[Supporting Information]

Multifold Enhancement of Loose-Nanofiltration Membrane Performance by Intercalation of Surfactant Assemblies

Linglong Shan[1,2], Yuanzhe Liang[3], Liudmyla Prozorovska[3], G. Kane Jennings[4], Shulan Ji[1] and Shihong Lin[2,4]*

[1]*Beijing Key Laboratory for Green Catalysis and Separation, College of Environmental and Energy Engineering, Beijing University of Technology, Beijing 100124, P. R. China*

[2]*Department of Civil and Environmental Engineering, Vanderbilt University, Nashville, Tennessee 37235, United States*

[3]*Interdisciplinary Material Science Program, Vanderbilt University, Nashville, Tennessee 37235, United States*

[4]*Department of Chemical and Biomolecular Engineering, Vanderbilt University, Nashville, Tennessee 37235, United States*

*Corresponding author: email: shihong.lin@vanderbilt.edu;
Tel. +1(615)322-7226

Preparation of polyelectrolyte films on Au/Si substrates for IRRAS characterization

The clean Au/Si substrates were immersed in 1mM solution of mercaptoacetic acid in ethanol for 14 hours, subsequently washed with ethanol, water, ethanol, and dried in a stream of nitrogen. The deposition of the negatively-charged self-assembly monolayers (SAMs) was confirmed by contact angle goniometry (the change in advancing water contact angle from 75°±3 for unmodified Au/Si substrates to 5°±3 upon SAM deposition was observed for all samples). The SAM/Au/Si substrates were first immersed in aqueous PEI solution (1.5 g/L) for 30 min, then rinsed with DI water, then immersed into aqueous SDS solution (3.5 g/L) or PSS solution (1.5 g/L) for 30 min with subsequent DI water rinsing. The procedure was repeated until the desired number of layers was obtained.

FTIR spectrum of hydrolyzed PAN membrane

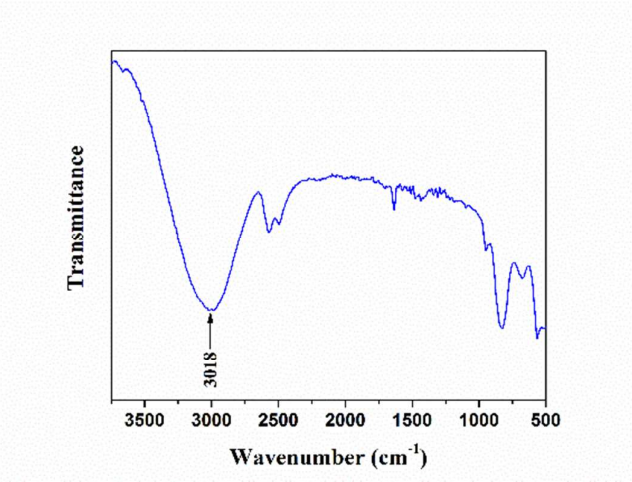

Figure S1. ATR-FTIR spectrum of hydrolyzed PAN membrane

Water contact angles of different membrane samples

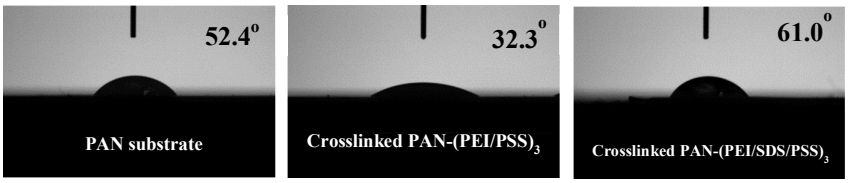

Figure S2. Water contact angles of the different membrane samples. Left: PAN membrane; Middle: Crosslinked PAN-$(PEI/PSS)_3$ membrane; Right: Crosslinked PAN-$(PEI/SDS/PSS)_3$.

Table S1. Performance (permeability and HA rejection) of other LNF membrane reported in literature.

Selective layer composition	Substrate composition	Fabrication method	Permeability (LMH/bar)	Rejection	Reference	Label in Fig. 3D
Polyamide	Sulfonated polyethersulfone	-	3.3	99%	41	a
Poly(ethylene glycol) methacrylate (PEGMA)	Polyethersulfone (PES)	UV-initiated graft copolymerization	3.5	95%	42	b
Zn-Al LDH/ Polyamide	PSf	Interfacial polymerization	1.69	92.3%	43	c
Zn-Al LDH/ Polyamide	PSf	Interfacial polymerization	2.37	89.8%	43	d
PEI/PSS	Polyacrylonitrile (PAN)	Layer by layer assembly	21	97.1	40	e
B-cyclodextrin polyurethane (b-CDPU)/polysulfone	-	Phase-inversion	5.7	76%	44	f
TiO_2/PEI/PSS	PAN	Layer by layer assembly	15.4	79%	45	g
Polyamide	Sulfonated polyethersulfone	-	13.8	74%	41	h
Graphene oxide/ Polyamide	PSf	Interfacial polymerization	1.63	62%	46	i
SiO_2/PDMS	Polysulfone (PSf)	Dipcoating	5.3	59.7%	45	j
Graphene oxide/ Polyamide	PSf	Interfacial polymerization	1.79	32.8%	46	k
Grapheme oxide /poly(vinylidene fluoride)	-	Phase inversion	60	23.7%	47	l
Grapheme oxide /poly(vinylidene fluoride)	-	Phase inversion	~108	~28%	47	m
Grapheme oxide/ TiO_2/polysulfone	-	Non-solvent induced phase separation	90	~97%	48	n
TiO_2/polysulfone	-	Non-solvent induced phase	~145	~88%	49	o

		separation				