## A facile and economic route assisted by trace tannic acid to construct high-performance thin film composite NF membrane for desalination

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Fig. S1 Diagram of the cross-flow filtration device.



Fig. S2 Cross-sectional SEM images of TFC membranes at different (a) TMC concentrations ([PIP] = 1.0 w/v%, [TA] = 0.004 w/v%) and (b) PIP concentrations ([TA] = 0.004 w/v%, [TMC] = 0.04 w/v%).



Fig. S3 Static water contact angles of the membranes prepared at TMC concentrations of 0.02 w/v% and 0.04 w/v% ([PIP] = 1.0 w/v%, [TA] = 0.004 w/v%).

Membrane	<b>PIP concentration</b>	TA concentration	TMC concentration
	(w/v%)	(w/v%)	(w/v%)
TFC-TA-1	1	0	0.1
TFC-TA-2	1	0.002	0.1
TFC-TA-3	1	0.004	0.1
TFC-TA-4	1	0.006	0.1
TFC-TA-5	1	0.010	0.1
TFC-TMC-1	1	0.004	0.02
TFC-TMC-2	1	0.004	0.04
TFC-TMC-3	1	0.004	0.06
TFC-TMC-4	1	0.004	0.08
TFC-TMC-5	1	0.004	0.10
TFC-TMC-6	1	0.004	0.12
TFC-PIP-1	0.1	0.004	0.04
TFC-PIP-2	0.25	0.004	0.04
TFC-PIP-3	0.5	0.004	0.04
TFC-PIP-4	1.0	0.004	0.04
TFC-PIP-5	1.5	0.004	0.04

**Table S1** Fabrication conditions of the TFC NF membranes

Table S2 Conductivities of the aqueous solutions

Aqueous Solution	Conductivity (µS/cm)
Pure water	6.30
TA solution (0.004 w/v%)	6.74
PIP solution (0.25 w/v%)	311
PIP/TA solution (0.25/0.004 w/v%)	357

Table S3 Elemental compositions of TFC-control and TFC-TA

Membrane	Atomic	O/N ratio		
	C1s	N1s	Ols	0/1 Tatio
TFC-control	70.50	13.41	16.09	1.20
TFC-TA	69.98	13.59	16.42	1.21

**Table S4** Concentrations of monomers and additive for constructing the relevant membranes inTable 2

TFC NF membranes	Monomer concentration		Additive	Reference
	PIP	ТМС	concentration	
TFC-TA	0.25 w/v%	0.04 w/v%	0.004 w/v% (A) <sup>a</sup>	this work
TFC-Control	0.25 w/v%	0.04 w/v%	-	this work
TFC-CNC-20	1.0 wt %	0.4 wt %	0.020 wt % (A)	39
TFC-CS	0.25 w/w%	0.8 w/v%	0.8 w/v% (A)	57
TFC-BAPBS	_b	0.1 w/v%	0.75 w/v%	55
TFC-sericin	0.15 w/v%	0.25 w/v%	0.06 w/v% (A)	58
TFC-TAC	1.0 wt%	0.15 wt%	0.04 wt% (O) <sup>c</sup>	59
TFC-ZWI	0.35 wt%	0.2 wt%	0.5 wt % (A)	60
TFN-MWCNT-OH	1 w/v%	0.15 w/v%	0.01 w/v% (A)	14
TFN-mZIF	0.35 w/v%	0.20 w/v%	0.10 w/v% (A)	4
TFN-HNTs	2 w/v%	0.2 w/v%	0.04 w/v% (O)	61
TFN-MoS <sub>2</sub>	1.60 wt%	0.35 w/v%	0.010 wt/v% (O)	17
TFN-SMWCNT	0.5 w/v%	0.1 w/v%	0.01 wt % (A)	62
TFN-HZN <sub>C</sub> s	0.2 w/v%	0.1 w/v%	19.0 wt % (O)	63
TFN-PDP	0.35 wt%	0.2 wt%	0.15 wt % (A)	64
TFN-TA-MoS <sub>2</sub>	0.3 w/v%	0.15 w/v%	0.01 wt% (A)	65

<sup>a</sup> (A) means additive was added in aqueous phase; <sup>b</sup> the aqueous monomer is BABPS rather than PIP; <sup>c</sup> (O) means additive was added in oil phase.