Electronic Supplementary Material (ESI) for Environmental Science: Water Research & Technology.

Reverse osmosis brine treatment using direct contact membrane distillation (DCMD): Effect of membrane characteristics on desalination performance and wetting phenomenon

Supplementary information

Zhongsen Yan, Haiyang Yang, Huarong Yu, Fangshu Qu*, Heng Liang, Guibai Li

State Key Laboratory of Urban Water Resource and Environment (SKLUWRE), Harbin Institute of Technology, Harbin, 150090, P.R. China

*Corresponding author.
Tel.: +86 451 86282252; Fax: +86 451 86282252.

E-mail address: qufangshu@163.com (Fangshu Qu)

LEP measurement

The membrane was fixed on the filtration cell. Both filtration tank and outlet were pre-filled with water. Outlet was connected to the tank on the electronic balance. Air was pumped to the cell by a persistent pump with the control of Arduino programming controller. Pressure of air side was increased by the step of 2 kPa. Each step lasted 1 min. Membrane was wetted when the value of electronic balance keeps rising, and pressure in this time equal to the LEP_P. Fig.of LEP measurement setup was shown in the Fig. S1.

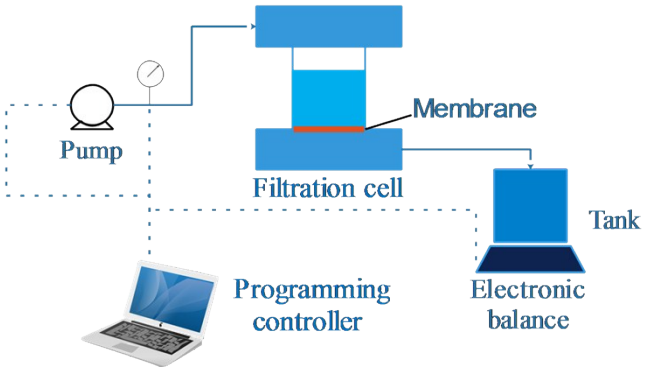

Fig. S1 LEP measurement setup

Table S1 Process data of porosity measurement

	Volume (cm^3)	Membrane weight (g)	Total weight (g)	porosity
GVHP	0.4732	0.2991	0.6302	70%
	0.4883	0.3168	0.6355	65%
	0.4876	0.3174	0.6660	71%
	0.4761	0.3009	0.6464	73%
BVSP	0.5706	0.3099	0.7150	71%
	0.5411	0.2908	0.6900	74%
	0.5594	0.3005	0.7080	73%
	0.5536	0.2977	0.7020	73%
SVSP	0.4913	0.3376	0.6545	65%
	0.4833	0.3348	0.6486	65%
	0.5010	0.3368	0.6360	60%
	0.5025	0.3366	0.6780	68%

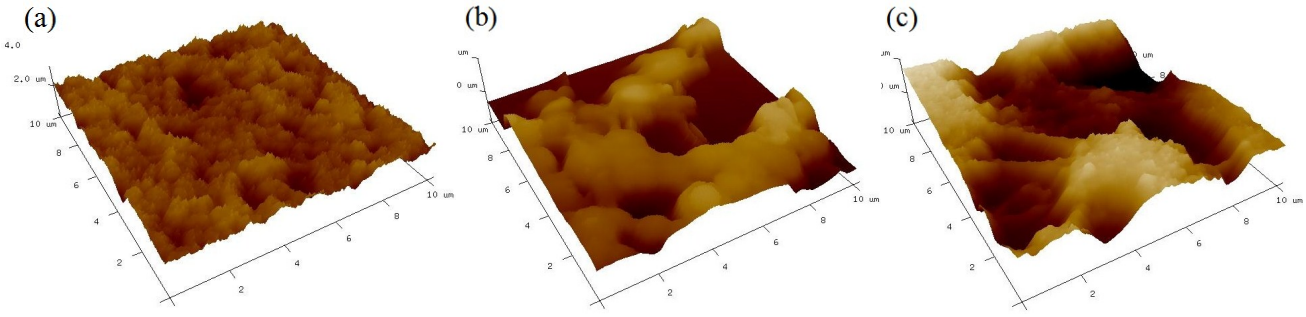

Fig. S2 Three-dimensional AFM surface images of the virgin membranes (a) GVHP, (b) BVSP, (c) SVSP

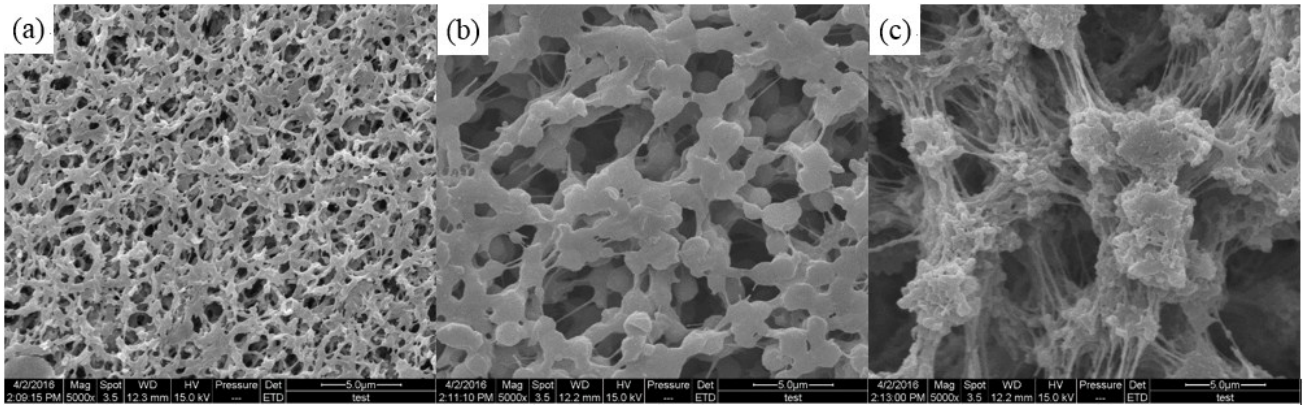

Fig. S3 SEM images of the virgin membranes (a) GVHP, (b) BVSP, (c) SVSP

Table S2 Ions rejections during RO brine treatment using three types of MD membranes (CF=3)

	Membrane	K^+	Na^+	Ca^{2+}	Mg^{2+}	Cl^-	SO_4^{2-}
First Stage	GVHP	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	BVSP	99.99%	99.99%	99.99%	99.97%	99.99%	99.99%
	SVSP	99.98%	99.99%	99.98%	99.96%	99.98%	99.99%
Second Stage	GVHP	99.99%	99.99%	99.99%	99.99%	99.99%	99.99%
	BVSP	99.97%	99.98%	99.98%	99.97%	99.99%	99.99%
	SVSP	99.97%	99.97%	99.95%	99.95%	99.97%	99.97%