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ELECTRONIC SUPPLEMENTARY INFORMATION

Nanocomposite Hollow Fiber Membranes with Recyclable β -Cyclodextrin

Encapsulated Magnetite Nanoparticles for Water Vapor Separation

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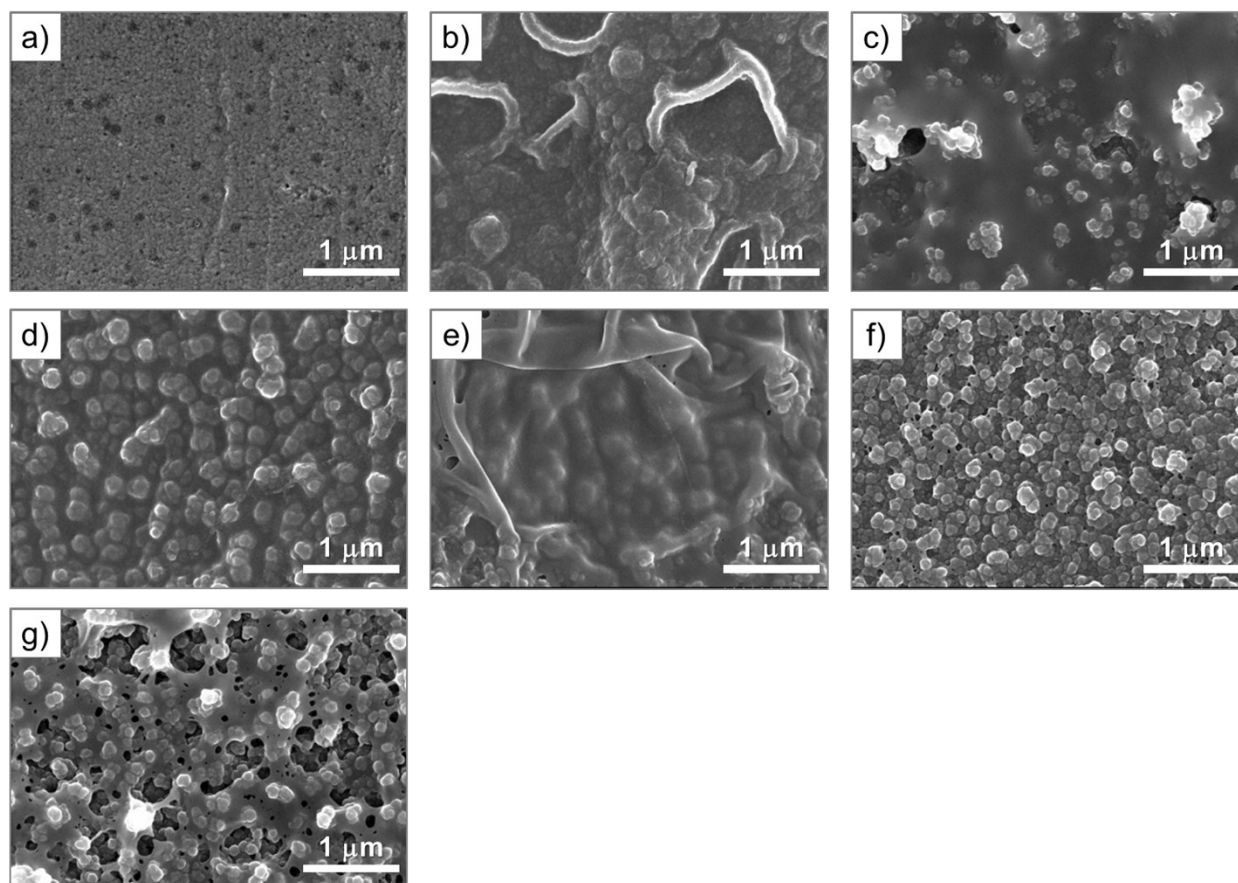


Fig. S1 The surface morphology of the PSf substrate, TFC and TFN membranes: a) PSf, b) M(0), c) M(0.05), d) M(0.1), e) M(0.2), f) M(0.5), g) M(1.0).

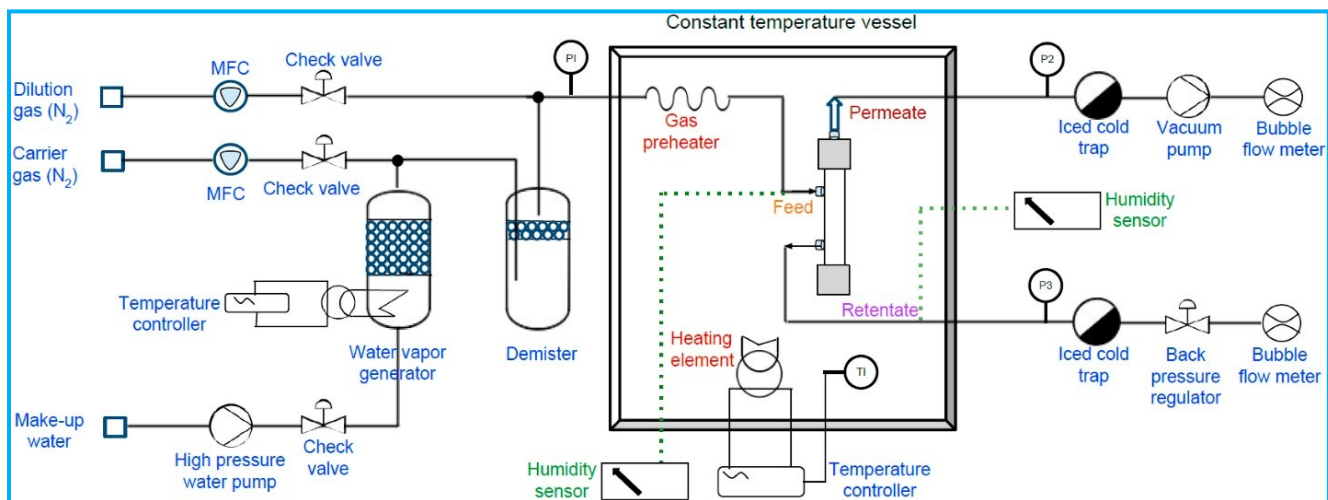


Fig. S2 Lab scale experimental set-up for the water vapor/N₂ mixed gas separation (Ref. 55).

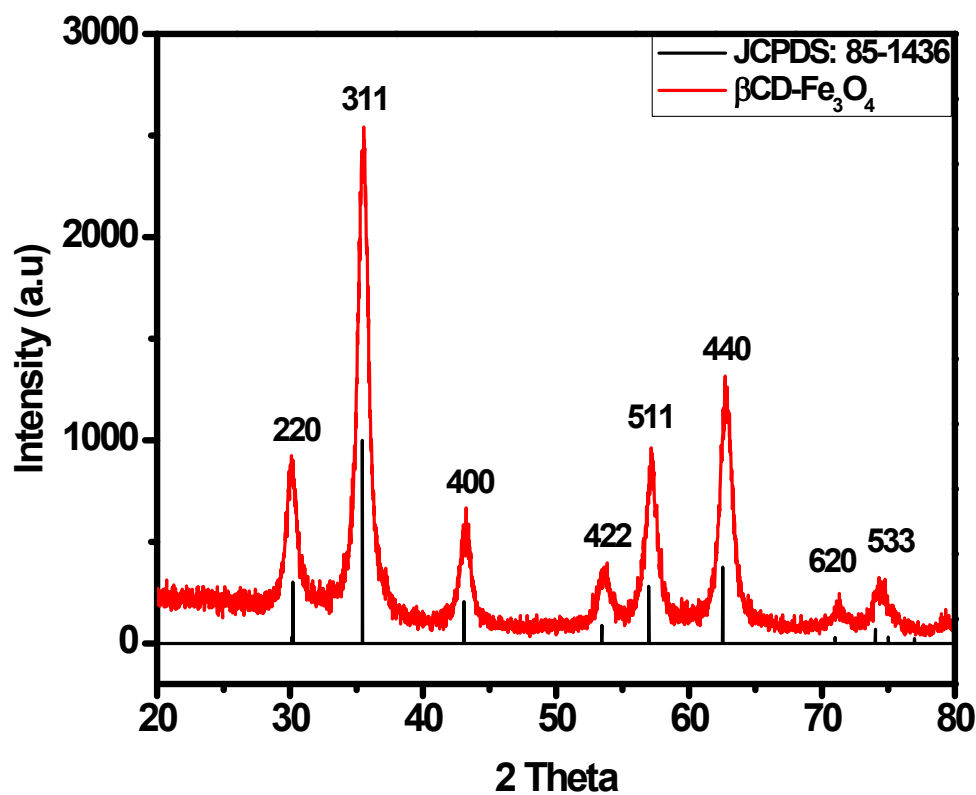


Fig. S3 XRD patterns of the β CD-Fe₃O₄ nanoparticles.

Table S1 Physical properties of the polysulfone hollow fiber membrane substrate.

Membrane	Dimensions			Mean pore size ^a	MWCO ^a	Type of membrane
	OD (μm)	ID (μm)	Thickness (μm)			
Polysulfone (PSf)	1400	1000	200	0.20 μm	8000	Ultrafiltration

^aPore size and MWCO data were supplied by manufacturer.

Table S2 Comparison of the water vapor permeance and selectivity of the manufactured membranes with those of state-of-the-art nanocomposite membranes.

Membrane	Type of membrane	Operating temperature (°C)	Operating pressure	Feed humidity	Feed flow rate (cm ³ /min)	Ref.
R1: PSf/DABA-TMC-CTiO ₂	Hollow fiber	30	3 kg _f /cm ²	AH = 25~27 g/m ³	1000	33
R2: PES/PDA-DABA-TMC	Hollow fiber	30	3 kg _f /cm ²	RH = 70%	-	54
R3: PES/CA-PEG	Hollow fiber	30	3 bar	RH = 20%	-	22
R4: PEI/PEBAX®1657	Flat sheet	21	2 kg _f /cm ²	RH = 47%	-	19
R5: PES/DABA-TMC	Hollow fiber	30	3 kg _f /cm ²	RH = 70%	1000	55
R6: PSf/MPD-TMC-OH-TiO ₂	Hollow fiber	30	3 kg _f /cm ²	RH = 15~80%	1000	56
R7: BTESO-Me-SiO ₂	Flat sheet	40	Atmospheric pressure	RH = 0~90%	500	57
R8: PSf/NaA-zeolite	Hollow fiber	25	350 kPa	Water concentration = 0.13 ± 0.03 wt%	200	58
R9: Mem-CoSi-3	Flat sheet	300~500	-	-	-	59
R10: PSf/MPD-TMC-Si NPs	Hollow fiber	30	3 kg _f /cm ²	RH = 80%	1000	52
R11: PSf/MPD-TMC	Hollow fiber	30	3 kg _f /cm ²	AH = 30~32 g/m ³	1000	60
R12: ABn-NH-TFN-3	Hollow fiber	30-60	3 kg _f /cm ²	RH = 30~70%	1000	61
R13: PSf/DABA-TMC-ETS-4	Hollow fiber	30	3 kg _f /cm ²	AH = 26~29 g/cm ³	600~2200	62
R14: PSf/DETA-TMC-sβCD	Hollow fiber	30	3 kg _f /cm ²	AH = 26~29 g/cm ³	1000	40
R15: PSf/MPD-TMC-MOF	Hollow fiber	30	3 kg _f /cm ²	RH = 70~80%	1200	35

R16 : PSf/ DETA-TMC- β CD-Fe ₃ O ₄	Hollow fiber	30	3 kg _f /cm ²	RH = 20~85%	1000	This work
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