Electronic Supplementary Material

Template-Free and Room Temperature Synthesis of Hierarchical Porous Zeolitic Imidazole Framework Nanoparticles and Their Dye and CO_2 Adsorption

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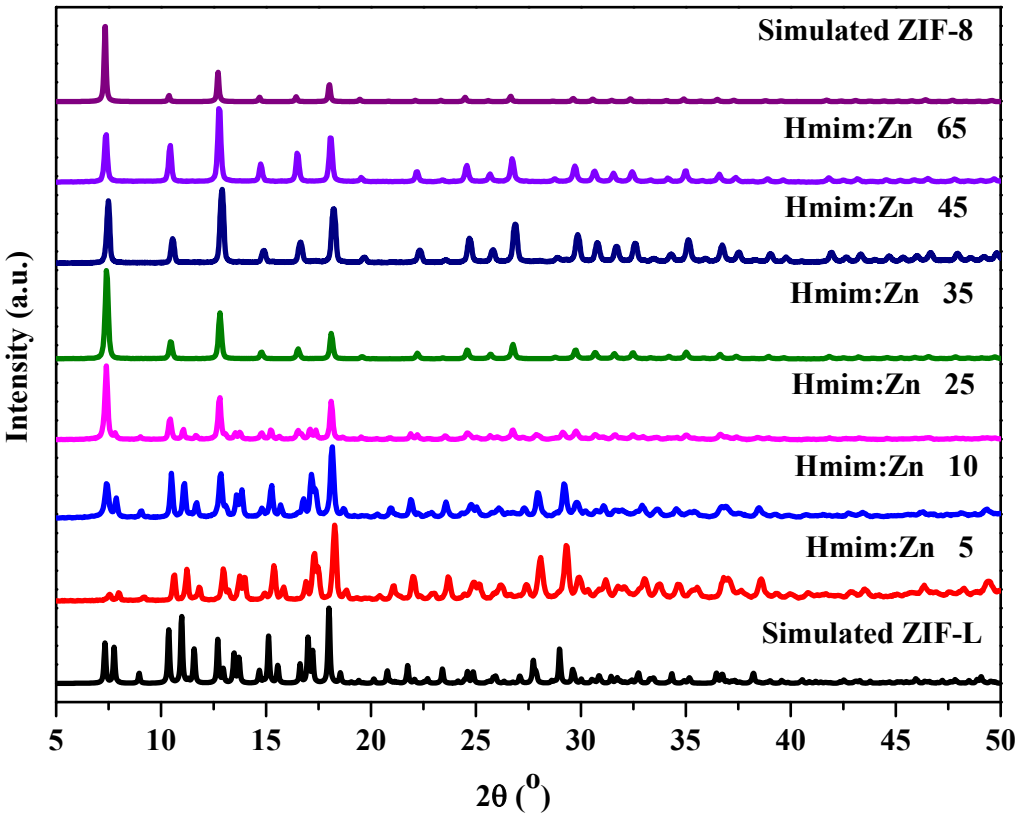

Figure S1 XRD patterns of samples obtained at different Hmim: Zn ratios (NaOH, 0.2 mmol).

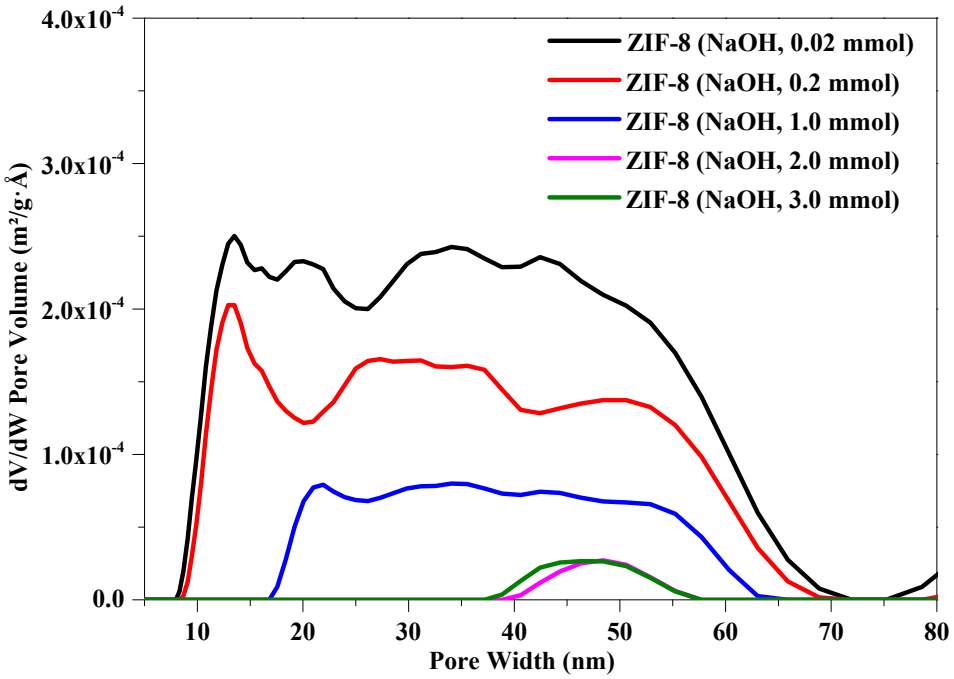

Figure S2 Pore size distribution of hierarchical porous ZIF-8 estimated from the N_2 sorption isotherms using NLDFT.

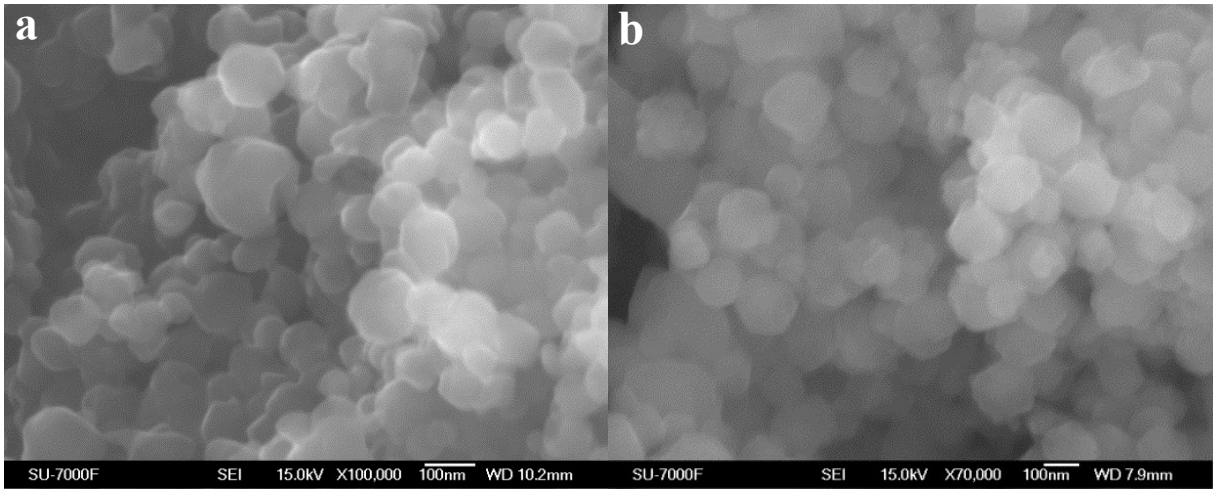

Figure S3 SEM images of ZIF-8 synthesized using a) 0.2 mmol and b) 1.0 mmol of NaOH (Hmim:Zn~35).

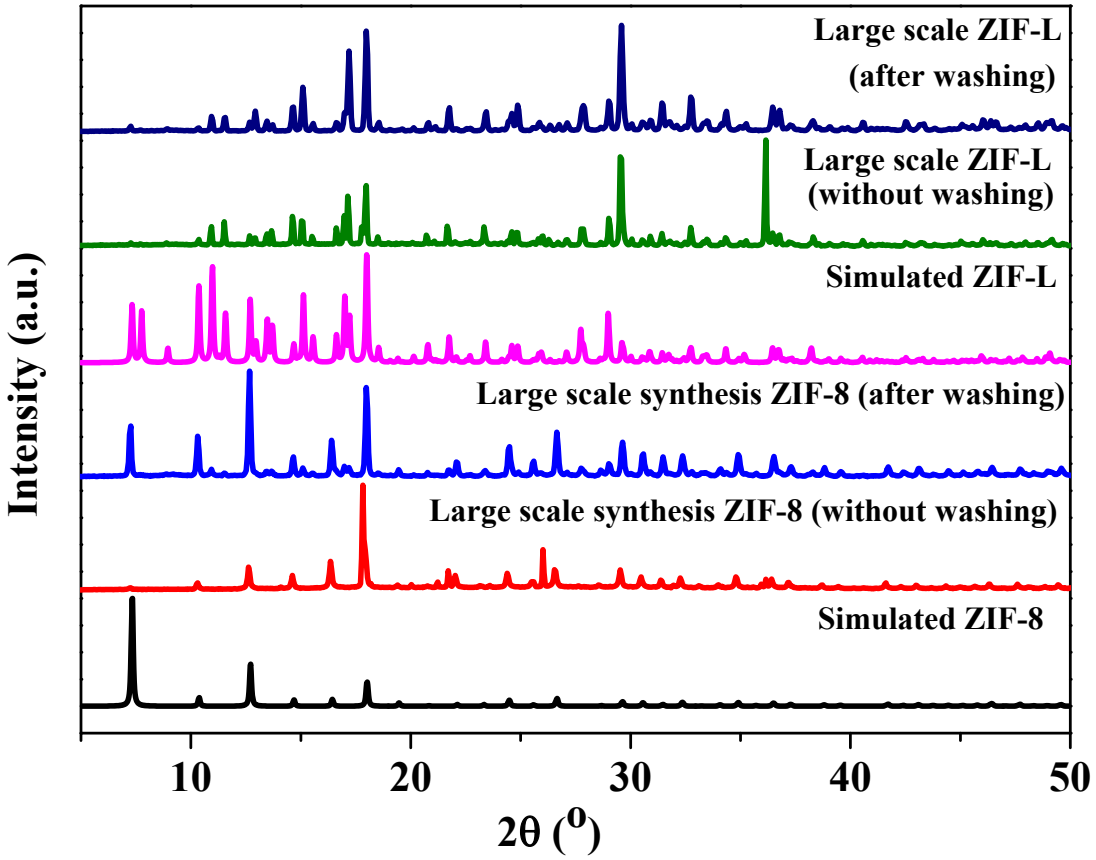

Figure S4 XRD of the synthesized materials using large scale synthesis.

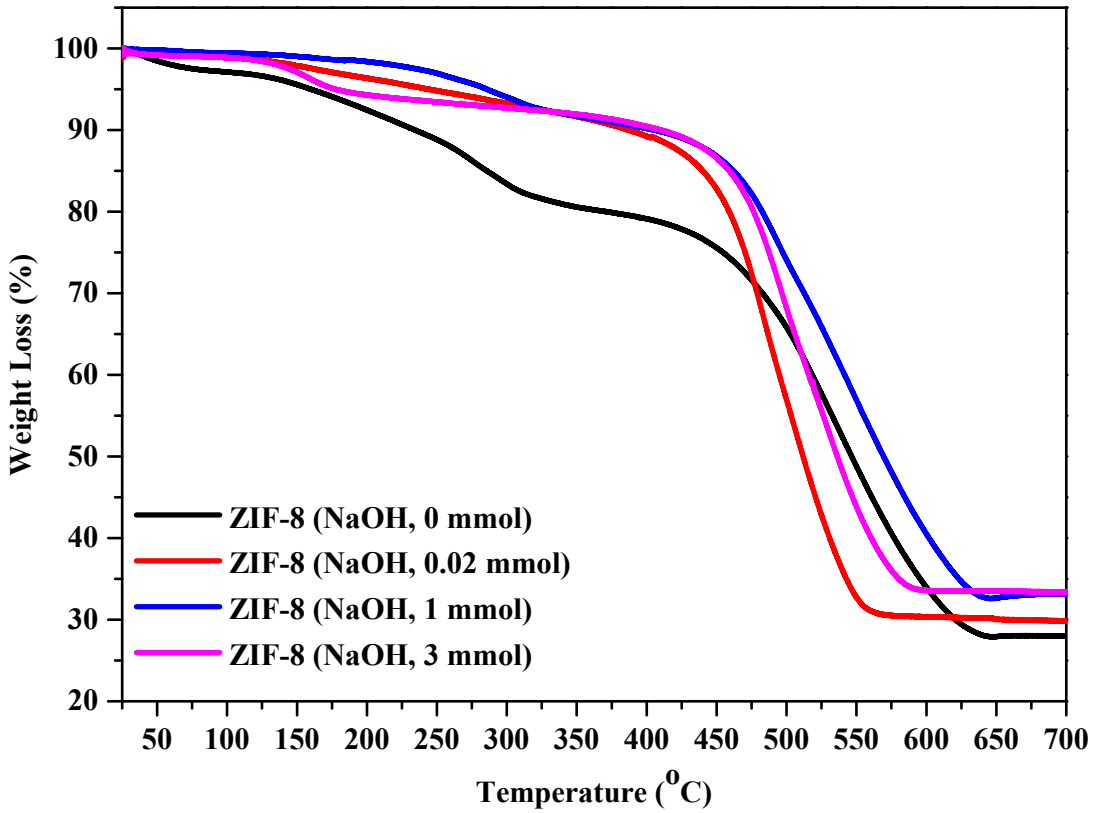

Figure S5 TGA curve of ZIF-8 nanoparticles.

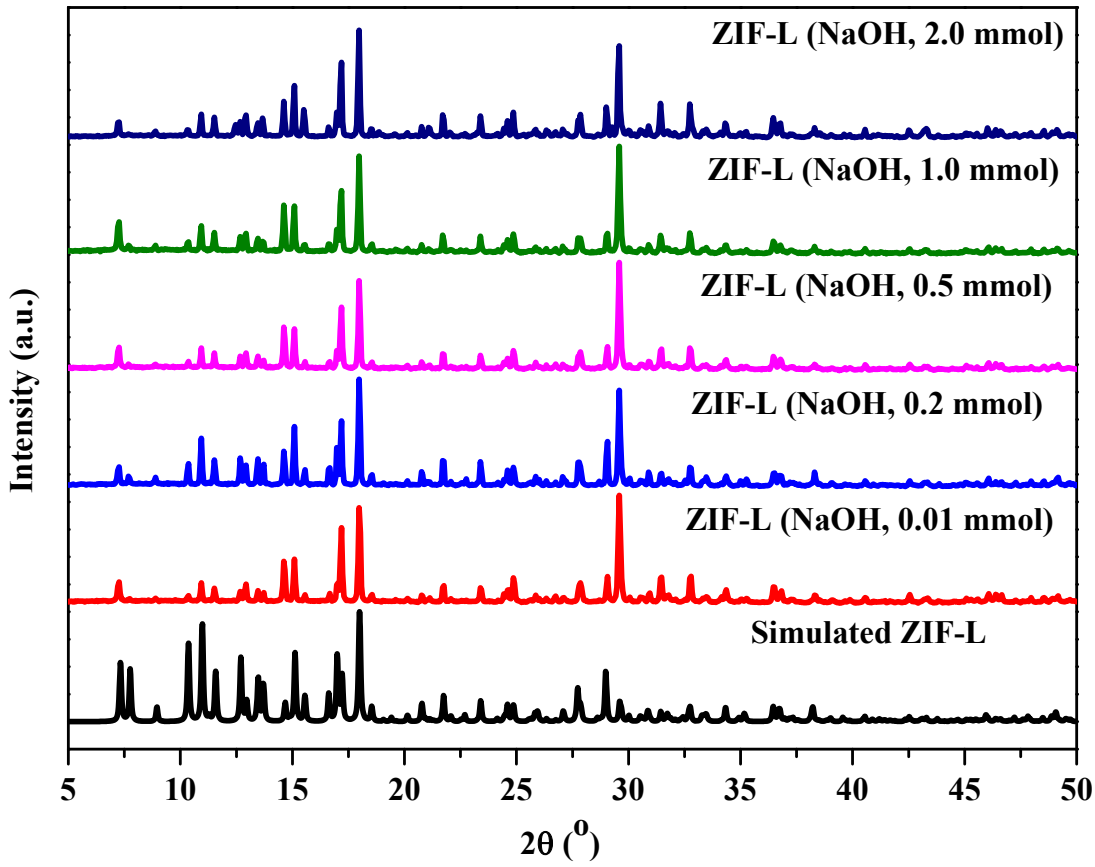

Figure S6 XRD patterns of 2D ZIF8-L synthesized using different amounts of NaOH (Hmim: Zn ~ 8).

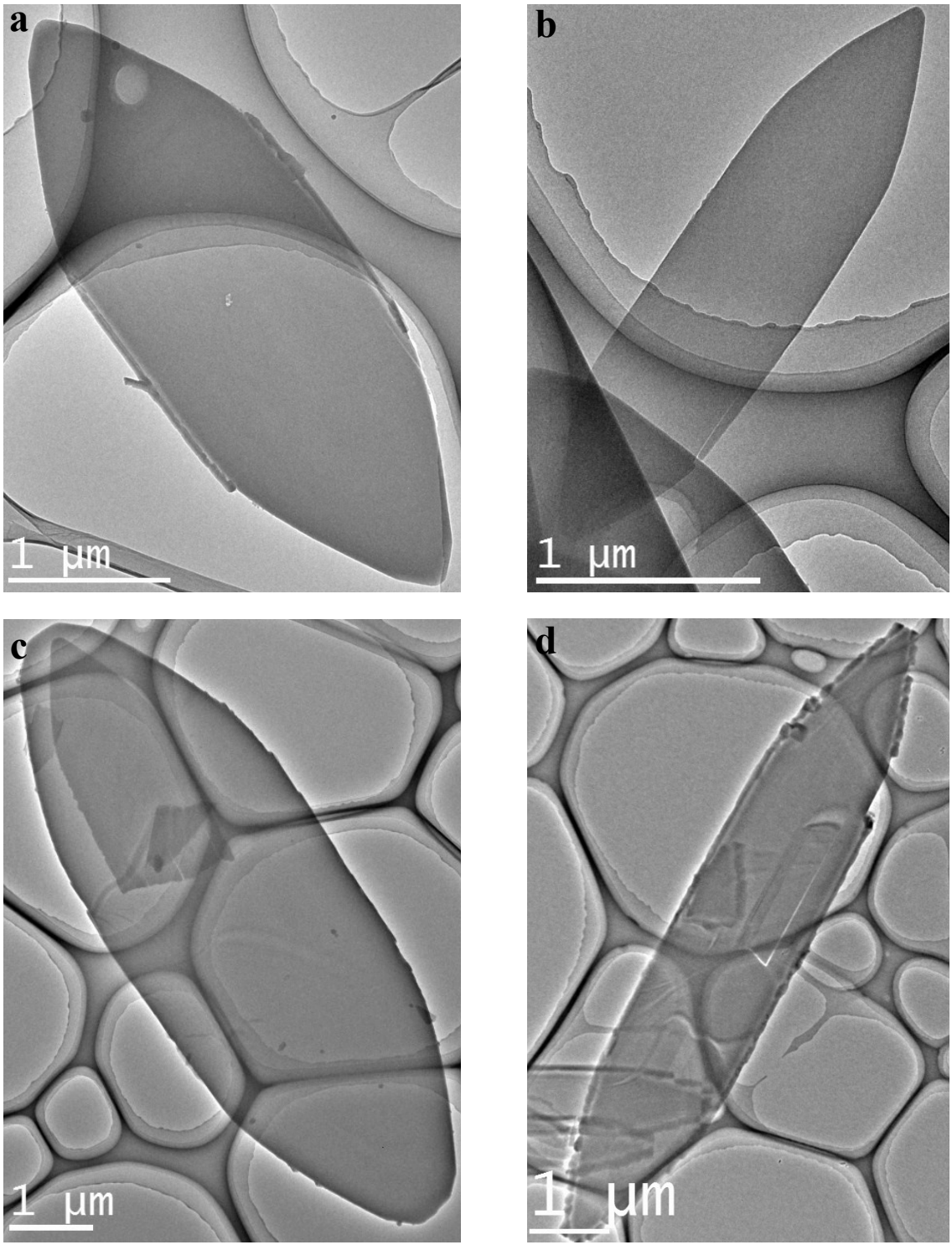

Figure S7 TEM images of 2D ZIF-L using a) 0.01 mmol, b) 0.2 mmol, c) 1 mmol, and d) 2 mmol of NaOH (Hmim:Zn~8).

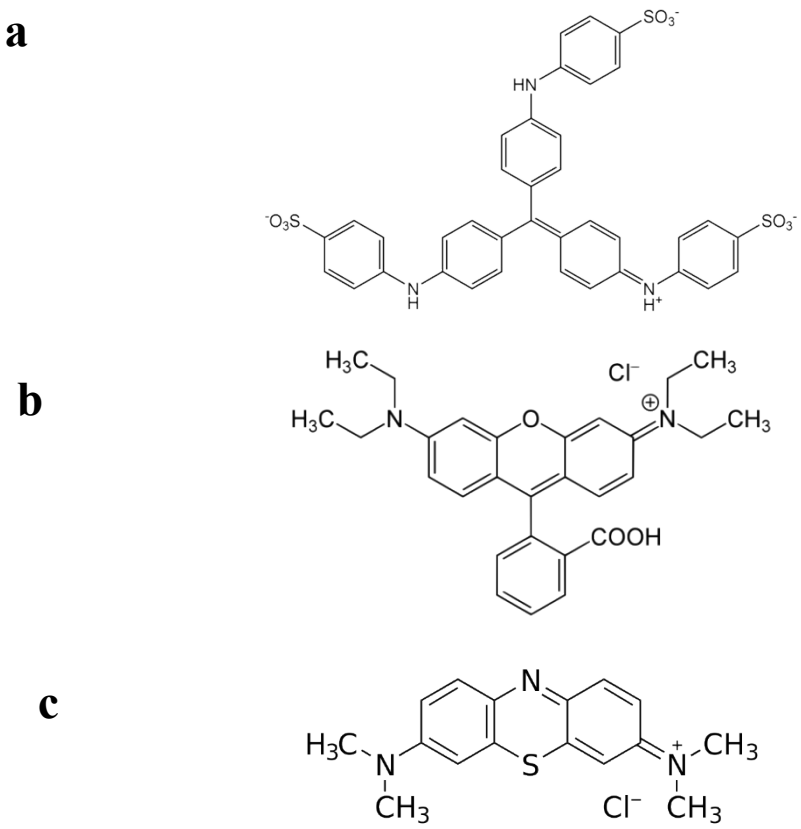

Figure S8 Chemical structures of the investigated dyes; a) methyl blue, b) rhodamine B, and c) methylene blue.

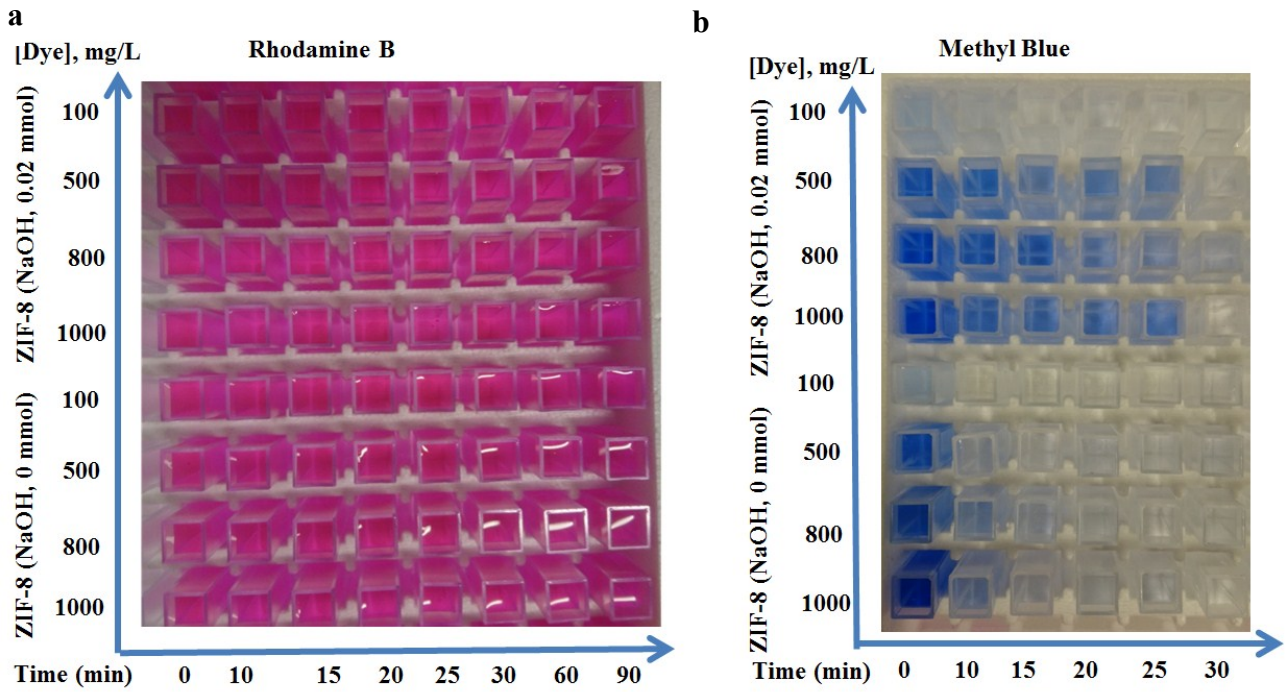

Figure S9 Photos showing time-dependent adsorption of a) RhB, and b) MB on ZIF-8 nanoparticles.

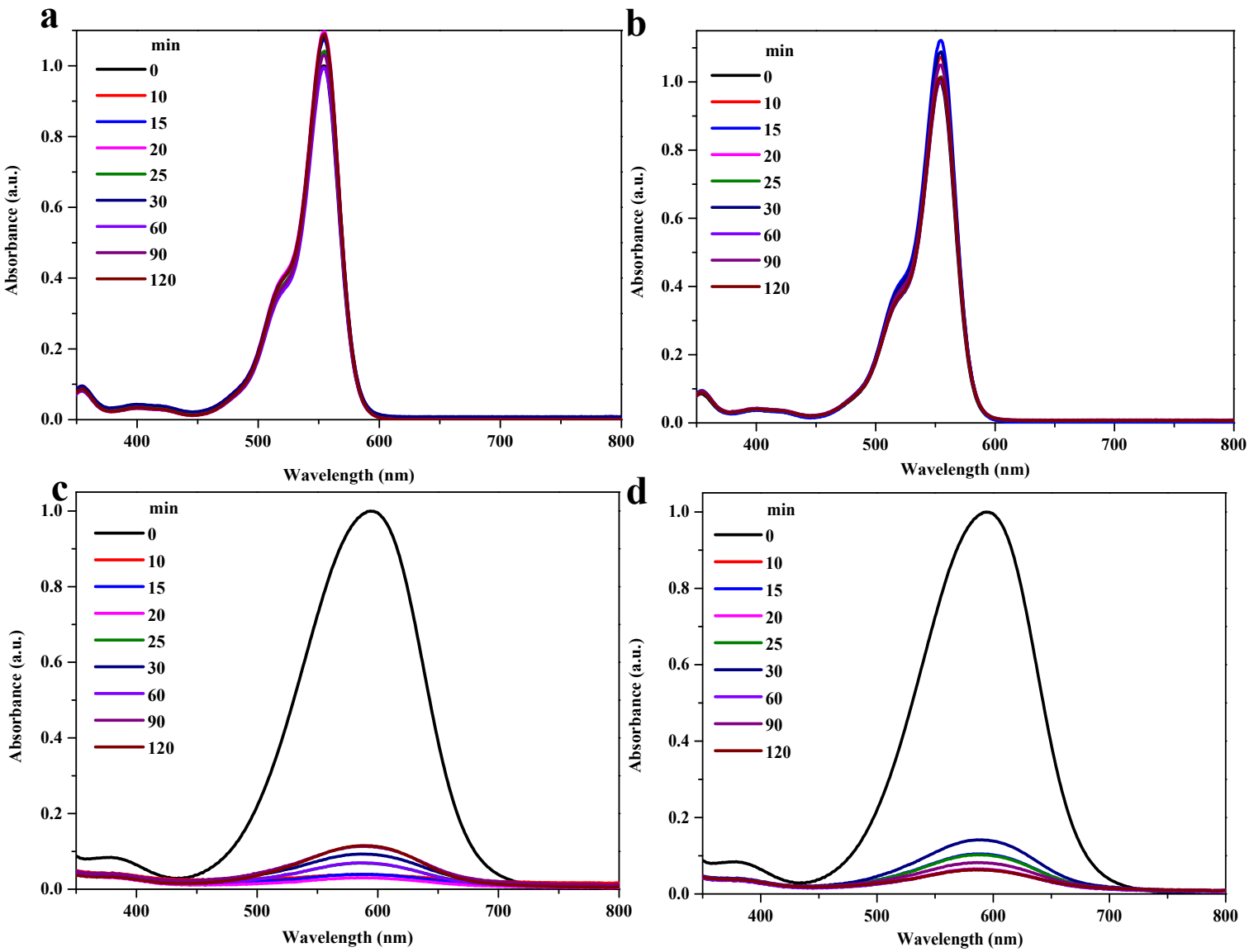

Figure S10 UV-vis absorption spectra for adsorption of a-b) RhB and c-d) MB (1000 mg/L) on ZIF-8 synthesised with a-c) 0 mmol and b-d) 0.02 mmol of NaOH.

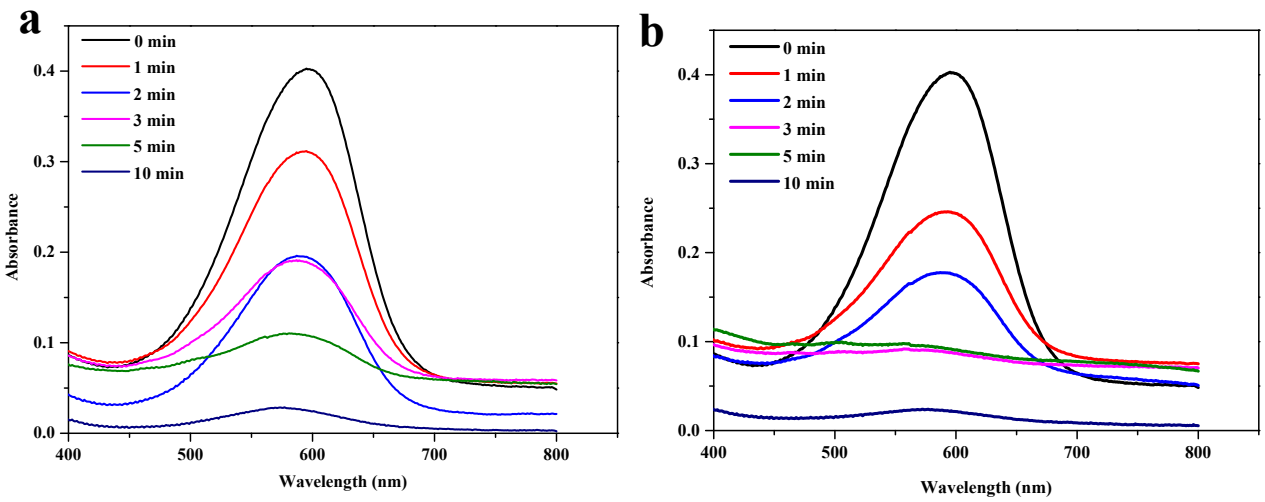

Figure S11 UV-vis absorption spectra for MB adsorption on ZIF-8 synthesised with a) 0 mmol and b) 0.02 mmol of NaOH.

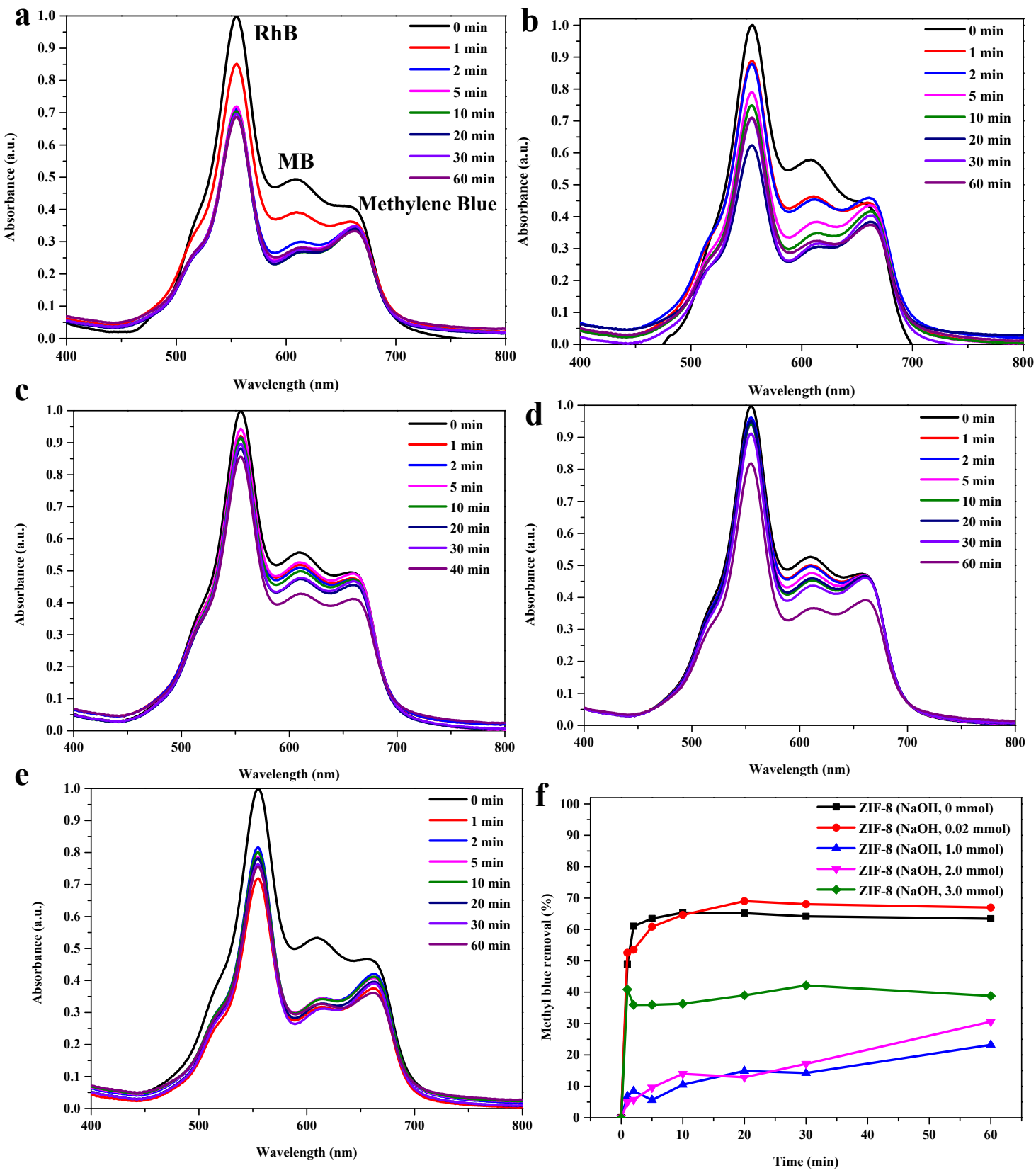

Figure S12 UV-vis absorption spectra for dyes MB, RhB and methylene blue on ZIF-8 synthesized using NaOH of a) 0 mmol, b) 0.02 mmol, c) 1 mmol, d) 2 mmol and e) 3 mmol, and the efficiency of MB adsorption.

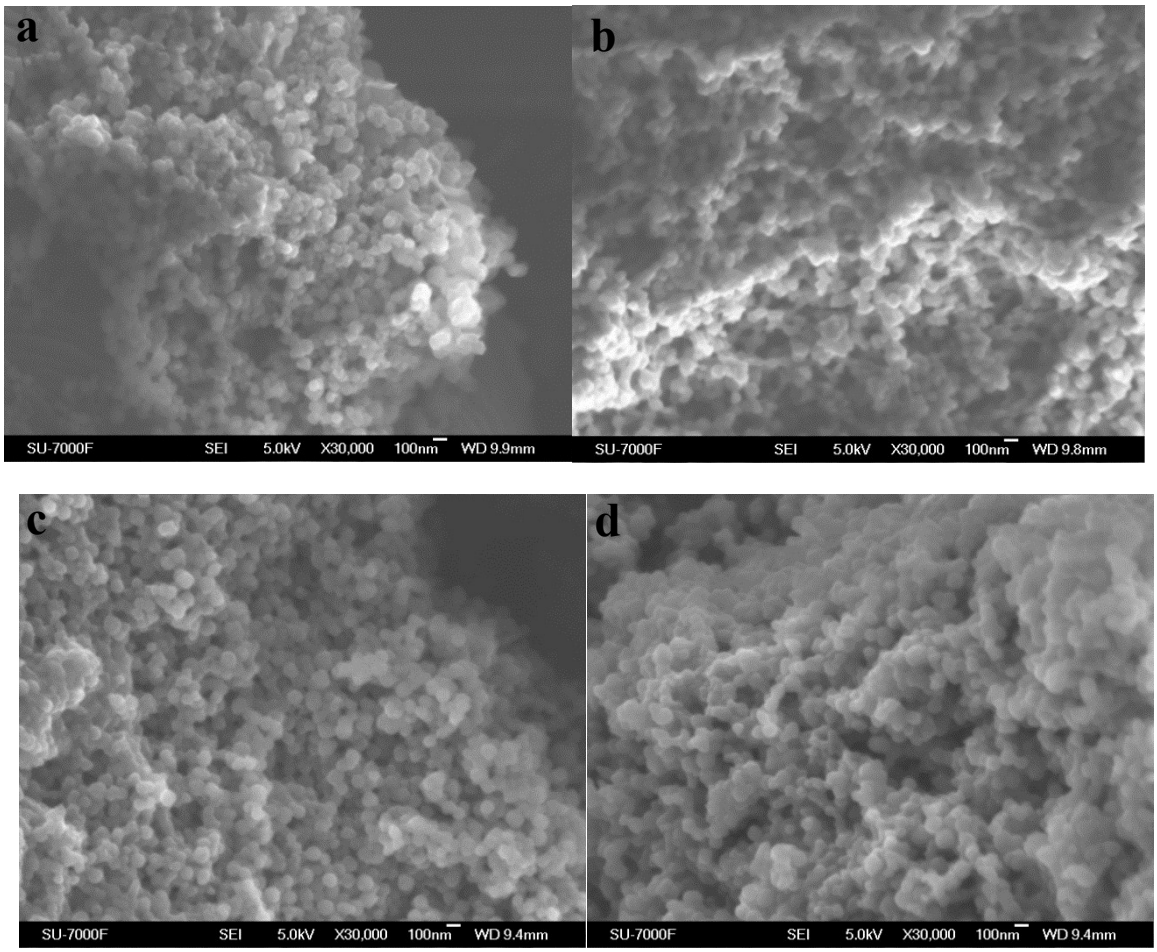

Figure S13 SEM images of ZIF-8 using NaOH a-b) 0 mmol and c-d) 0.02 mmol before a-c) and after b-d) adsorption of MB.

Table S1. Comparison among different ZIF-8 materials reported for dye adsorption

Materials	Size (nm)	Synthesis condition	Porosity/surface area	Dye	Efficiency%	Contact time	Ref.
ZIF-8	500 nm	Zn:Hmim: NH_4OH 1:2:54	Nomesoporous structure and only microporous in ZIF-8, $S_{BET,}$ and S_{Lan} area are 1007.4 and1322.9 m^2g^{-1}, respectively.	MB	99.5	30 min	[1]
ZIF-8-SLM	14.8-15.3 nm	Zn:Hmim: MeOH 1:4:1, RT, 1h	ND	RhB and MB	88.3-99.1	10 h	[2]
ZIF-8 or ZIF-67	3.5–4.5 μm	Zn^{2+}: Hmim: NH_3: TEA: H_2O molar compositions of 1: 2: 32: (0–32): 157	Mesoporous volume is 0.04-0.14 $cm^3\ g^{-1}$, S_{BET} is 395-441 m^2g^{-1}	RhB, anionic methyl orange and cationic methylene blue	30-89	2h	[3]
ZIF-8	50-200	Zn:Hmim: NaOH 1:35:0-2.3	Pore size 10-60 nm, $S_{BET,}$ and S_{Lan} area are 1320-1708 $m^2g^{-1}$and 1738-1837 m^2g^{-1}, respectively	MB	> 95	< 10 min	Here

Note: $S_{BET,}$ BET surface area; $S_{Lan,}$ Langmuir surface area; ND, not detected.

1 Y. Feng, Y. Li, M. Xu, S. Liu and J. Yao, *RSC Adv.*, 2016, **6**, 109608–109612.

2 M. Isanejad, M. Arzani, H. R. Mahdavi and T. Mohammadi, *J. Mol. Liq.*, 2017, **225**, 800–809.

3 Y. Li, K. Zhou, M. He and J. Yao, *Microporous Mesoporous Mater.*, 2016, **234**, 287–292.