Supporting Information

Functionalized Boron Nitride Membranes with Multipurpose and Super-Stable Semi-permeability in Solvents

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Chemicals and materials:

h-BN powder was bought from Momentive Performance Materials Inc. Urea, NMP, Acetone, Methanol, Ethanol, toluene, hexane, p-xylene, pyrene, H_2SO_4, HNO_3, NaOH, and RhB were purchased from Sigma-Aldrich. All the chemicals were analytical pure and used without further purification. Hydrophilic Nylon membrane with a 0.2 um pore size were acquired from Merck Millipore.

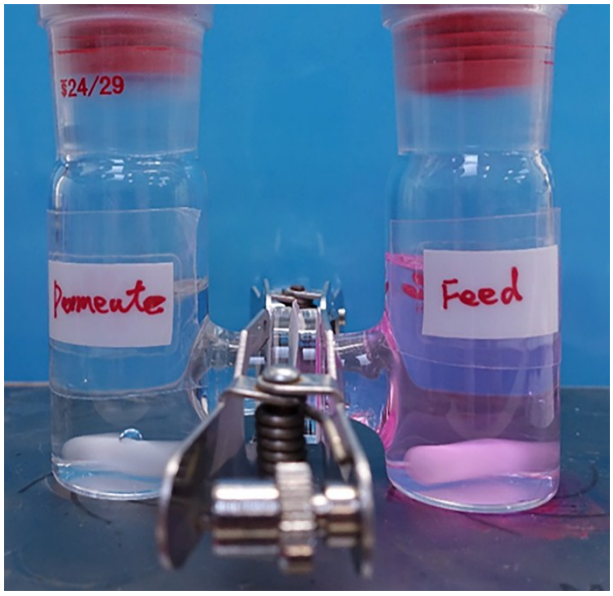

Figure S1. The photograph of the H cell.

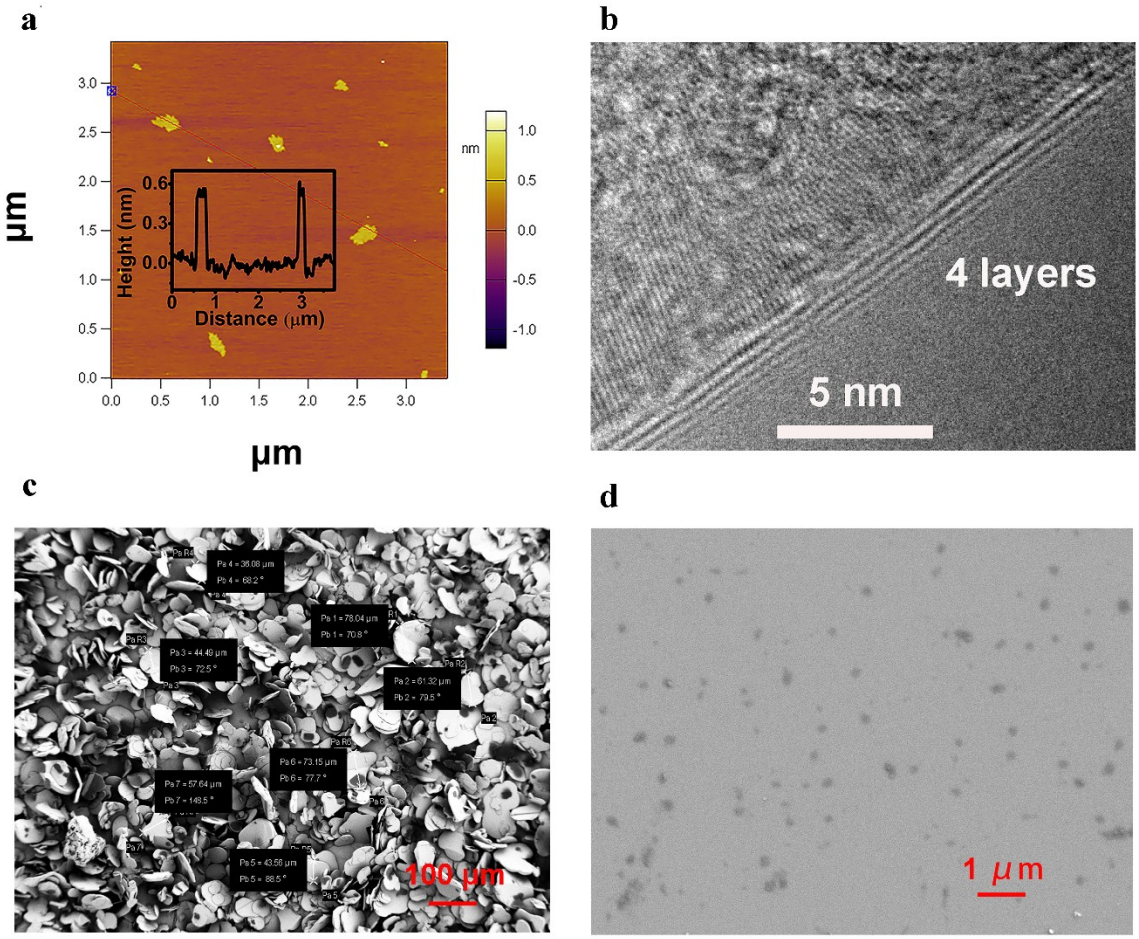

Figure S2. The AFM image a), TEM image b), SEM image of the commercial BN (c) and FBN flakes (d).

Note:

The size distribution of the commercial BN can be collected with the SEM images, where we can measure the size directly. Then we get the commercial BN has a distribution around 60 ± 20 μm. The size distribution of the FBN flakes was calculated using ImageJ (available from the NIH as a free software). After measuring 60 FBN flakes, we can get the FBN flakes have an area of 0.01~0.06 μm^2, indicating that the lateral FBN flakes dimension ranging from 100 nm to 300 nm.

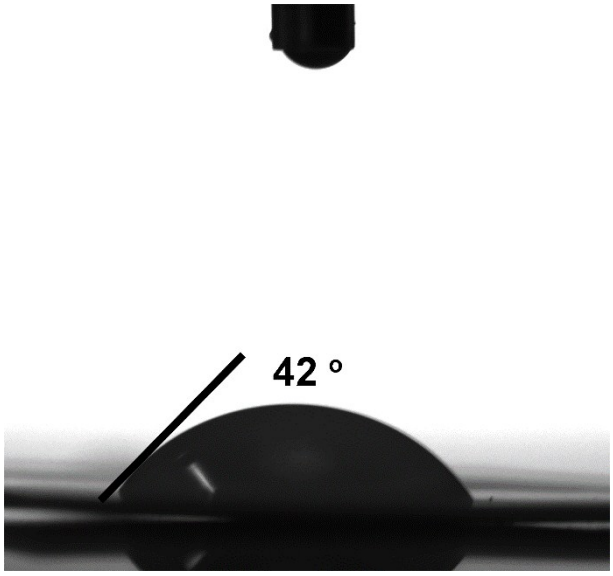

Figure S3. The contact angle of FBN membrane. The contact angle is about 42° on an average of 6 measurements with a contact angle goniometer (CAM101, KSV).

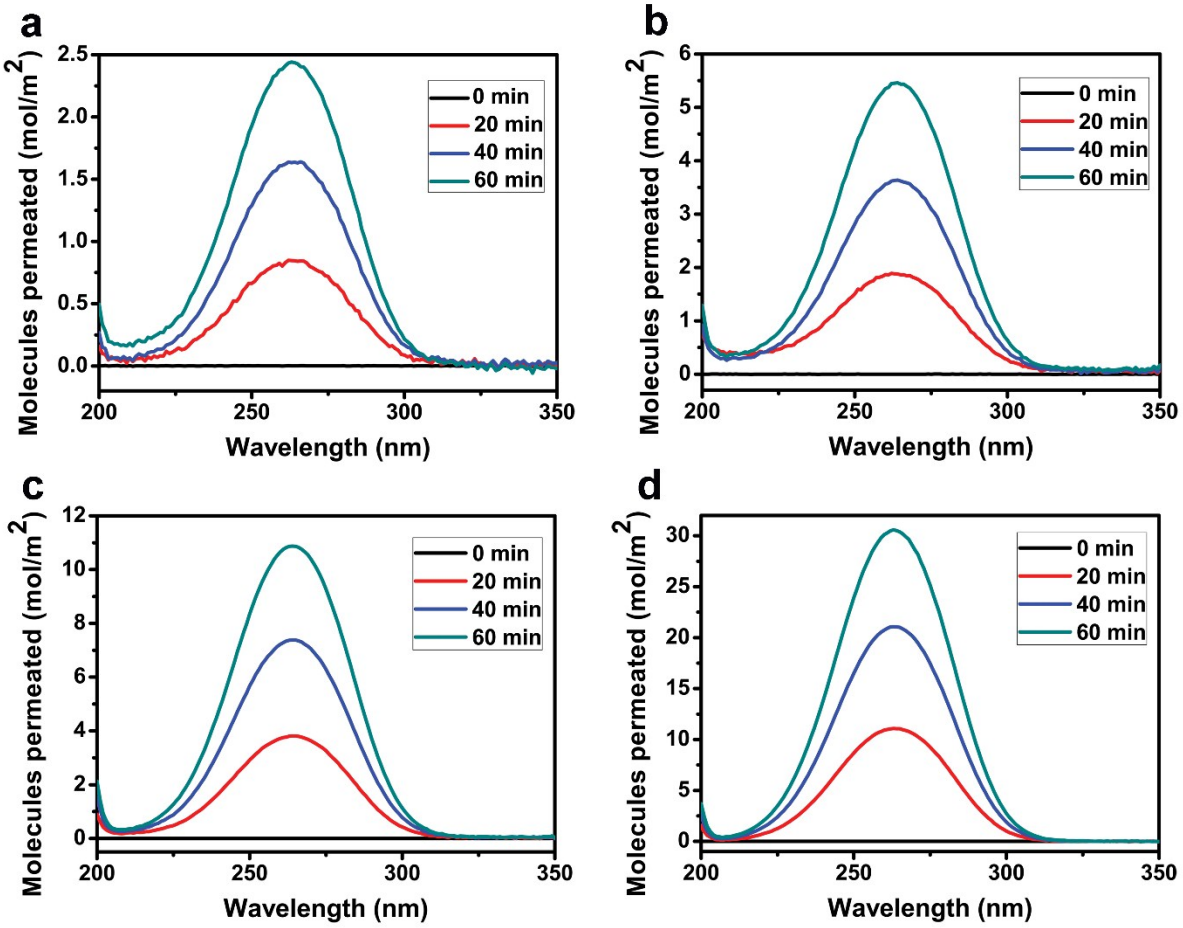

Figure S4. The permeated molecules of acetone in water with various concentration (a) 0.5M, (b) 1M, (c) 2M and (d) 5M.

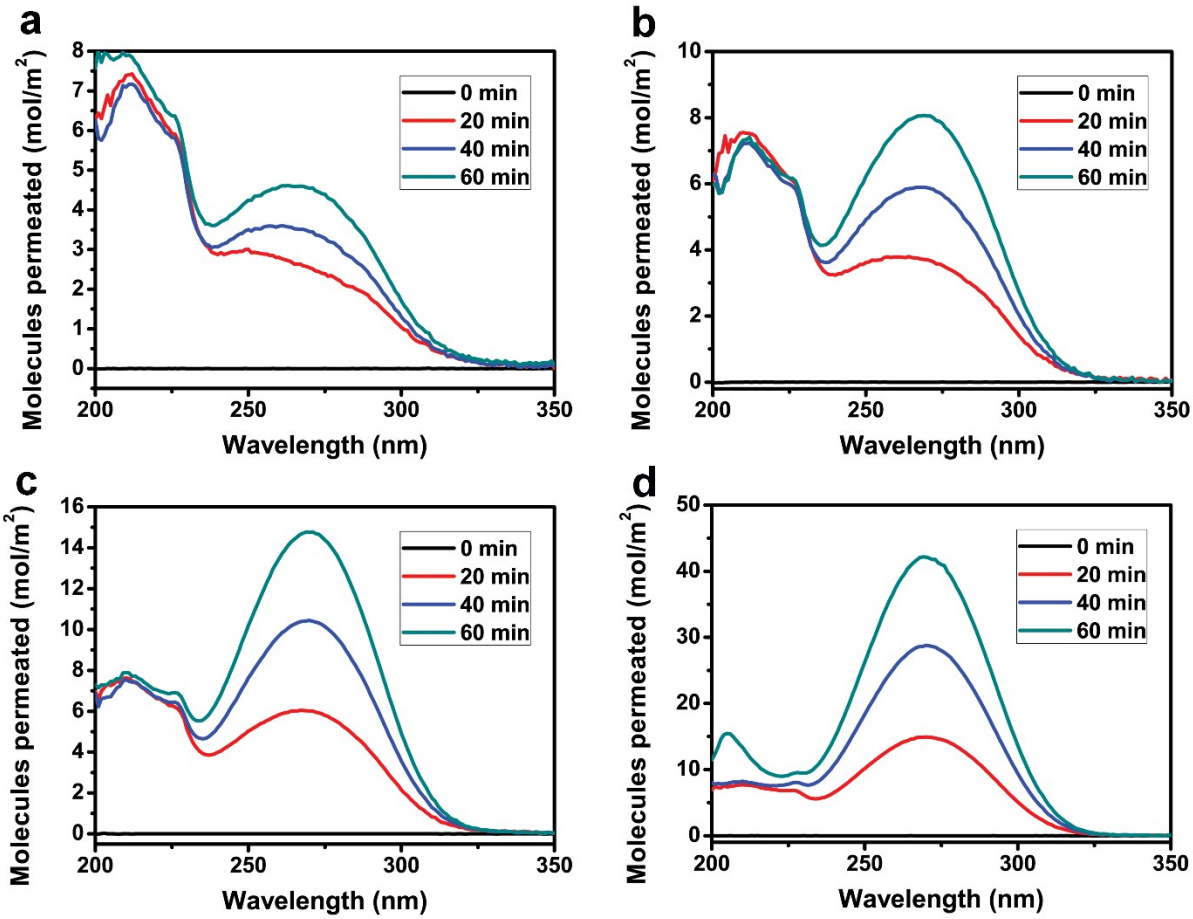

Figure S5. The permeated molecules of acetone in ethanol with various concentration (a) 0.5M, (b) 1M, (c) 2M and (d) 5M.

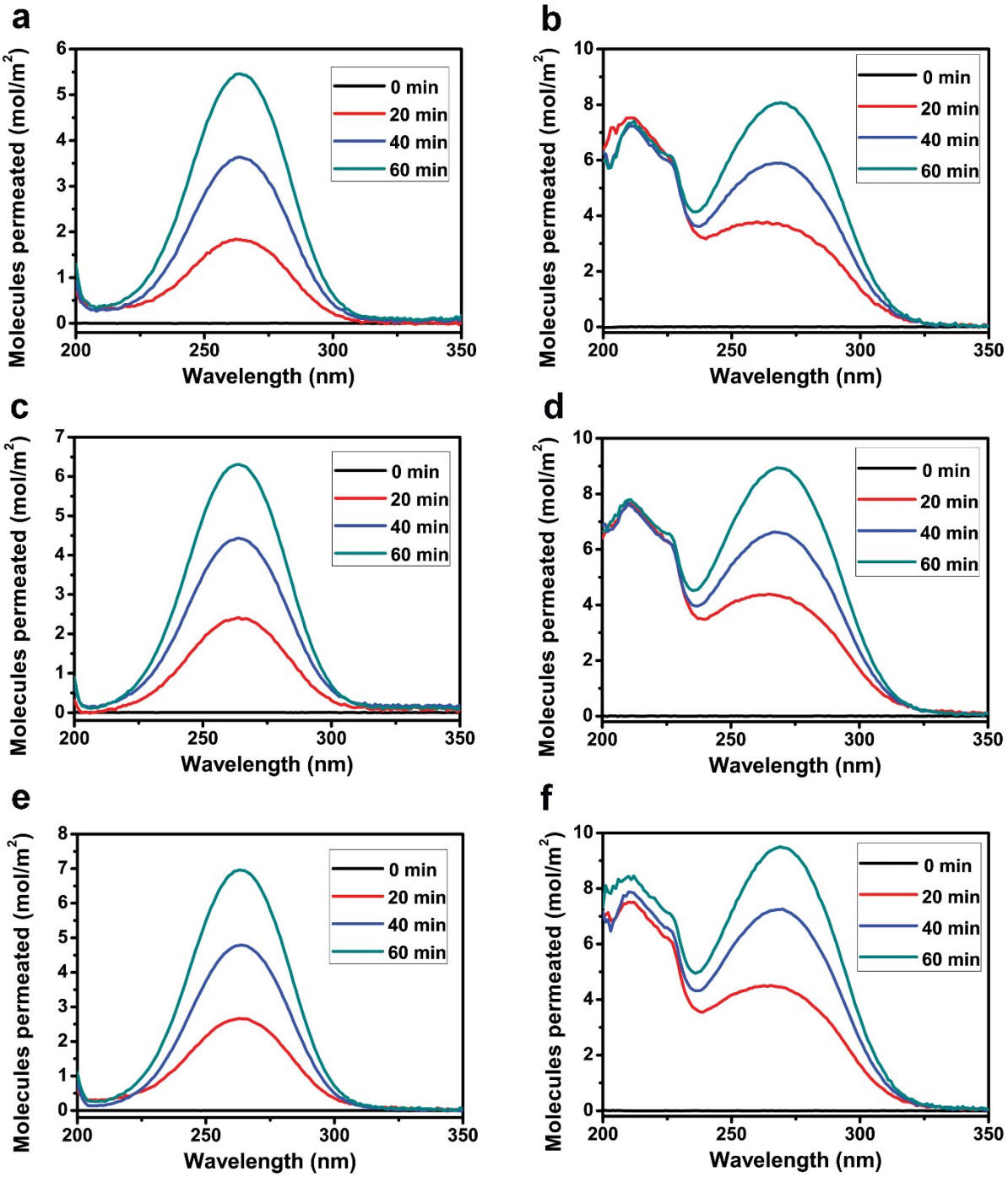

Figure S6. The permeated molecules of acetone in water with various temperature (a) 25 ℃, (c) 35 ℃, (e) 45 ℃ and in ethanol with various temperature (b) 25 ℃, (d) 35 ℃, (f) 45 ℃.

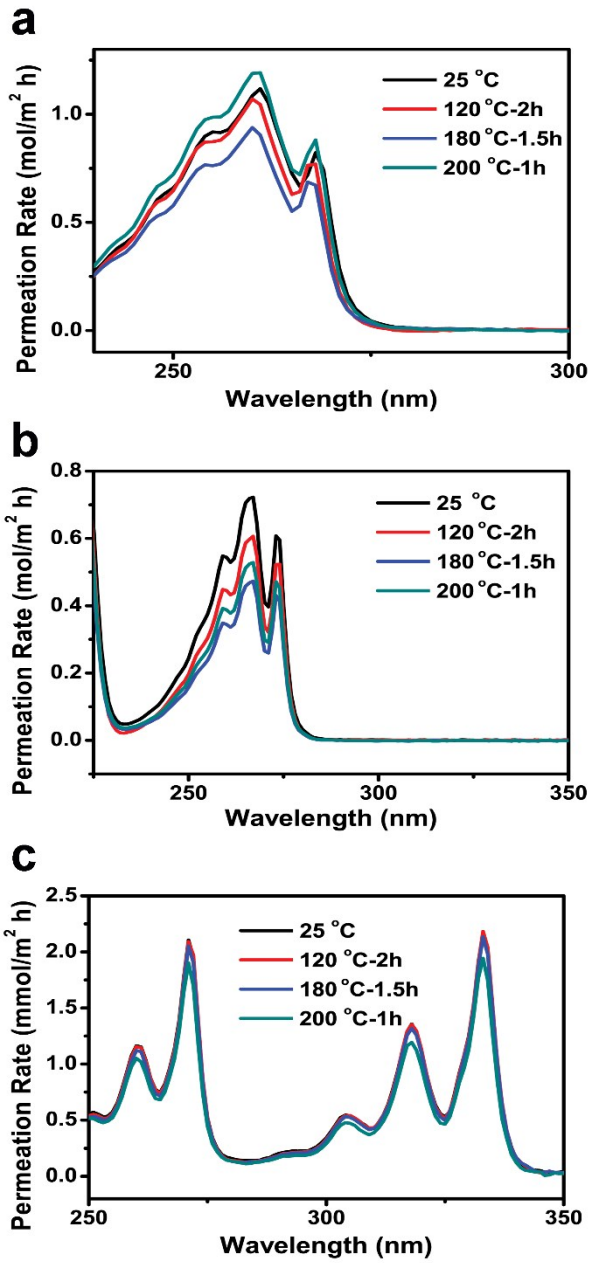

Figure S7. The permeation rate of toluene, p-xylene and pyrene through the FBN membrane after various thermal treating, respectively.

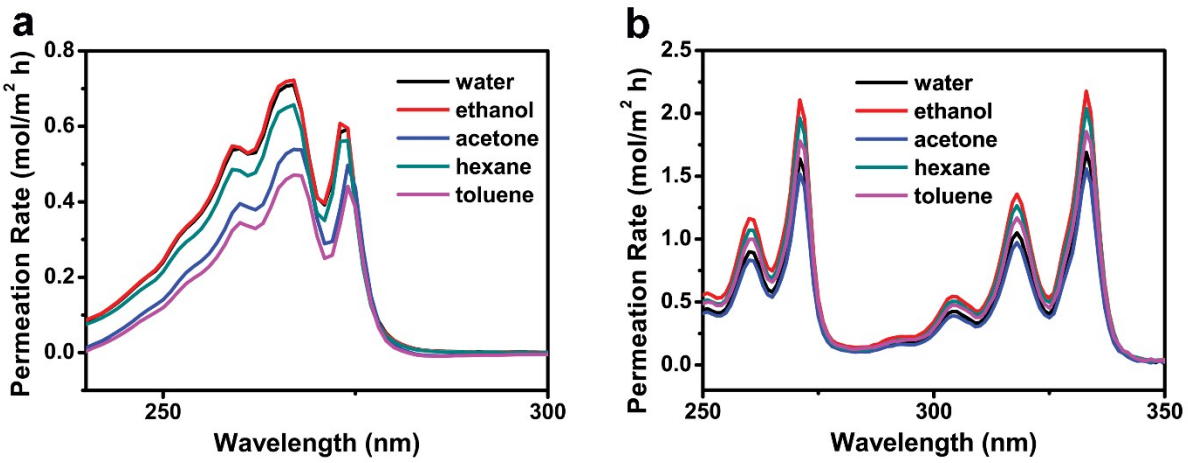

Figure S8. The permeation rate of p-xylene and pyrene through the FBN membrane after various solvation effect treating, respectively.

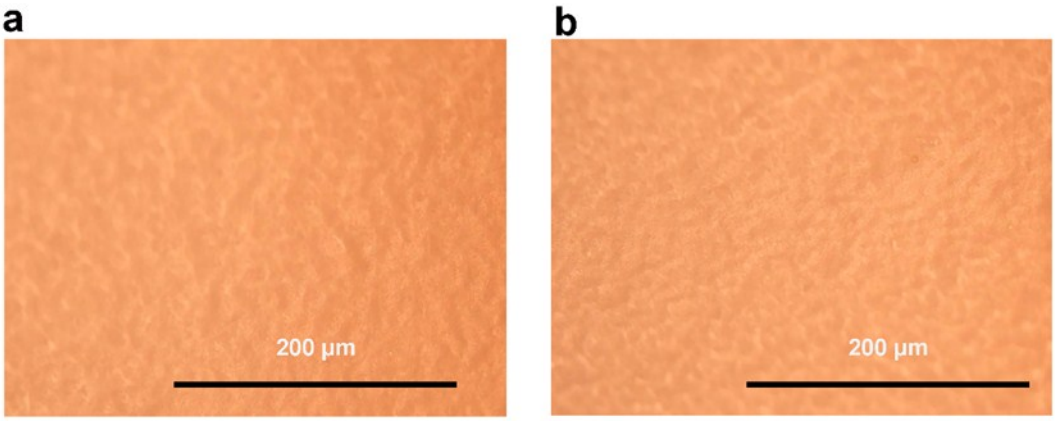

Figure S9. Photographs of the fresh FBN membrane (a) and FBN membrane after thermal treating at 200 ℃ for 1 hour (b).

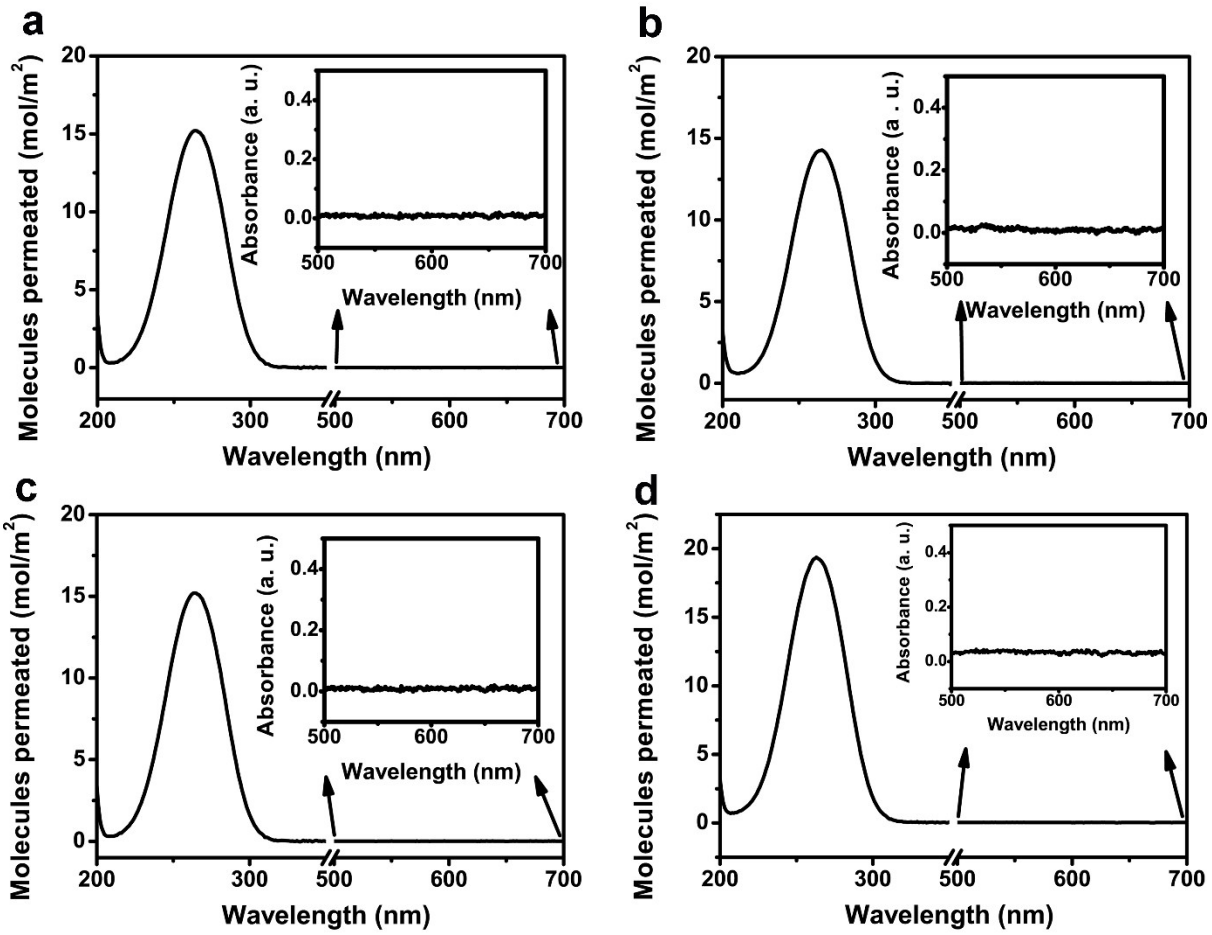

Figure S10. Molecular sieving of acetone and RhB through FBN membrane in water after 4 hours.

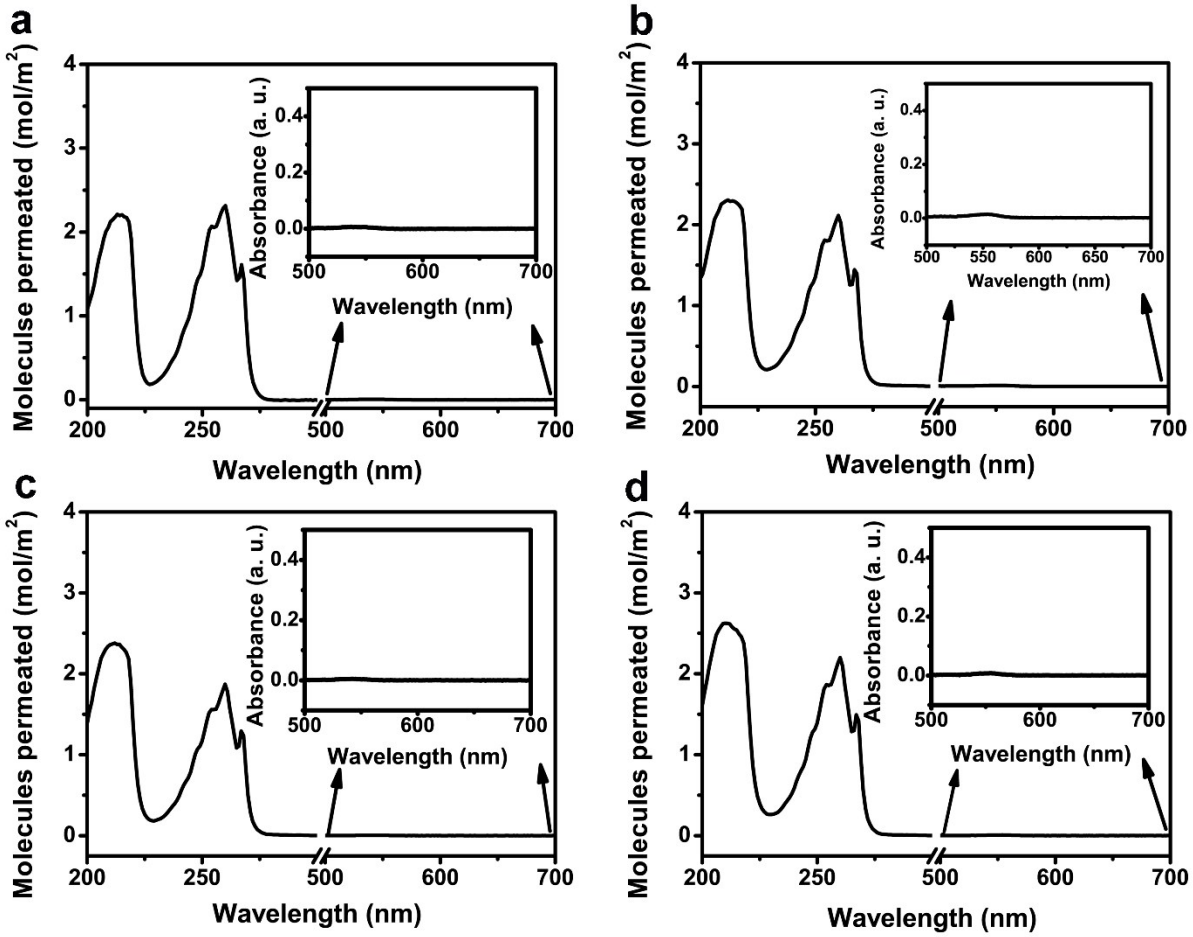

Figure S11. Molecular sieving of toluene and RhB through FBN membrane in ethanol after 4 hours.