Supplementary data

Conductive nanofiltration membrane with hydrogel coated stainless steel mesh support for electrically enhanced fouling mitigation potential

Jiansuxuan Chen, Xueye Wang, Yang Li, Ruobin Dai*, Zhiwei Wang

State Key Laboratory of Pollution Control and Resource Reuse, Shanghai Institute of Pollution Control and Ecological Security, School of Environmental Science and Engineering, Tongji University, 1239 Siping Road, Shanghai 200092, China

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*Corresponding Author.

Tel.: +86-21-65975669, Fax: +86-21-65980400, E-mail address: dairuobin@tongji.edu.cn (R. Dai)

Calculation of the cross-linking degree of membranes

The cross-linking degree is calculated based on the structural formula of semi-aromatic polyamide (Figure 1) and the following equations:[1]

$$\frac{\mathrm{O}}{\mathrm{N}}=\frac{3x+4y}{3x+2y} \qquad \backslash * \text{ MERGEFORMAT (1)}$$

where x and y are the cross-linking portion and linear portion, respectively. The O/N ratio of the polyamide layer of a membrane was directly obtained from the XPS results. As defined O/N ratio to be a constant a, then there is:

$$\text{Degree of cross-linking}=\frac{x}{x+y}\times 100\%=\frac{4-2\mathrm{a}}{\mathrm{a}+1}\times 100\% \backslash * \text{ MERGEFORMAT (2)}$$

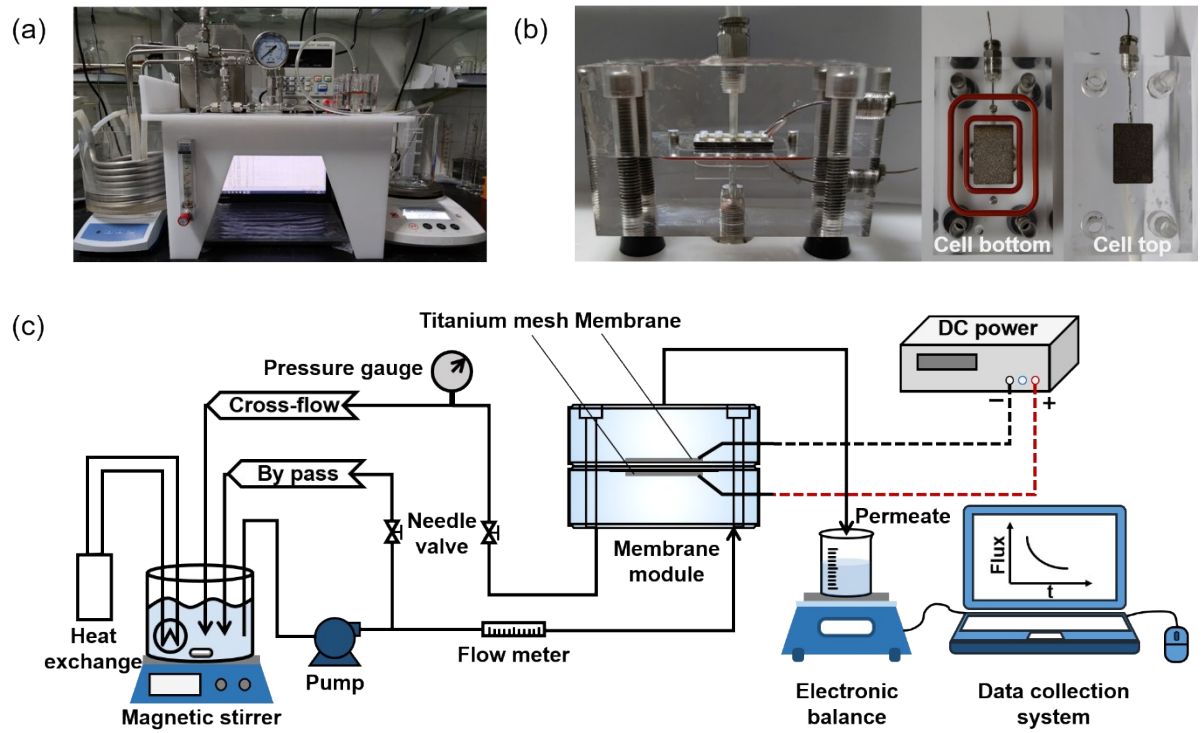

Figure S1. Illustration of the laboratory electrically-assisted cross-flow NF membrane filtration setup.

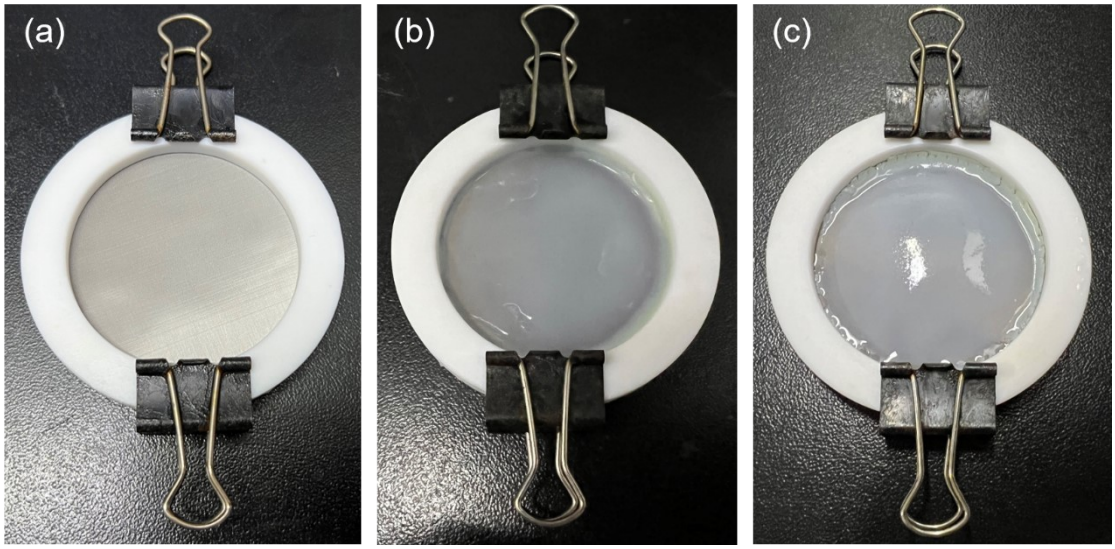

Figure S2. Digital images of various membranes fixed in PTFE frames: (a) SSM, (b) SSM-K, (c) SSM-K-PA.

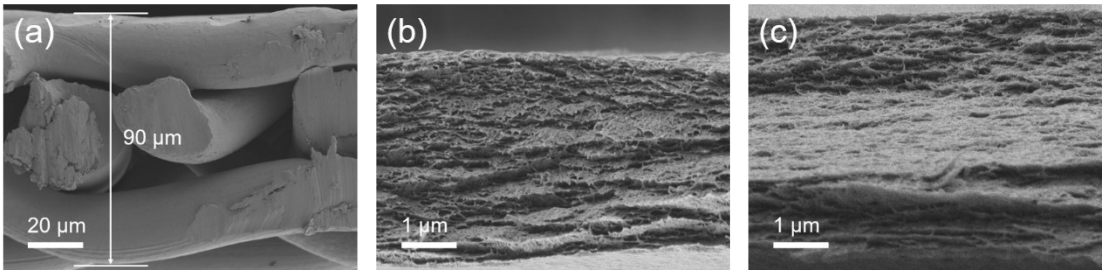

Figure S3. SEM images of cross-sectional morphologies of membranes: (a) SSM, (b) SSM-K, (c) SSM-K-PA.

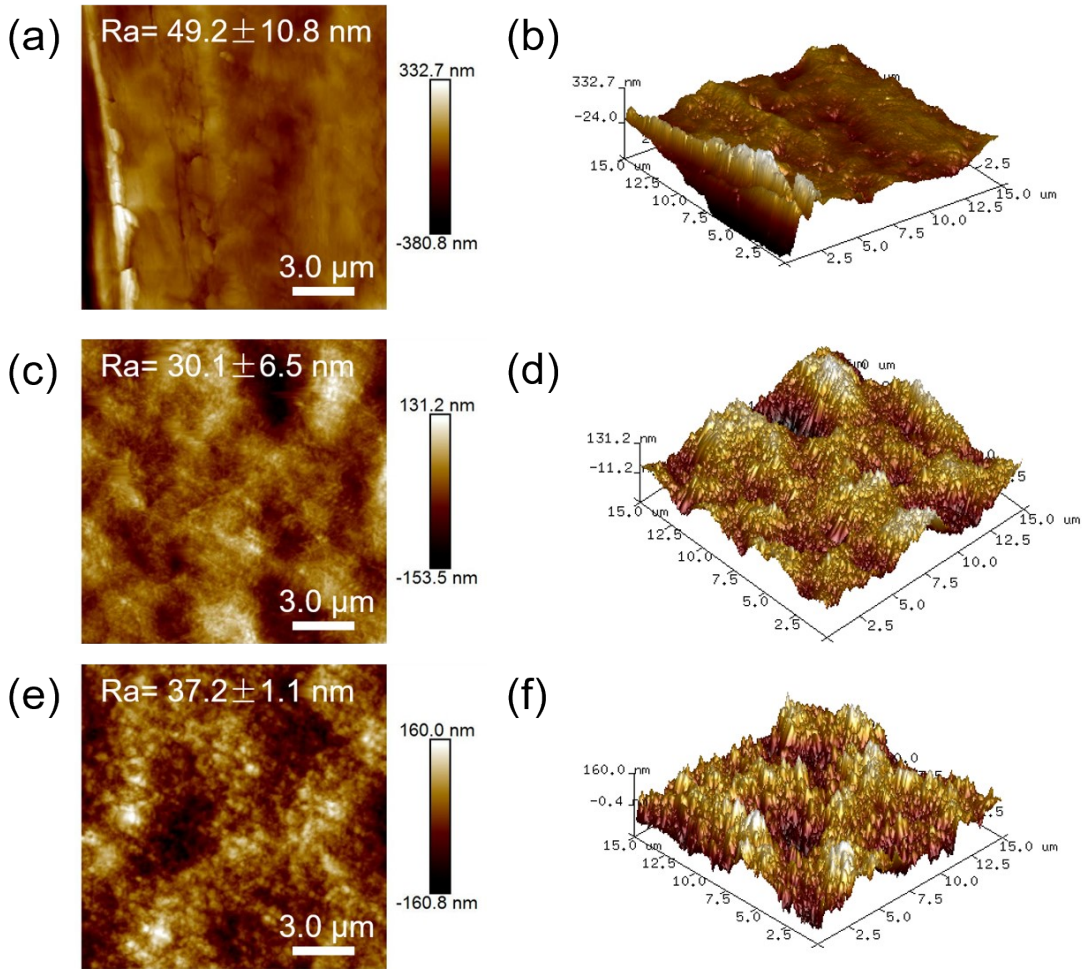

Figure S4. AFM reveals 2D and 3D images of surfaces of membranes: (a, b) SSM, (c, d) SSM-K, (e, f) SSM-K-PA.

Table S1 Surface elemental compositions of SSM, SSM-K, and SSM-K-PA membrane

Membrane	Atomic composition (%)							
	C	**N**	**O**	**Fe**	**Mn**	**Cr**	**Ni**	**Si**
SSM	37.51	2.22	39.1	2.71	1.87	6.17	0.93	9.47
SSM-K	76.61	10.52	11.34	0.21	0.2	0.23	0.17	0.71
SSM-K-PA	70.7	13.52	14.39	0.23	0.17	0.23	0.17	0.59

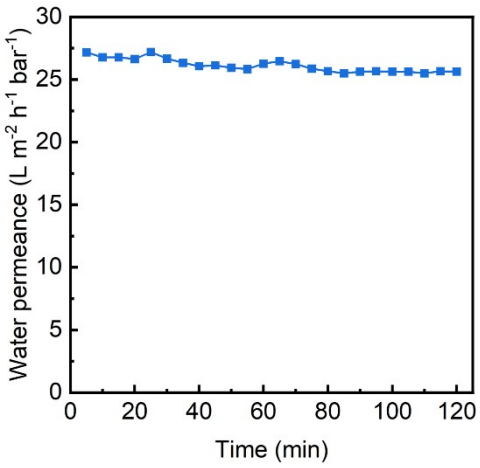

Figure S5. Water permeance of SSM-K-PA durning pre-compaction in 2 h.

Table S2 Performance comparison among various NF membranes.

Membranes	Water permeance ($L\ m^{-2}\ h^{-1}\ bar^{-1}$)	Na_2SO_4 Rejection (%)	Ref.
PIP-TMC/MoS_2/PES UF	~ 15	98.8	2
PIP-TMC/TA-Fe/PSF UF	19.6 ± 0.5	~95	3
PIP-TMC/PDA/PEI/PSF UF	9.8	96.8	4
PIP-TMC/MWCNTs/PES MF	17.6	~95	5
PIP-TMC/PDA-COF/PAN UF	20.7	93.4	6
COF/PIP-TMC /PES UF	19.3	>80	7
BHTTM/PIP-TMC/PSF UF	13.2	99.5	8
PAMAM/SiO_2/PIP-TMC/PSF UF	6.4	92	9
PIP-TMC/PD/PES UF	11.4	93.5	10
PIP-TMC/NH_2-TNTs/PSF UF	7.5	96.4	11
PIP-TMC/CNTs/PES MF	21	98.5	12
DCH-TMC/PSF UF	7.4	98.1	13
BPF/PIP-TMC/PES UF	12.0 ± 0.2	96.6 ± 1.1	14

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