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).
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** $\text{N}_2$ 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.
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

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<tr>
<th>Compound</th>
<th>SmBTC</th>
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<tr>
<td>Empirical formula</td>
<td>C_{40}H_{8}O_{45}Sm_{4}</td>
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<td>Formula weight</td>
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<td>P_1</td>
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<td>b, Å</td>
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<td>c, Å</td>
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<tr>
<td>β, deg</td>
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<tr>
<td>γ, deg</td>
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<td>V, Å³</td>
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<td>D_{calcd}, g/cm³</td>
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<td>μ, mm⁻¹</td>
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<td>F(000)</td>
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<td>Reflections collected</td>
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<td>R_{int}</td>
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<td>GOF</td>
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<tr>
<td>R_1 (I &gt; 2σ(I))</td>
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<td>wR_2 (I &gt; 2σ(I))</td>
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<td>R_1 (all data)</td>
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<tr>
<td>wR_2 (all data)</td>
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</table>

\[ R_1 = \frac{\sum |F_O| - |F_C|}{\sum |F_O|}, \quad wR = \left[ \frac{\sum [w(F_O^2 - F_C^2)]^2}{\sum w(F_O^2)} \right]^{1/2} \]
Supplementary References
