Electronic Supplementary Information

Membrane adsorber containing new Sm(III)–organic framework for dye removal

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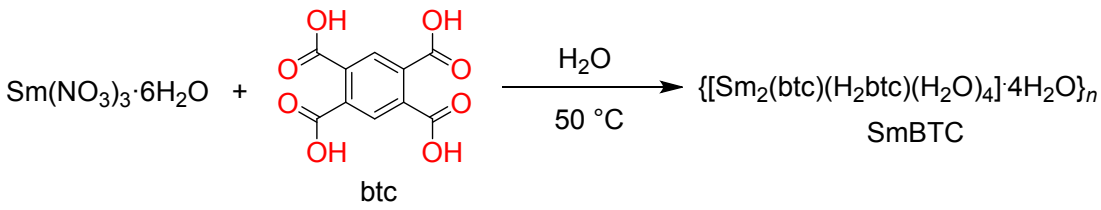


Scheme S1 Reaction pathway of synthesis of SmBTC.

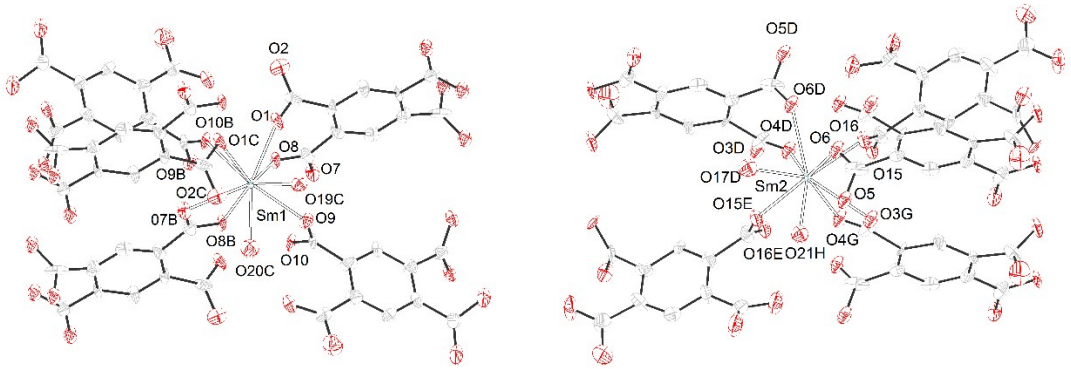
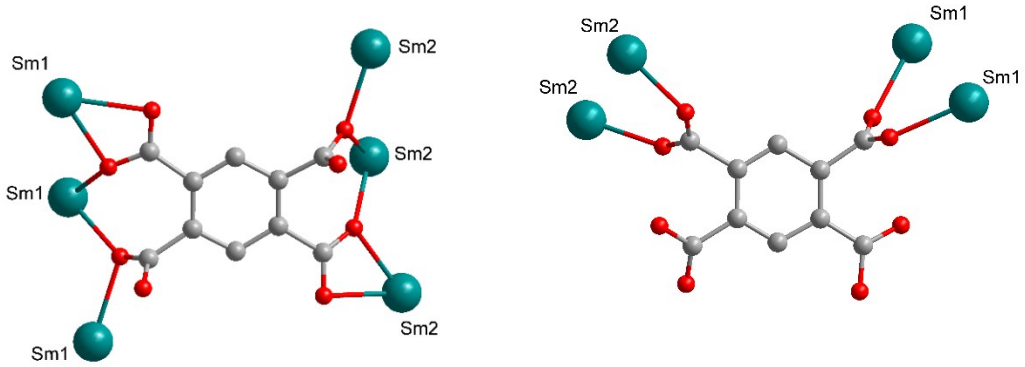


Fig. S1 Coordination environments of Sm^{III} ion in SmBTC (symmetry code: (B) –x + 1, –y + 1, –z + 2; (C) –x, y + 1, –z + 2; (D) –x + 1, –y + 2, –z + 1; (E) –x + 2, –y + 2, –z + 1; (H) x + 1, y, z; (G) x, y, z – 1).



Mode I Mode II

Fig. S2 Coordination modes of btc ligand in SmBTC.

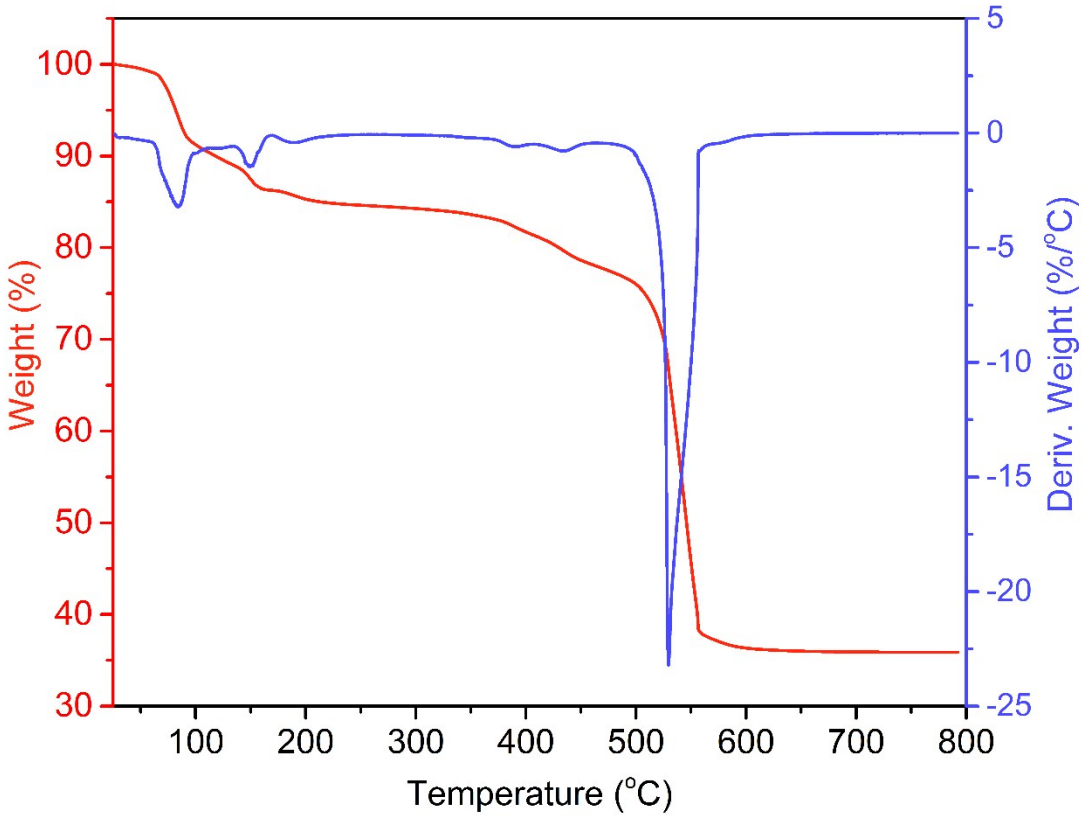


Fig. S3 Thermogravimetric analysis (TGA) and derivative thermogravimetry (DTG) curves of the as-synthesized SmBTC.

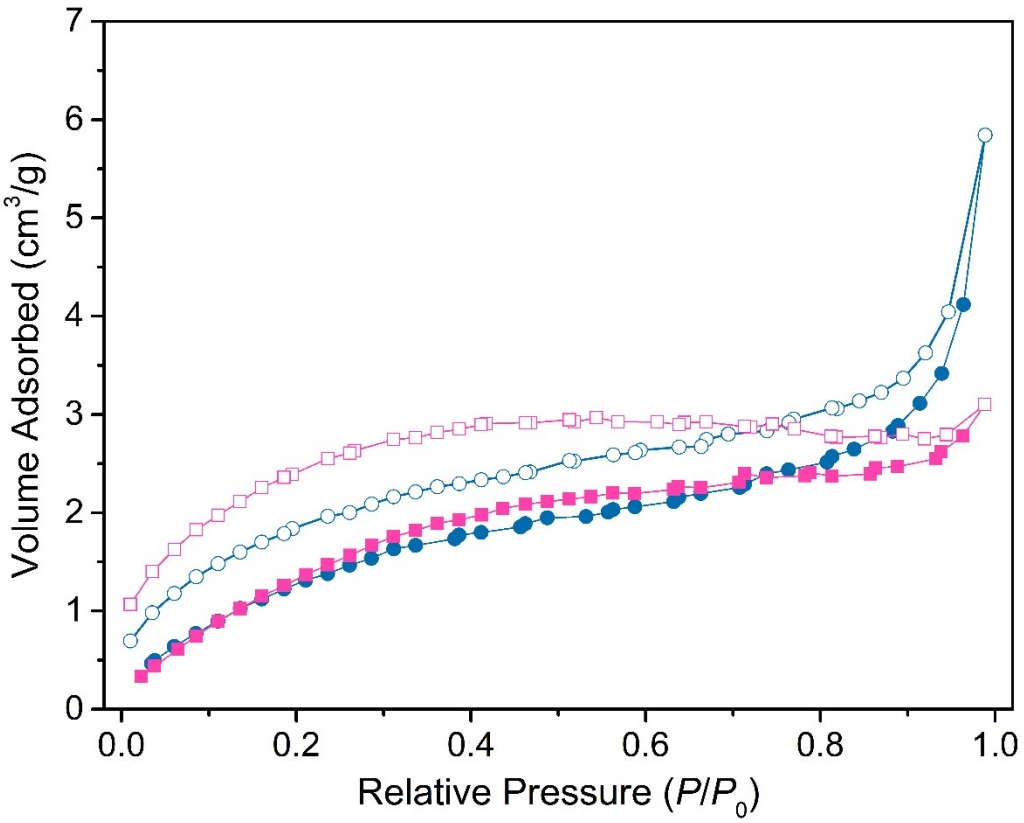


Fig. S4 N_2 adsorption isotherms at 77 K of as-synthesized SmBTC (circle) and SmBTC following three adsorption-desorption cycles (square).

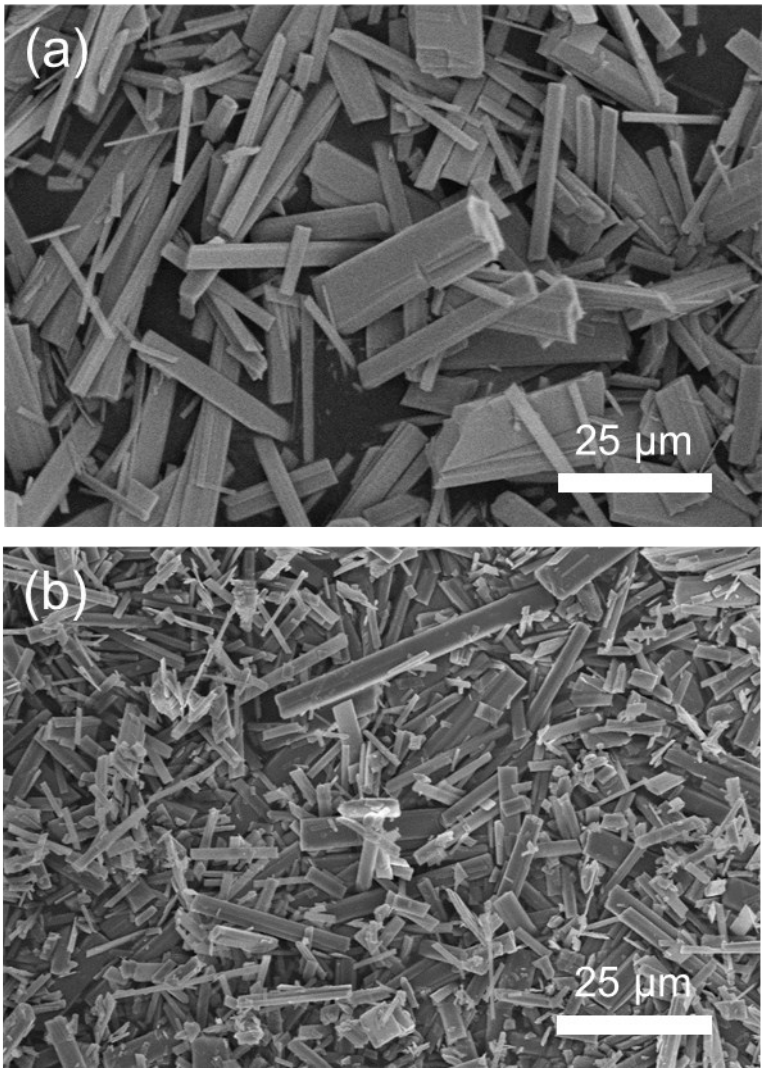


Fig. S5 SEM images of SmBTC synthesized in (a) homogeneous and (b) heterogeneous reactions.

Fig. S6 Photographs of (a) as-synthesized SmBTC powder, (b) SmBTC powder after adsorption of RB, and SmBTC powder following three adsorption-desorption cycles.

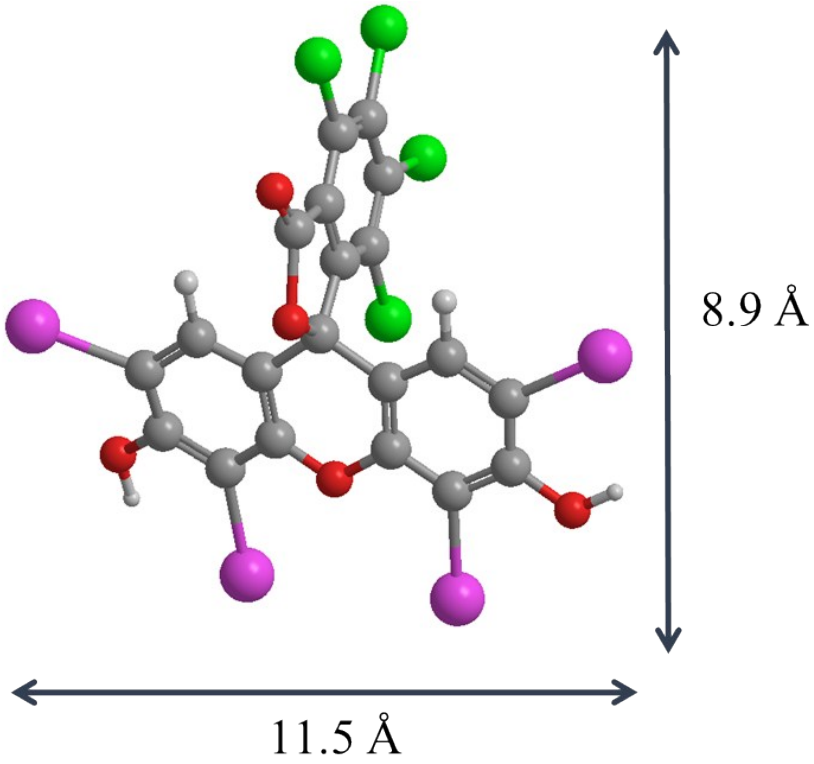


Fig. S7 3D structure of Rose Bengal.

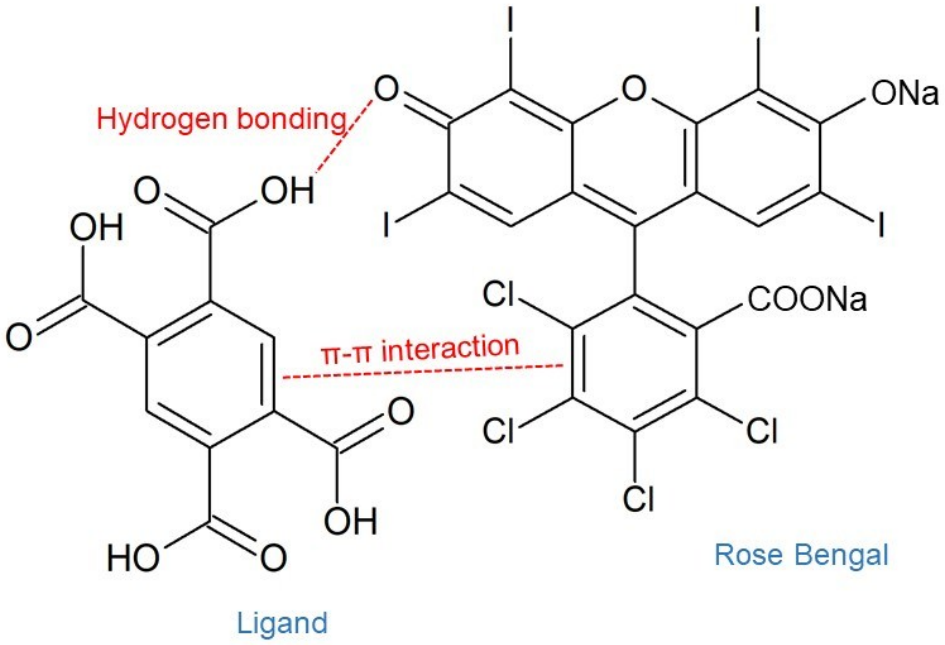


Fig. S8 Proposed interaction between SmBTC and Rose Bengal.

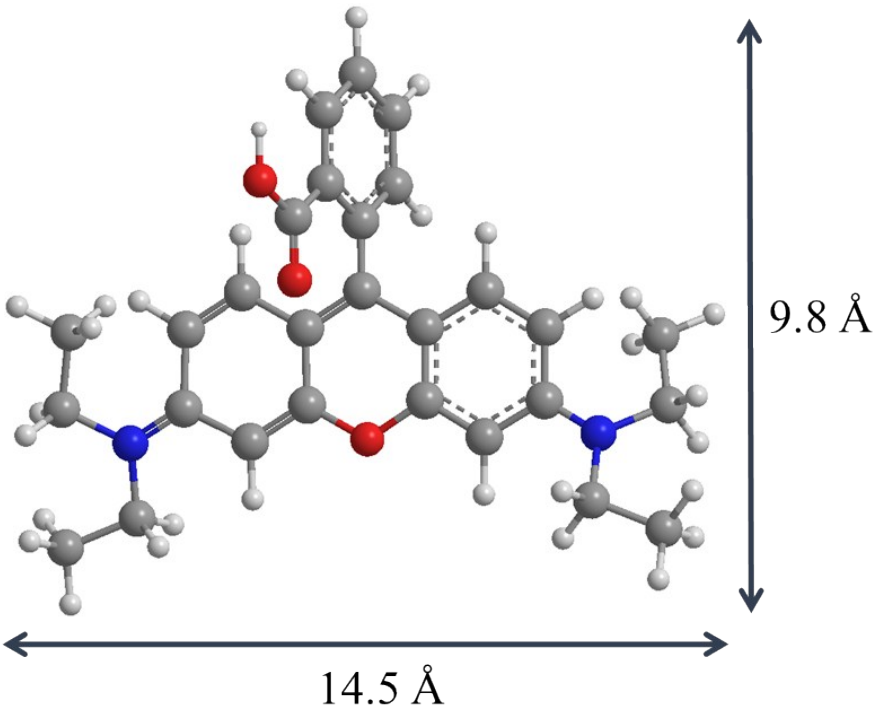


Fig. S9 3D structure of Rhodamine B.

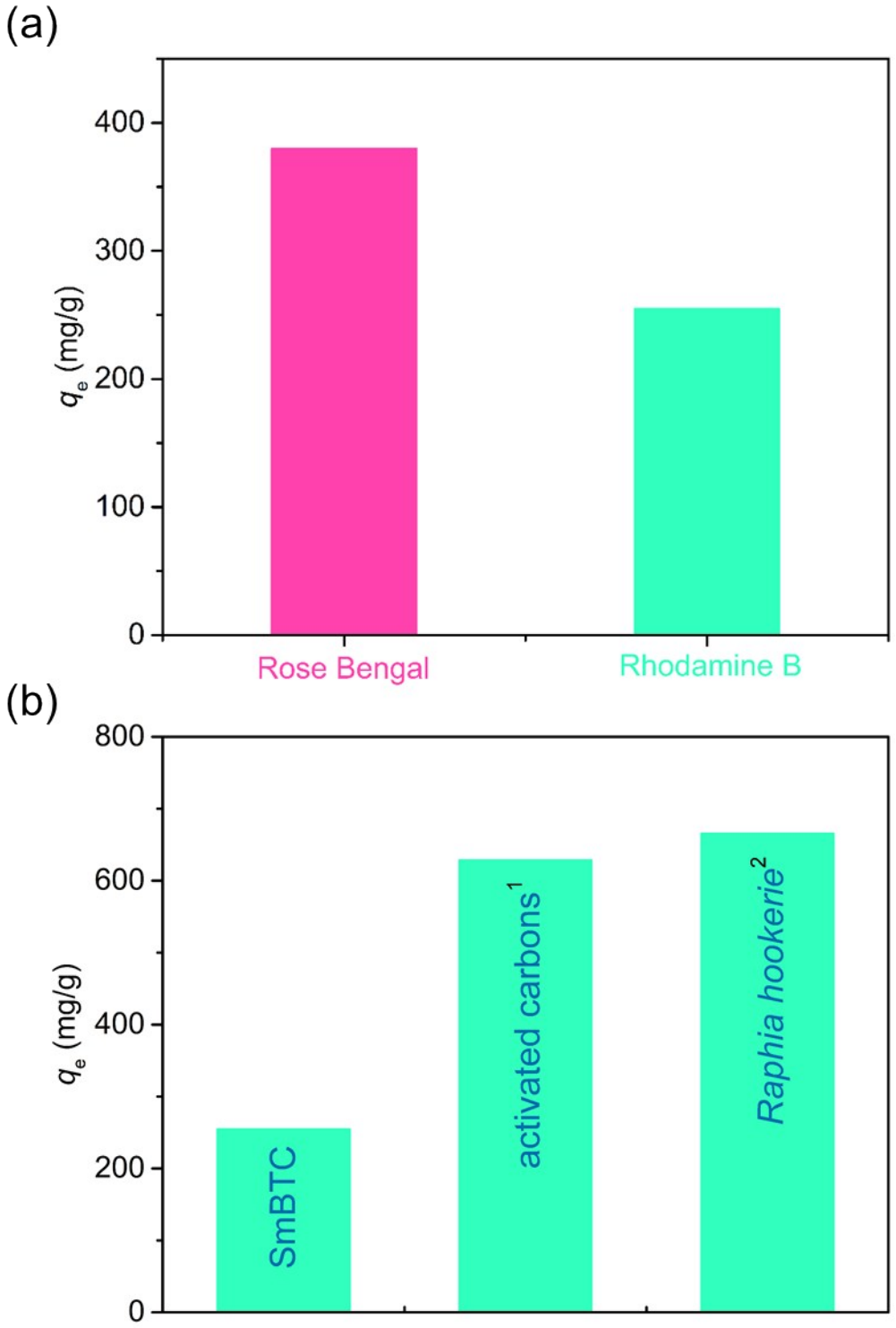


Fig. S10 (a) The adsorption uptake (q_e) of Rose Bengal and Rhodamine B after sorption tests with initial concentration of 500 ppm. (b) Summary of RhB adsorption capacity of various adsorbents.[1,2]

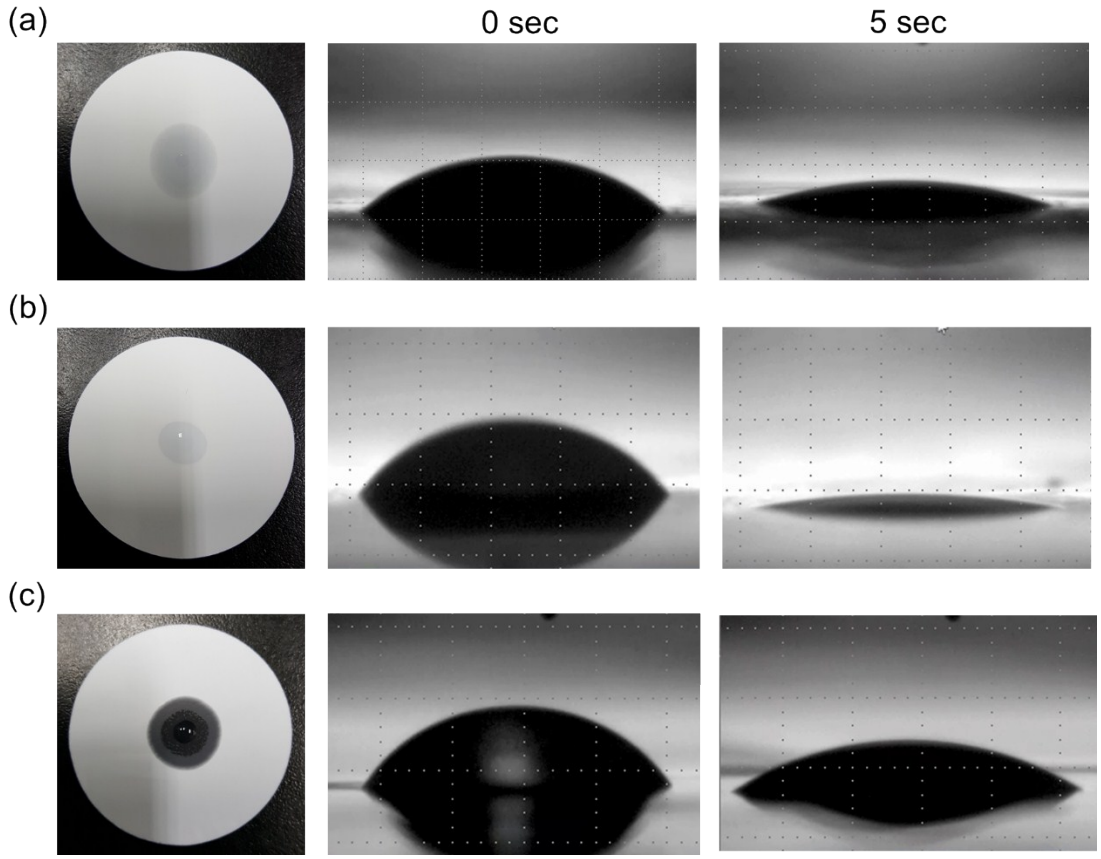


Fig. S11 The results of the water contact angle measurements for (a) Nylon, (b) PES, and (c) PTFE substrate.

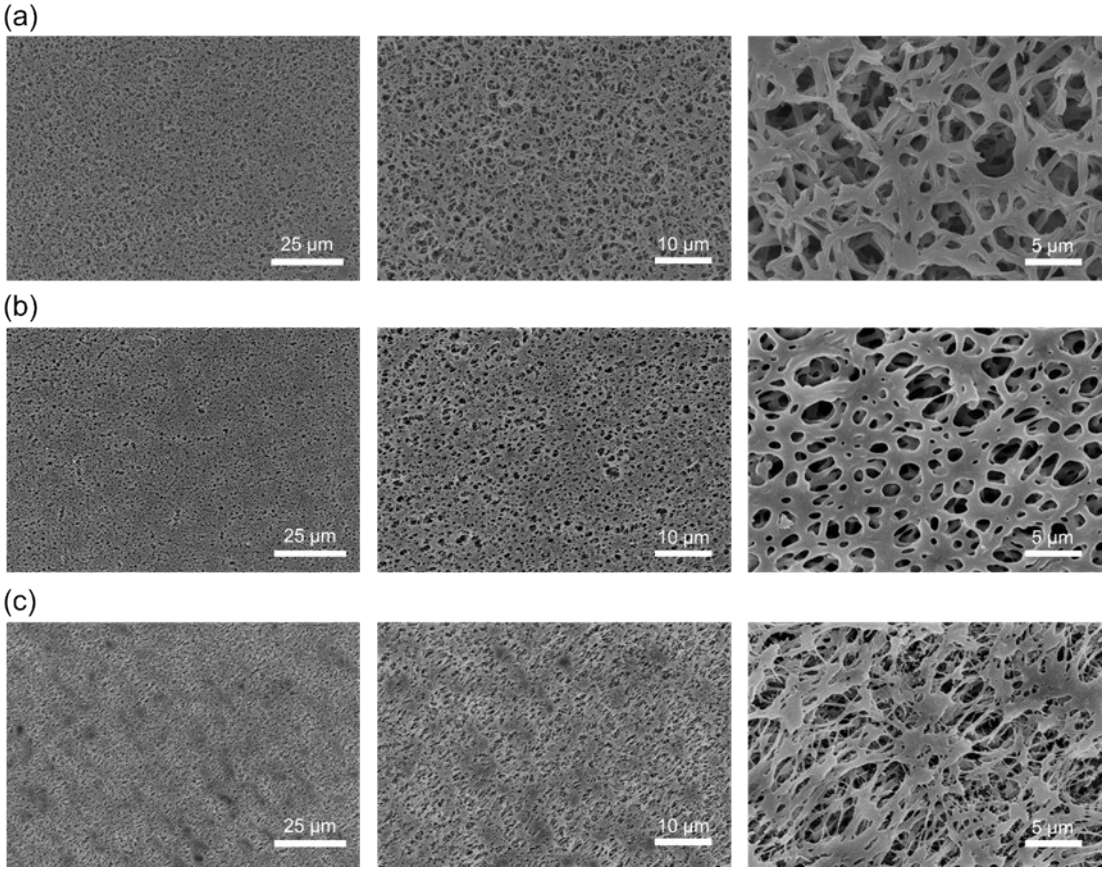


Fig. S12 Top-view SEM images of (a) Nylon, (b) bare PES, and (c) PTFE substrate.

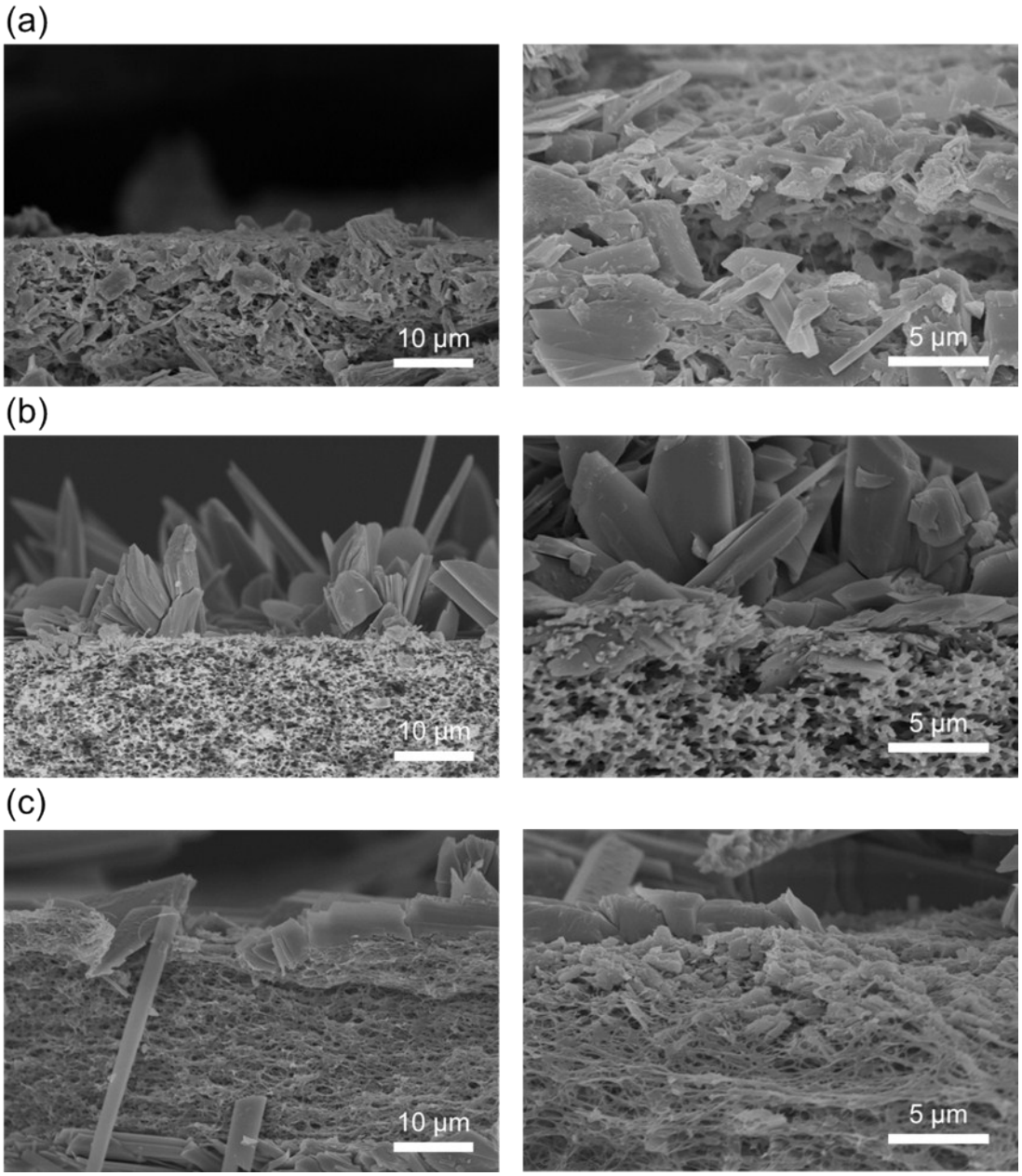


Fig. S13 Side-view SEM images of SmBTC membrane adsorbers with (a) Nylon, (b) PES, and (c) PTFE substrates.

Table S1. Crystallographic data of SmBTC obtained from single-crystal diffraction

Compound	**SmBTC**
Empirical formula	$C_{40}H_8O_{45}Sm_4$
Formula weight	1809.86
Crystal system	Triclinic
Space group	P_1
a, Å	7.3501(9)
b, Å	13.554(2)
c, Å	13.9104(19)
α, deg	79.271(4)
β, deg	89.105(4)
γ, deg	89.582(4)
V, Å^3	1361.3(3)
Z	1
D_{calcd}, g/cm^3	2.208
μ, mm^{-1}	4.373
F(000)	856
Reflections collected	32844
R_{int}	0.0752
GOF	1.164
R_1[a] ($I > 2\sigma(I)$)	0.1071
wR_2[b] ($I > 2\sigma(I)$)	0.1224
R_1[a] (all data)	0.2866
wR_2[b] (all data)	0.2969

[a]$R_1 = (\Sigma||F_O|-|F_C||)/\Sigma|F_O|$, [b]$wR = [\Sigma[w(F_O^2-F_C^2)^2]/\Sigma[w(F_O^2)^2]]^{1/2}$

Supplementary References

1. Z. Guo, J. Zhang and H. Liu, Ultra-high Rhodamine B adsorption capacities from an aqueous solution by activated carbon derived from Phragmites australis doped with organic acid by phosphoric acid activation, *RSC Adv.*, 2016, **6**, 40818.
2. A. A. Inyinbor, F. A. Adekola and G. A. Olatunji, Kinetics, isotherms and thermodynamic modeling of liquid phase adsorption of Rhodamine B dye onto *Raphia hookerie* fruit epicarp, *Water Resources and Industry*, 2016, **15**, 14.