

Supporting Information

Sulfaguanidine Nanofiltration Active Layer towards Anti-adhesive and Antimicrobial Attributes for Desalination and Dyes Removal

Hong-Li Zhang,^{&†} Bing-Hua Liu,^{&‡} Mingbo Yang,[§] Pan Zhang,[†] Jing-Gang Gai^{1,†}

*[†] State Key Laboratory of Polymer Materials Engineering, Polymer Research Institute,
Sichuan University, Chengdu, Sichuan 610065, China*

*[§] College of Polymer Science and Engineering, State Key Laboratory of Polymer
Materials Engineering, Sichuan University, Chengdu, Sichuan 610065, P. R. China*

*[‡] Laboratory of molecular biology, College of Medicine, Chengdu University,
Chengdu 610106, PR China*

1. Figures and Tables

Table S1 Surface elemental composition of the SG-Xs.

Sample	C(%)	O(%)	N(%)	S(%)	C/O	N/O	S/O
SG-0	71.94	17.18	10.89	/	4.19	0.63	/
SG-0.05	72.77	16.33	10.51	0.39	4.46	0.64	0.024
SG-0.1	74.26	14.64	10.56	0.55	5.07	0.72	0.038

¹Corresponding authors. Tel.: +86 28 85467166; fax: +86 28 85402465. E-mail addresses:
gaijinggang@scu.edu.cn (J-G. Gai)

[&]These authors contributed equally to this work and should be considered co-first authors

SG-0.3	73.03	13.92	11.88	1.32	5.25	0.85	0.095
SG-0.4	72.14	14.35	12.19	1.35	5.03	0.83	0.094
SG-0.5	74.10	13.58	10.95	1.37	5.46	0.81	0.100

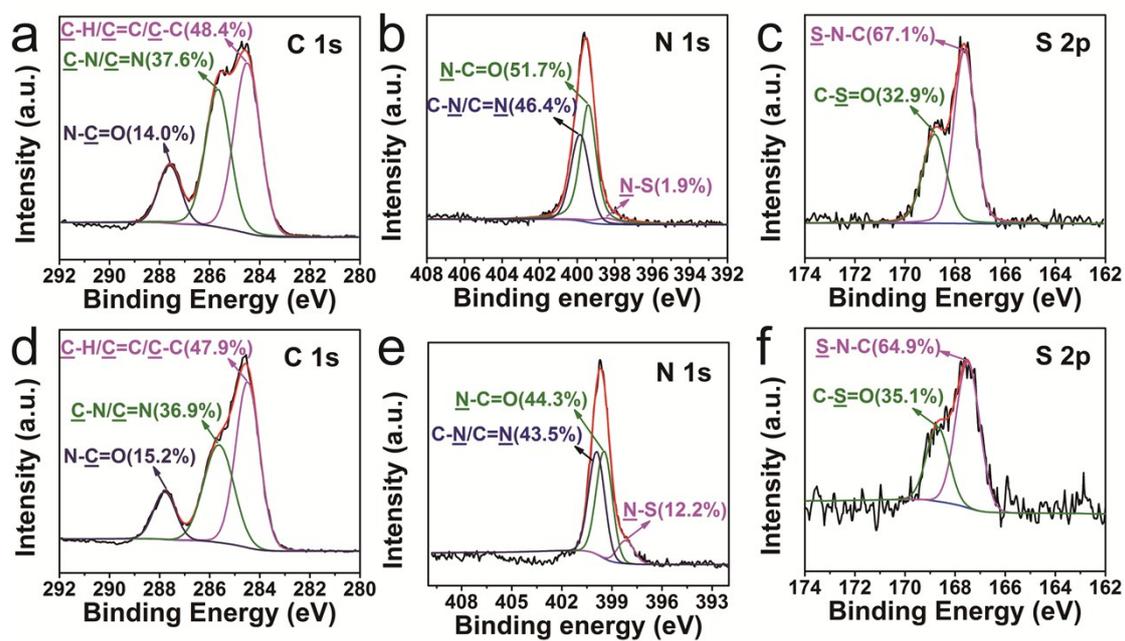


Figure S1 XPS survey spectra C 1s a), N 1s b) and S2p c) core-level spectra for SG-0.05 membrane; C 1s d), N 1s e) and S2p f) core-level spectra for SG-0.5 membrane.

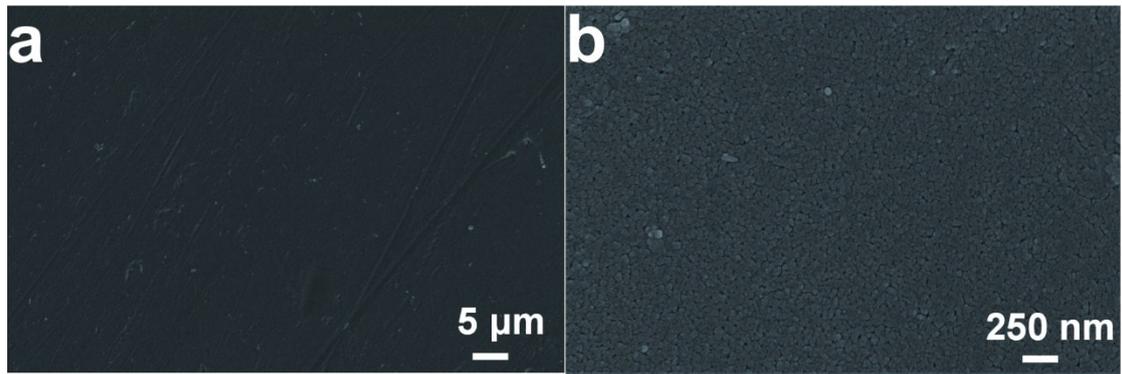


Figure S2 The surface SEM images of polysulfone (PSf) support membrane morphology.

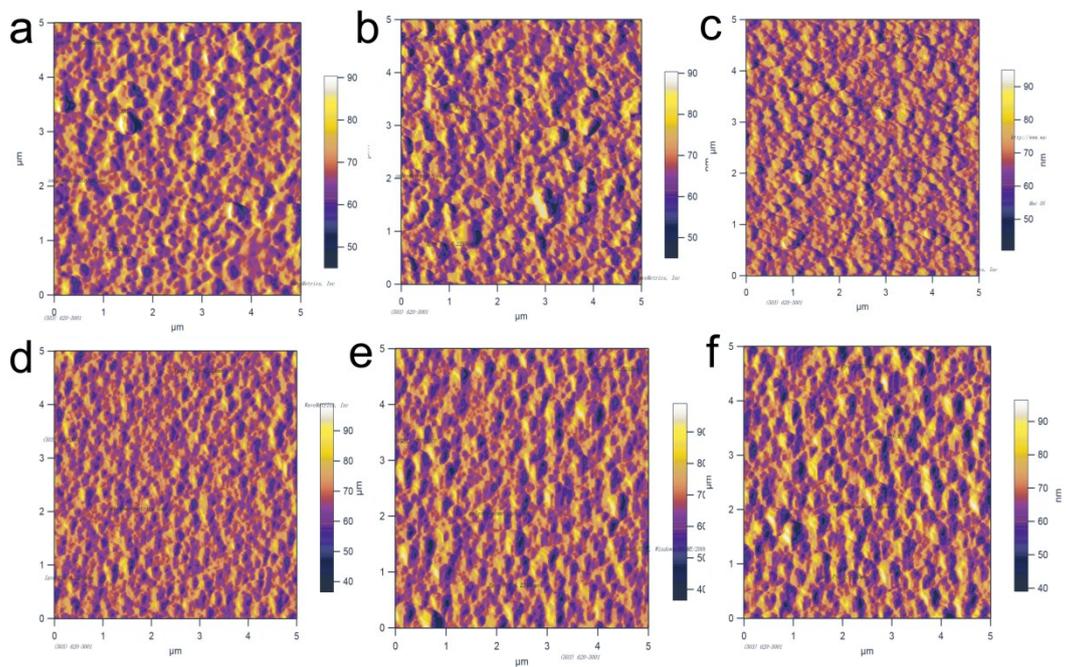


Figure S3 AFM topographical images of SG-0 a), SG-0.05 b), SG-0.1 c), SG-0.3 d), SG-0.4 e) and SG-0.5 f) layers.

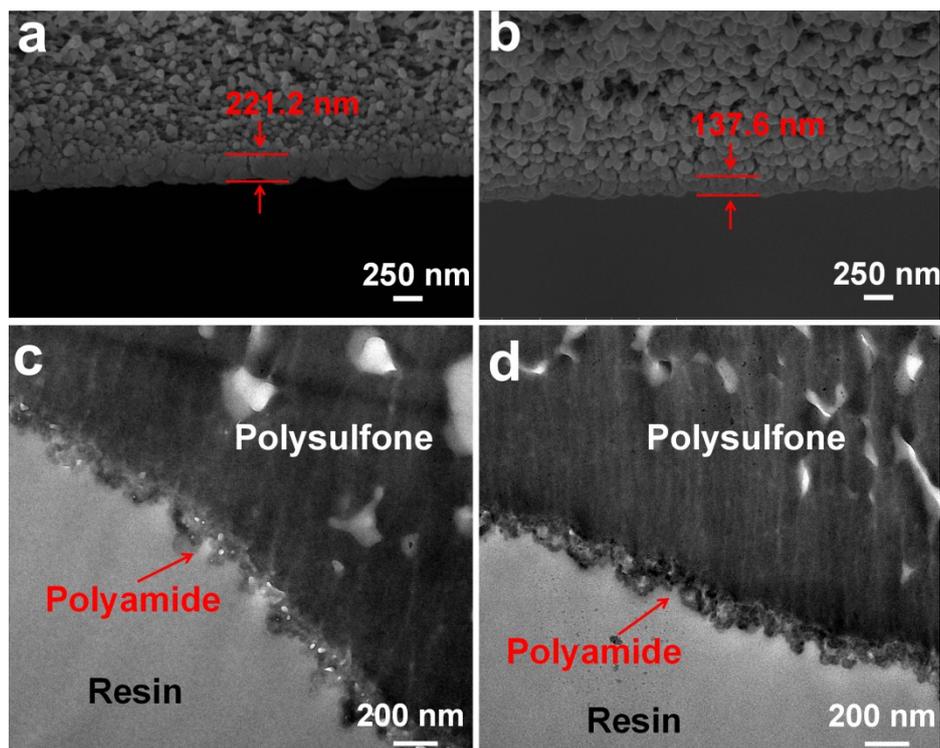


Figure S4 The cross sectional SEM images of SG-0.05 a) and SG-0.5 b) membranes, and the cross sectional TEM images of SG-0.05 c) and SG-0.5 d) membranes.

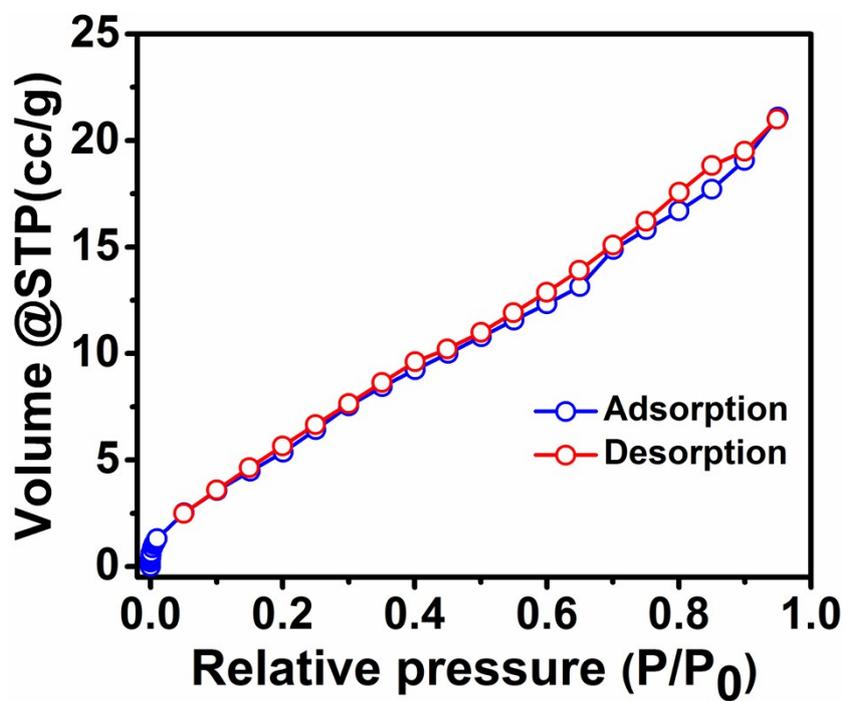


Figure S5 Nitrogen adsorption-desorption isotherm of the SG-0 membrane.

Table S2 Stokes radius and diameters of PEG molecules.

Solute	M_w (g/mol)	r_s (nm)	d_s (nm)
PEG200	200	0.320	0.640
PEG400	400	0.471	0.942
PEG600	600	0.590	1.180
PEG1000	1000	0.784	1.568

Table S3 Performance comparison of SG-0.3 with the state-of-the-art NF membranes towards different salts rejection.

Membrane	PWP(L m ⁻² h ⁻¹ bar ⁻¹)	R (%)		Feed Concentration(g L ⁻¹)	Operating Pressure (bar)	Ref.
		Na ₂ SO ₄	NaCl			
SG-0.3	16.8	98.3	34.6	2	6	<i>This work</i>
NF-270 (polyamide)	11.6	94.0	51.0	2	10	S1
NF-PDA /PEI/PAA	5.5	98.3	59.0	1	5	S2
PIP/NH ₂ -PEG-NH ₂	5.8	99.5	58.3	2	6	S3

PIP/MWCNT-OH	6.9	97.6	35.3	2	6	44
PIP-TMC/GO-COCl	3.77	97.1	57.2	1	6	S4
PIP& ABA	11.9	93.15	15.55	1	6	45
PIP/Sericin ^b -TMC	16.4	97.3	32.0	0.5	5	S5
GO (PA)	1.47	94.0	89.0	2	15	S6
brGO-PVDF/CE	21.8	60		2.84	5	7
ZIF-8 TFC NF	53.5	95	11	1	4	S7
GO-PSBMA (PES)	11.98	10	4	1	4	16
GO (NFM)	11.13	63.13	27.86	2.84	1	S8

Table S4 Dye molecules and their properties.

Dye molecule	M_W (g/mol)	Molecule Size*	λ_{max} (nm)	Charge
Methyl orange (MO)	327.33	1.13 nm×0.42 nm	464	-
Chrome black T (CBT)	461.38	1.55 nm×0.88 nm	541	-
Rhodamine B (RB)	479.02	1.20 nm×1.13 nm	554	+
Congo red (CR)	696.66	2.56 nm×0.73 nm	504	-

Methyl blue (MB)	799.80	2.36 nm×1.74 nm	584	-
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Note: *Molecule size was measured by Materials Studio 8.0 and quoted from references.^[S9-S10]

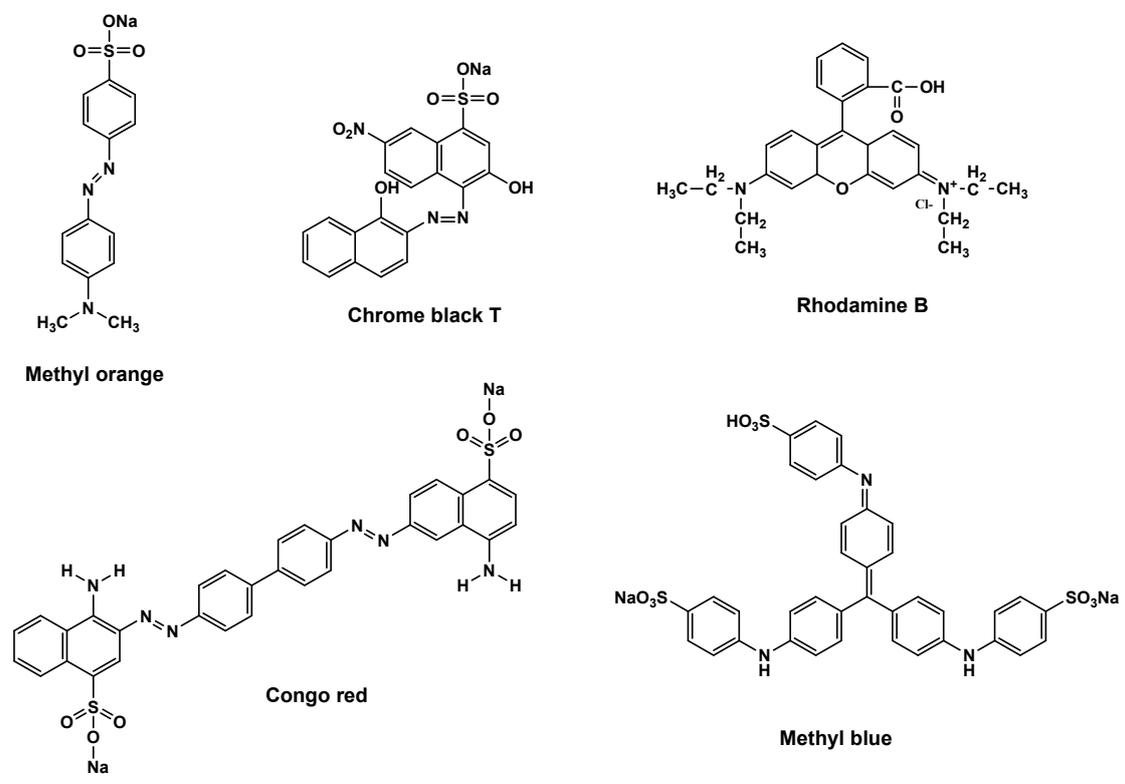


Figure S6 Chemical structural formula of dyes.

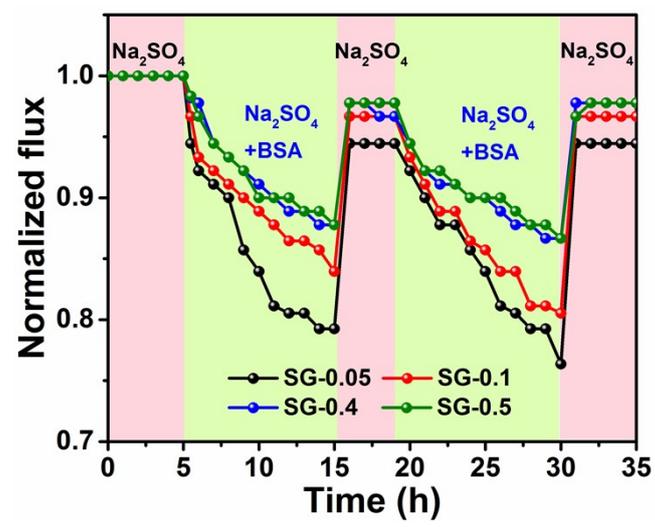


Figure S7 Time-dependent relative water flux of other fabricated membranes tested with 2 g L⁻¹ Na₂SO₄ and 2 g L⁻¹ Na₂SO₄ + 1 g L⁻¹ BSA aqueous solution at 25 °C and 6

bar.

2. References

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