

Supplementary Materials

Fabrication of Anatase TiO₂/PVDF Composite Membrane for Oil-in-Water Emulsion Separation and Dye Photocatalytic Degradation

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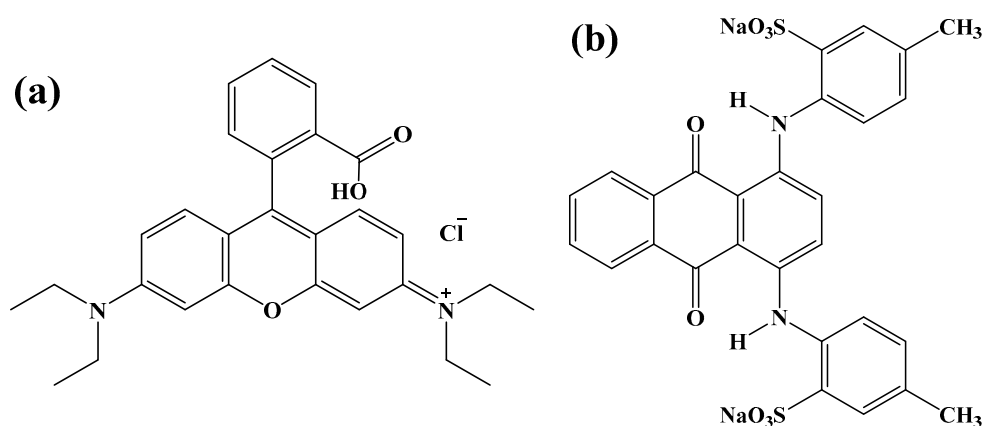


Figure S1. Chemical structure of RhB and AG-25 dyes.

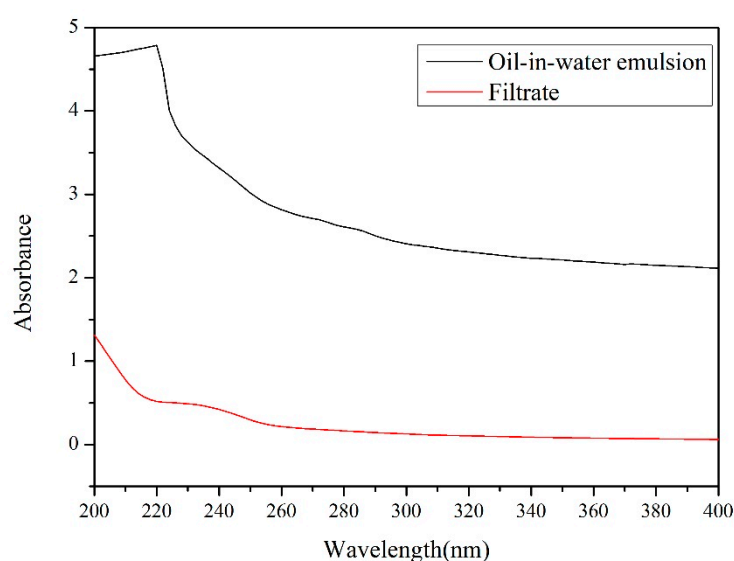


Figure S2. The maximum UV absorption wavelength of soybean oil.

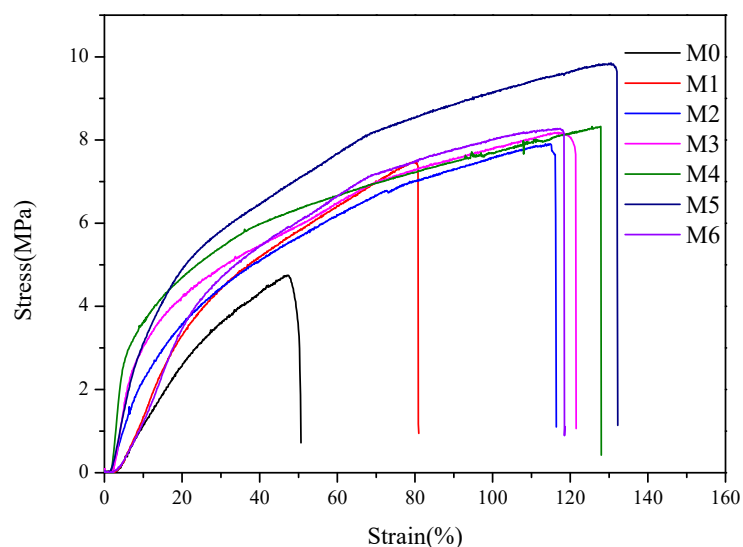
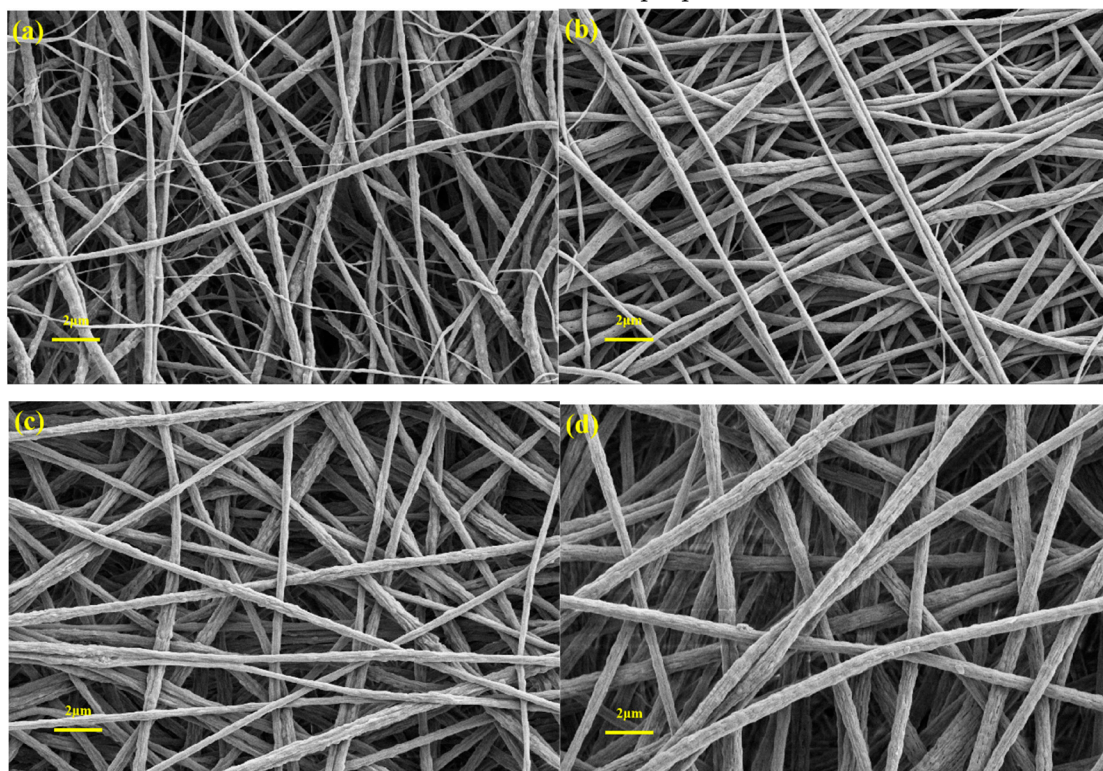


Figure S3. The membrane stress-strain curves of different PEMA content.

Obviously, the composite membranes show an increased tensile strength and tensile strain compared with pristine PVDF membrane, indicate the blending of PEMA can enhance the mechanical strength of membranes. Additionally, the tensile strength (from 4.75 Mpa to 9.84Mpa) and tensile strain (from 47.37% to 130%) increase gradually with the PEMA content increasing from 0 wt% to 25 wt %. Nevertheless, for the 30 wt% PEMA content, the tensile strength (form 9.84 Mpa to 8.28 Mpa) and tensile strain suddenly decreased (from 130% to 117.38%), indicating the excessive blending PEMA into PVDF membrane matrix will reduce the flexibility of the membrane. In conclusion, the composite membrane has excellent mechanical properties.



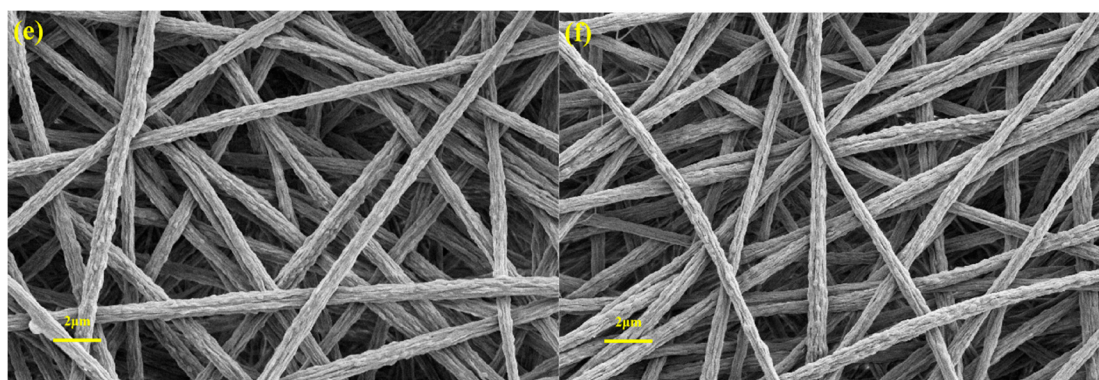


Figure S4. The membrane SEM of different PEMA content. (a) 5%, (b) 10%, (c) 15%, (d) 20%, (e) 25% and (f) 30%.

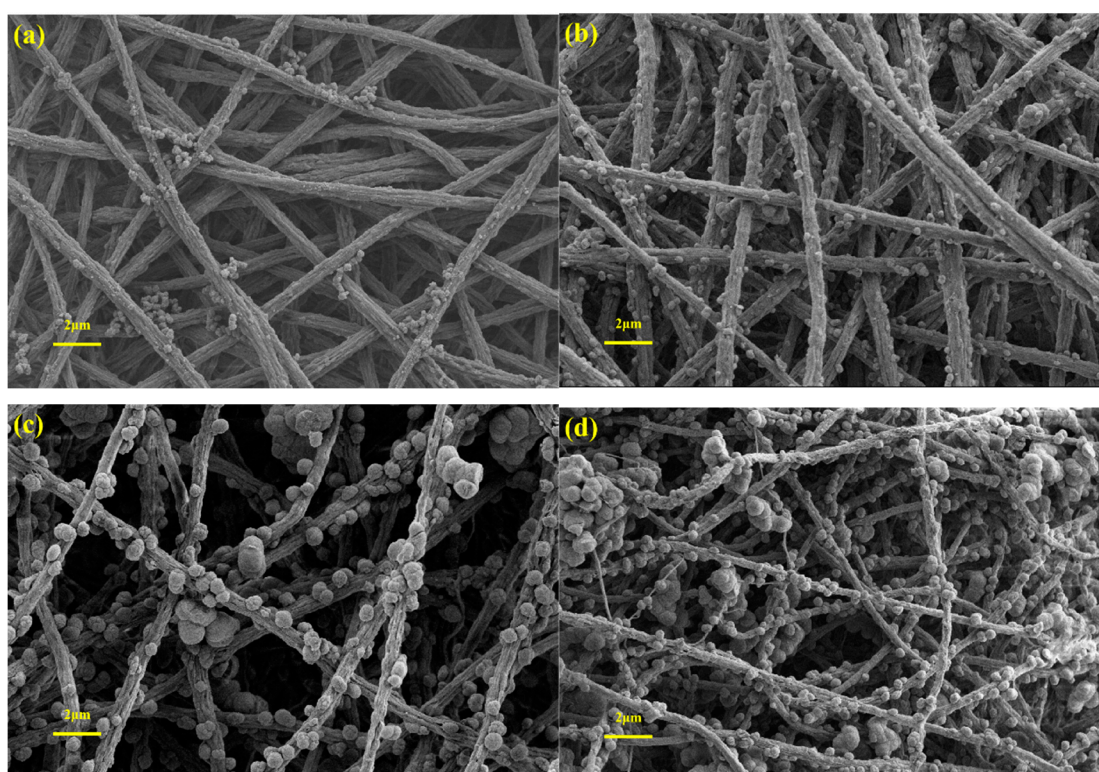


Figure S5. The membrane SEM of different TiO_2 deposition time. (a) 1h, (b) 2h, (c) 3h and (d) 4h.

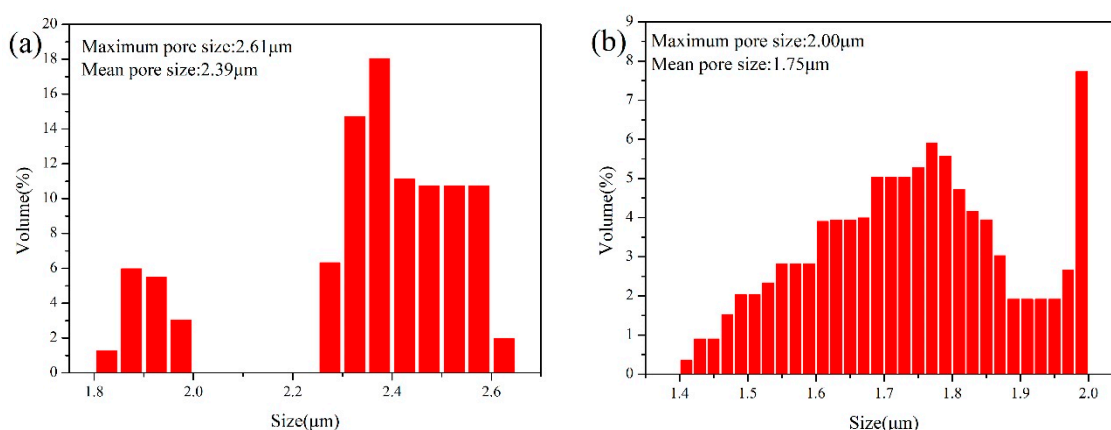


Figure S6. The pore size distribution map of M5(a) and M5-TiO₂(2) membrane.

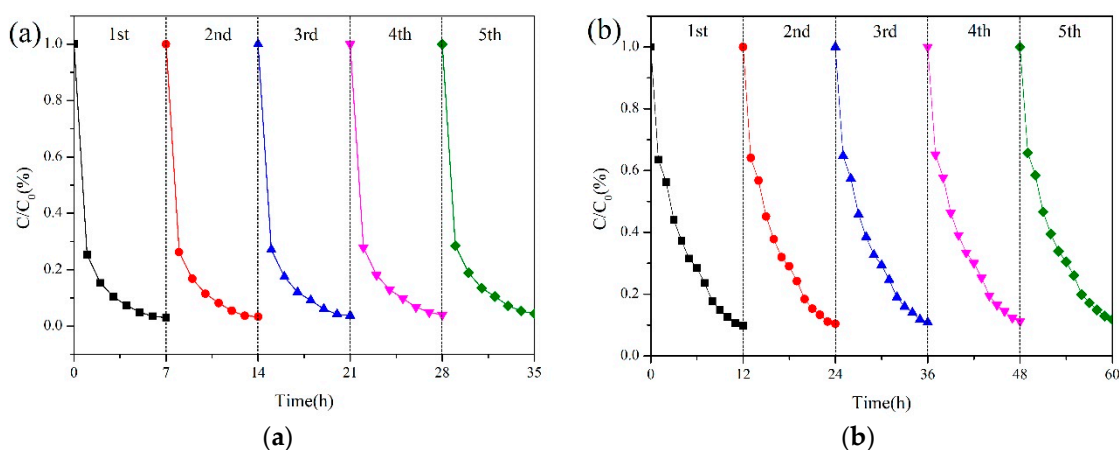


Figure S7. Adsorption-degradation performance of the M5-TiO₂(2) for RhB (a) and AG-25 (b) during 5 cycles.

Table S1. Comparison of the emulsion separation performance and dye photocatalytic degradation performance of this work with related literature.

Membrane	Emulsion	Separation Efficiency (%)	Flux·(L·m ⁻² ·h ⁻¹ ·bar)	Photocatalytic Efficiency (%)	Reference
M5-TiO ₂ (2)	O/W 1:1000 (m/m)	98.95	6786.64	97%(RhB 5ppm) 90.2%(AG-25 50ppm)	This work
PTFE-PGAL/PEI-KH560(1.2%)	O/W 1:1000 (m/m)	98.2	3484.46	NA	[3]
PVDF/ZnO:La(37%)	NA	NA	NA	93.36% (RhB 5ppm) 96.33 (MB 10ppm)	[9]
PVDF/NM88B-1	O/W 1:100 (V/V)	>99.4	340-1970	97% (MB 10ppm) added with H ₂ O ₂	[17]
Janus F-TiO ₂ @PPS membrane	O/W 1:100 (V/V)	>98	711-1055	NA	[42]
PP-Si-PAMAM/PVDF-2	O/W 1:100 (V/V)	99.1>	922-1634	88% (RhB 5ppm) 90% (MB 5ppm) added with H ₂ O ₂	[43]
CuWO ₄ /Cu ₂ O coated mesh	O&W mixture 3:7 (V/V)	95	NA	23.9% (MB 0.1mM) 90.2% (MB 0.1mM) added with Na ₂ S ₂ O ₈	[44]

Reference

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