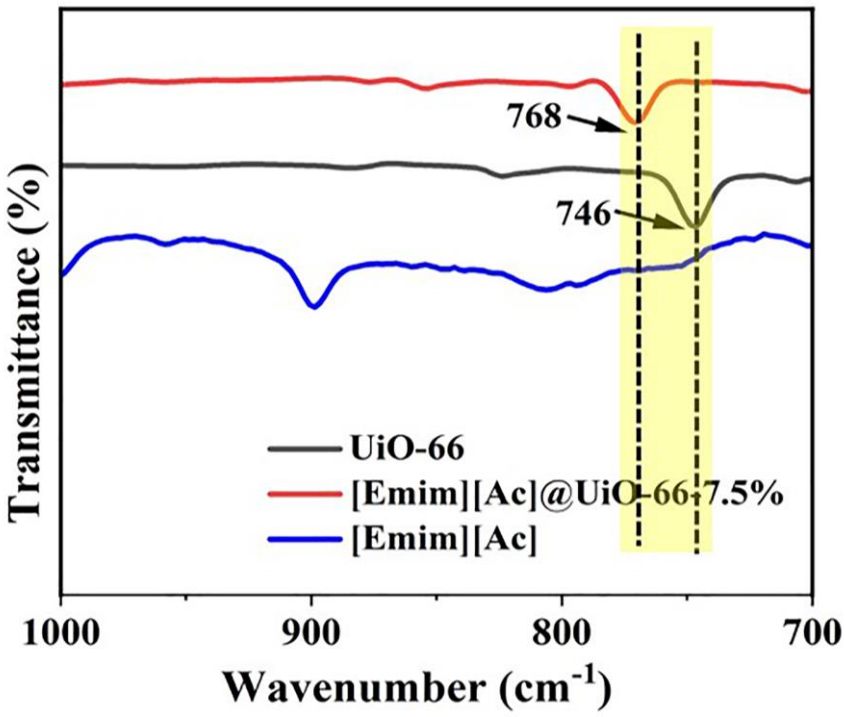

Figure S8. FTIR spectra of UiO-66, [Emim][Ac], and [Emim][Ac]@UiO-66-7.5% on 700-1000 cm^{-1}.

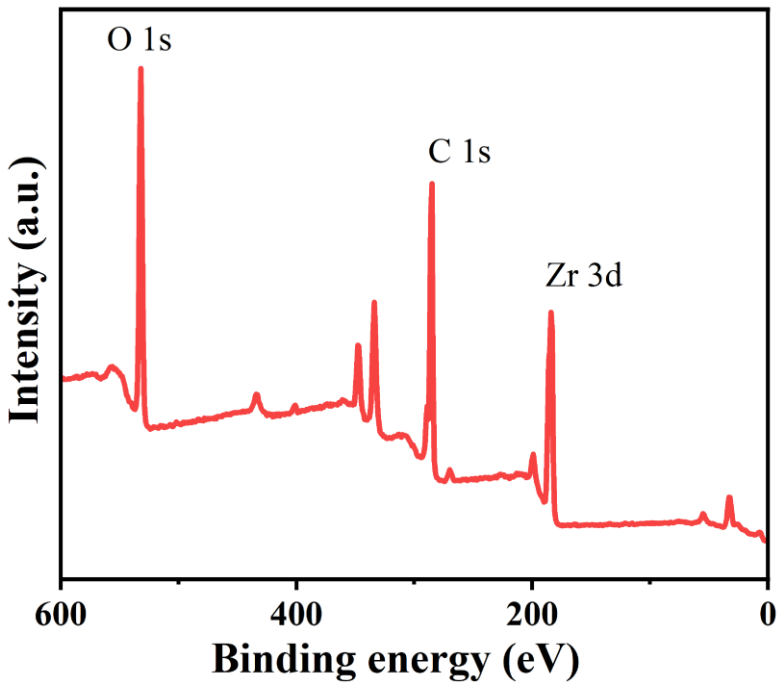

Figure S9. XPS spectrum of UiO-66.

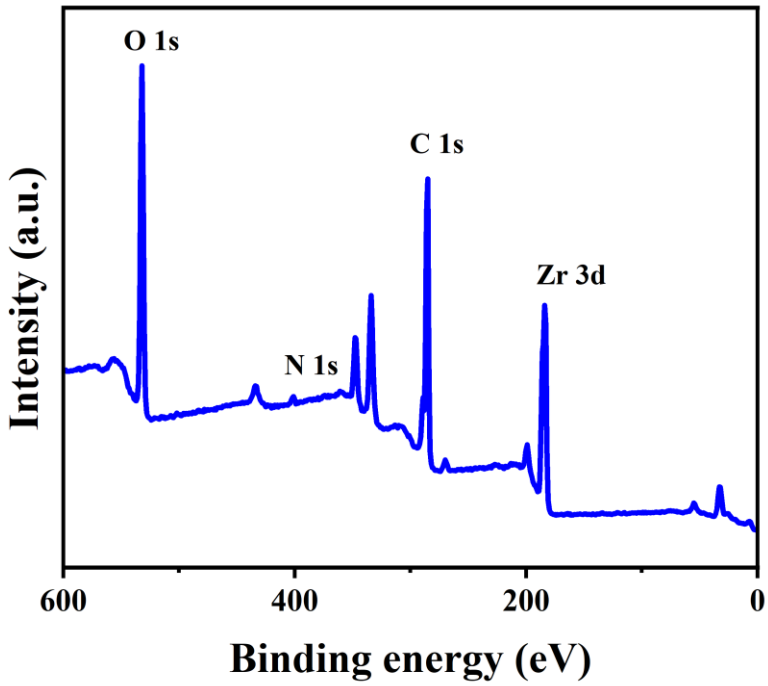

Figure S10. XPS spectrum of [Emim][Ac]@UiO-66-7.5%.

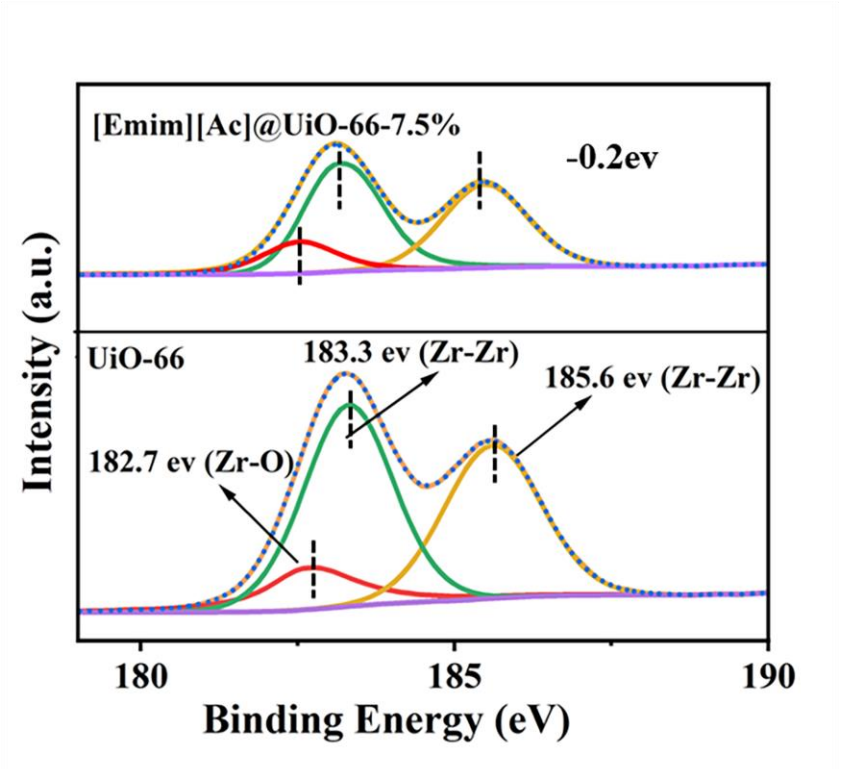

Figure S11. The Zr 3d region of the XPS spectra of UiO-66 and [Emim][Ac]@UiO-66-7.5%.

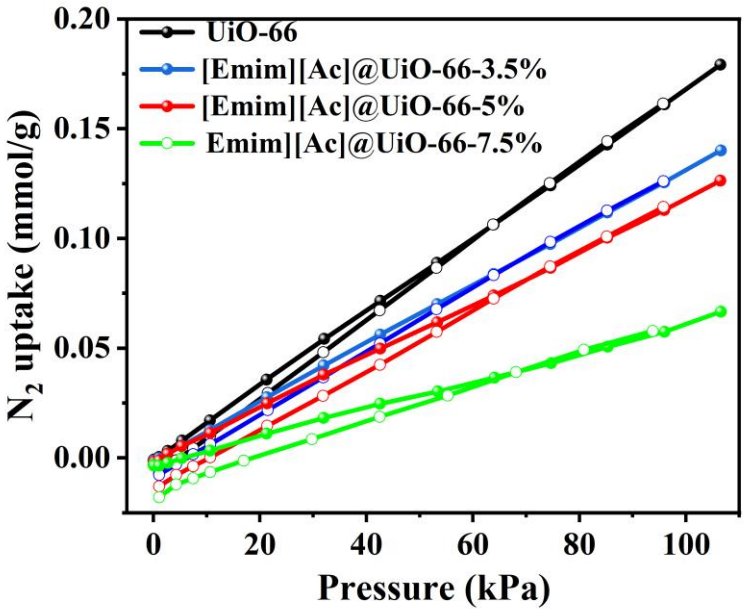

Figure S12. N_2 adsorption isotherms of [Emim][Ac]@UiO-66 composites at 298K and 1.0 bar.

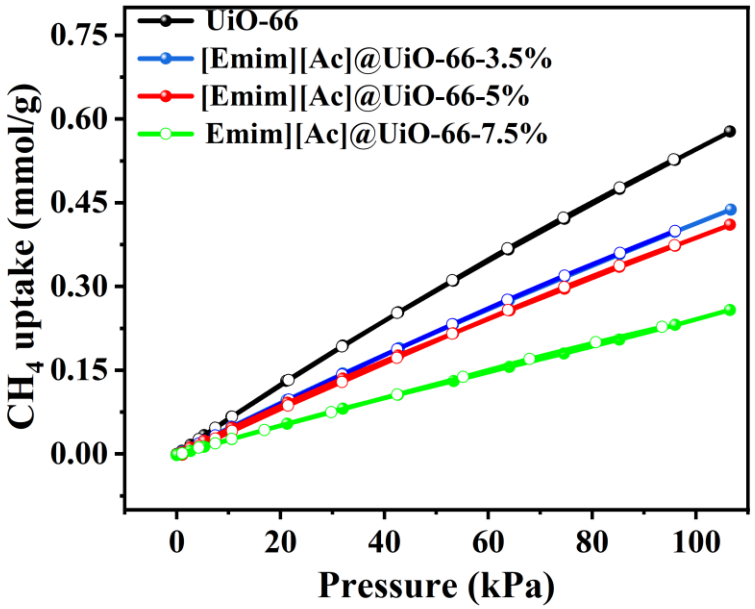

Figure S13. CH_4 adsorption isotherms of [Emim][Ac]@UiO-66 composites at 298 K and 1.0 bar.

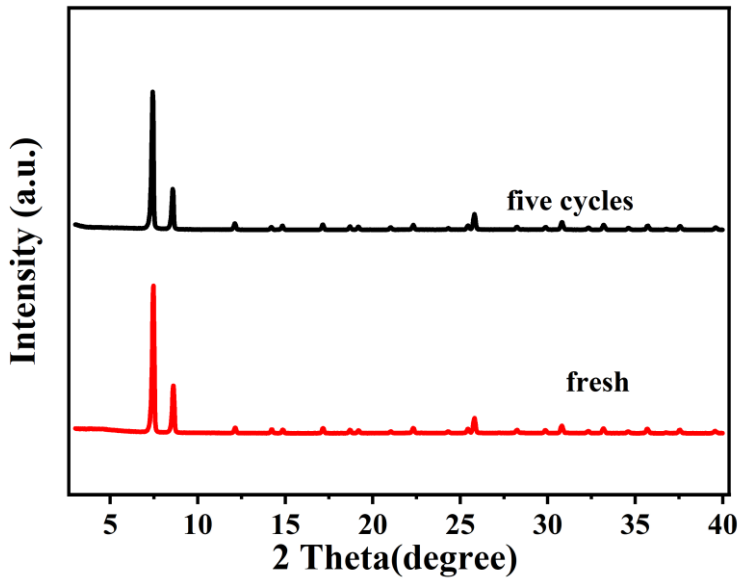

Figure S14. PXRD patterns of fresh [Emim][Ac]@UiO-66-3.5% and resued [Emim][Ac]@UiO-66-3.5% after five cycles.

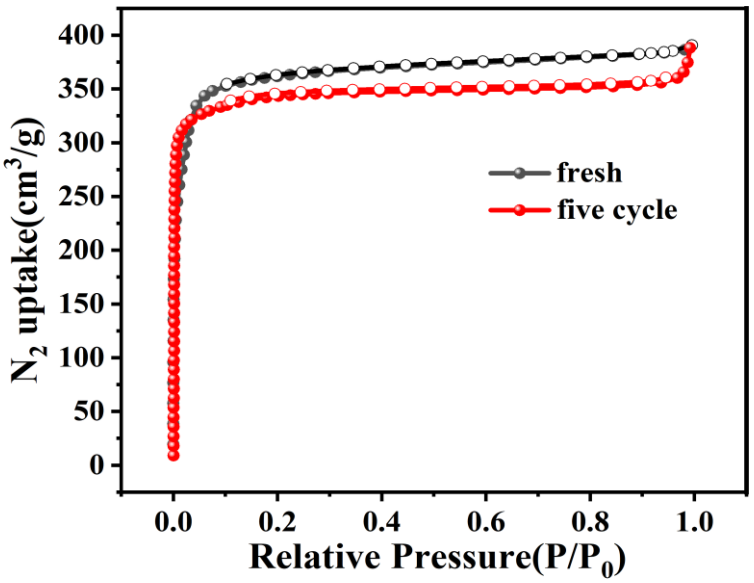

Figure S15. N_2 adsorption-desorption isotherms of fresh [Emim][Ac]@UiO-66-3.5% and resued [Emim][Ac]@UiO-66-3.5% after five cycles.

Table S1. Textural properties of [Emim][Ac]@UiO-66composites.

Sample type	BET surface area (m^2/g)	Langmuir surface area (m^2/g)	Total pore volume (cm^3/g)	Average pore width (nm)
UiO-66	1170.2	1686.4	0.5817	0.7602
[Emim][Ac]@UiO-66-3.5%	1117.3	1612.9	0.5511	0.7506
[Emim][Ac]@UiO-66-5%	987.5	1440.8	0.4894	0.7970
[Emim][Ac]@UiO-66-7.5%	874.3	1277.3	0.4417	0.7160

Table S2. Comparison of the CO_2 adsorption capacity and CO_2/N_2, CO_2/N_2 selectivity of different materials from different references.

Samples	T (k)	CO_2 (mmol/g)	CO_2/N_2 selectivity	CO_2/CH_4 selectivity	Ref.
UiO-66	298	2.1	18	6	This work
[Emim][Ac]@UiO-66-3.5%	298	2.5	72	11.4	This work
ZIF-8	298	0.71	7	4	1
IL-ZIF-IL	298	1.53	5572	1190	2
[HEMIM][DCA]@ZIF-8	298	0.49	-	117	3
MIL-53(Al)	294	2.23	4.5	3	4
ZIF-68	298	1.74	19	5	5
NUT-1	298	1.36	29000	400	6
NUT-2	298	0.99	8000	360	6
NUT-3	298	0.64	1600	90	6
NH_2-UiO-66	298	5.70	31	-	7

References

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