Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Self-Assembled Two-Dimensional Metal-Organic Framework Membrane as Nanofluidic Osmotic Power Generator

Yuyu Su,[a] Jue Hou, [a] Chen Zhao,[a] Qi Han,[b] Jian Hu,[a] and Huacheng Zhang*[a]

[a] *Chemical and Environmental Engineering, School of Engineering, RMIT University, Melbourne, VIC 3000, Australia*

[b] *School of Science, STEM College, RMIT University, Melbourne, VIC 3000, Australia*

* Corresponding authors.

E-mail addresses: huacheng.zhang@rmit.edu.au

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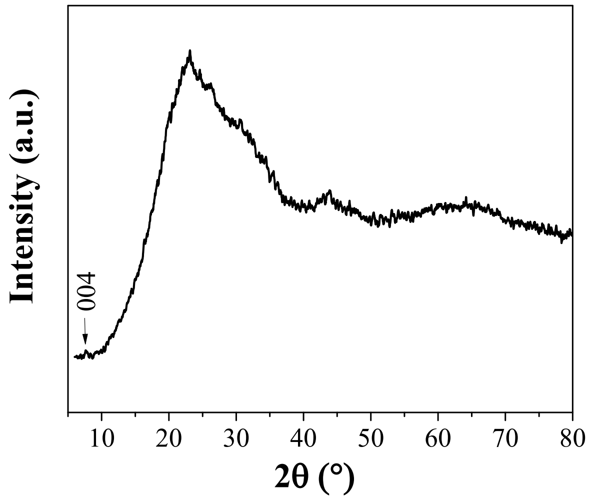

Figure S1. The XRD pattern of ZnTCPP membrane.

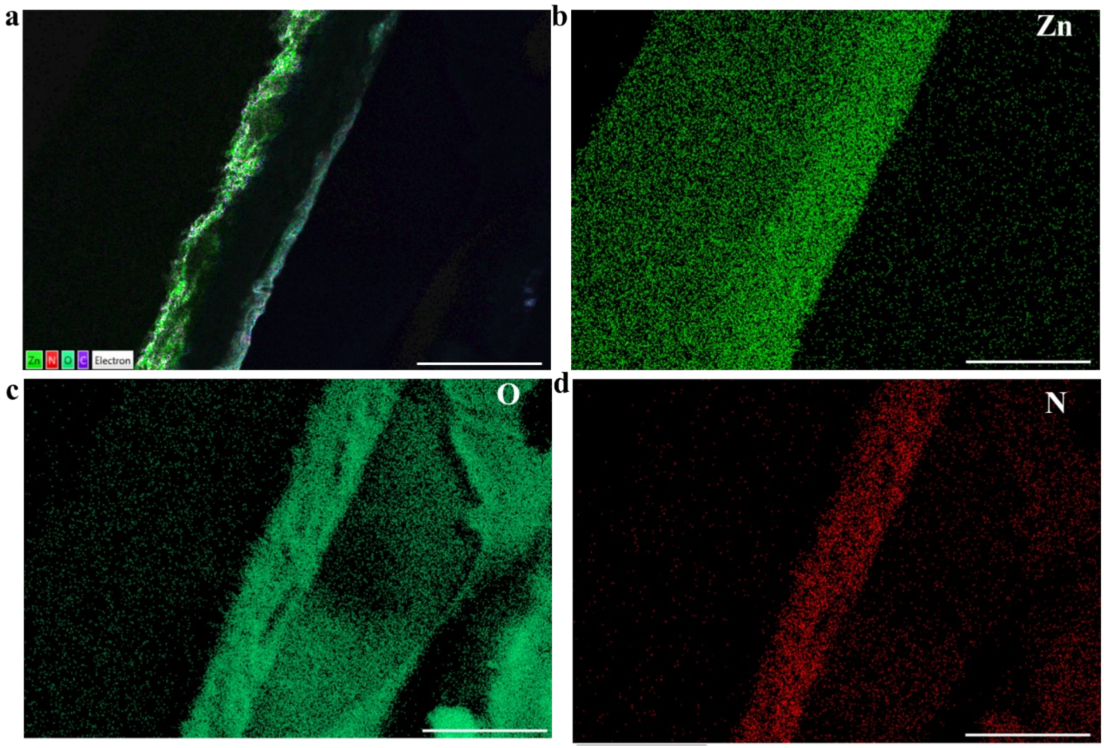

Figure S2. (a) Cross-section SEM image of the ZnTCPP membrane. (b-d) EDX mapping images of ZnTCPP membrane. The scale bars are 50 μm.

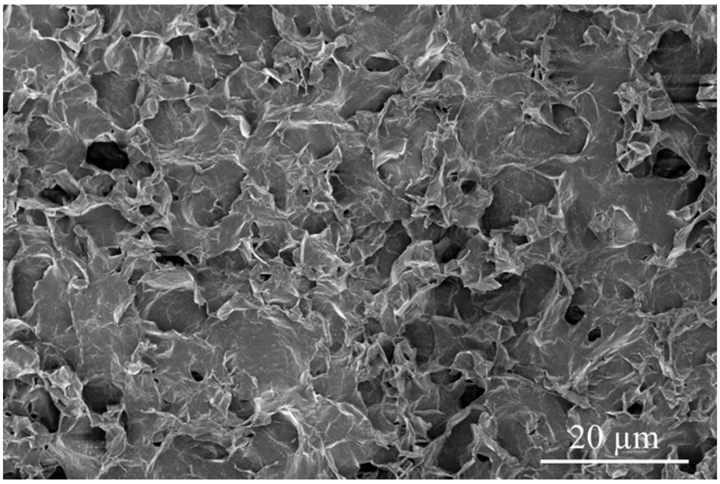

Figure S3. The SEM image of the ZnTCPP membrane surface.

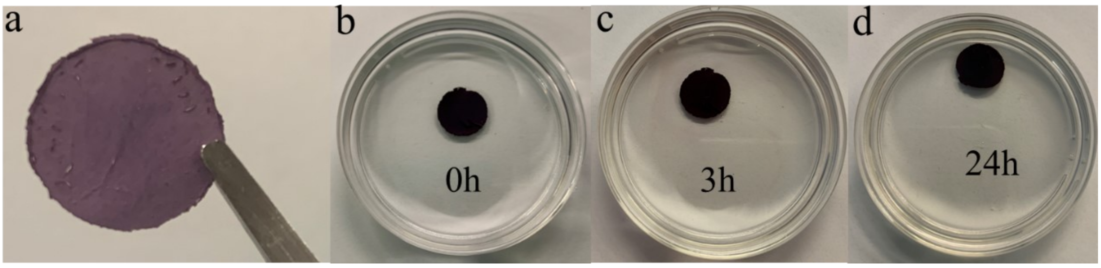

Figure S4. (a) The photo of the as-prepared freestanding ZnTCPP membrane. (b-d) The stability testing of the membrane in water for 0h to 24 h.

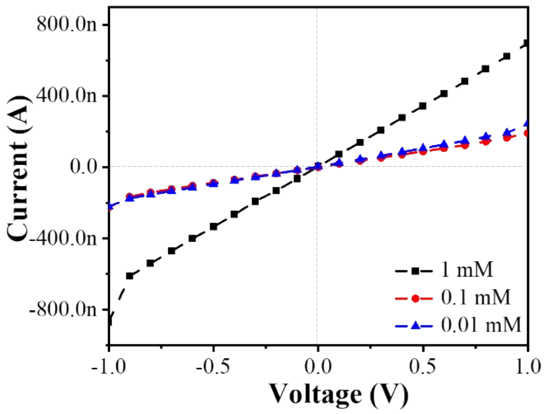

Figure S5. The *I-V* curves of the ZnTCPP membrane in KCl electrolyte solutions with various concentrations (0.01 mM-1mM).

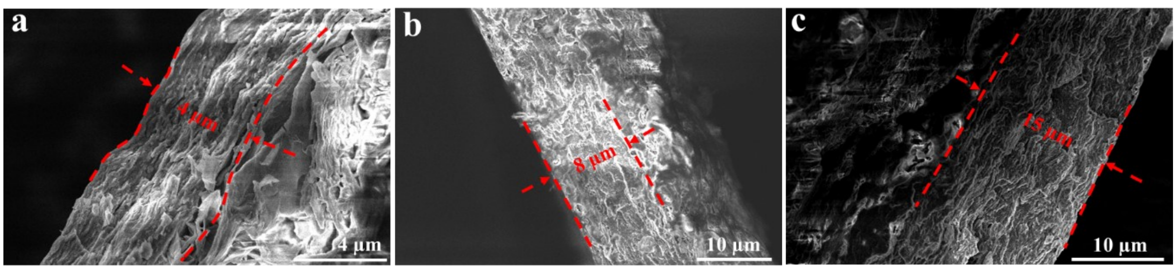

Figure S6. The SEM images of ZnTCPP membranes with different thicknesses. (a) 4 μm. (b) 8 μm. (c) 15 μm.

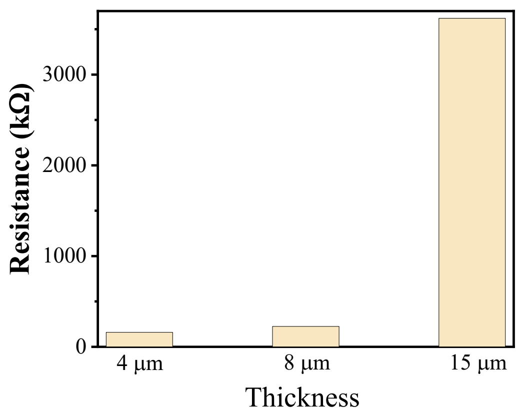

Figure S7. The resistance of membranes with different thicknesses

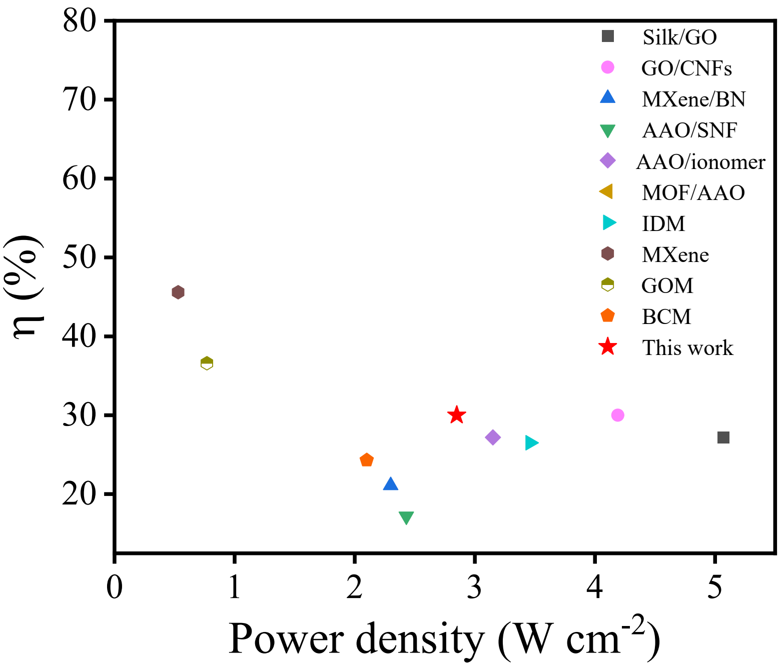

Figure S8. The power density and energy conversion efficiency of membranes compared with other membranes in the literature.

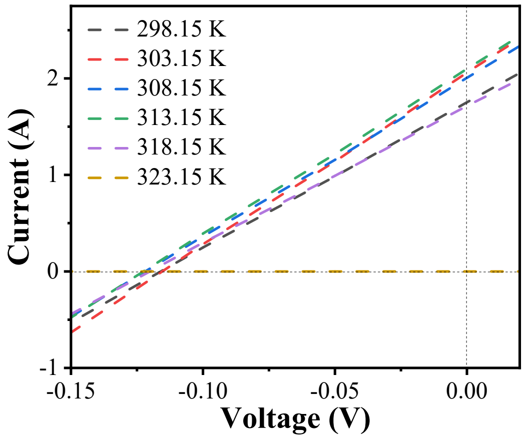

Figure S9. The *I-V* curves of the ZnTCPP membrane at different temperatures ranging from 298.15 K to 323.15 K.

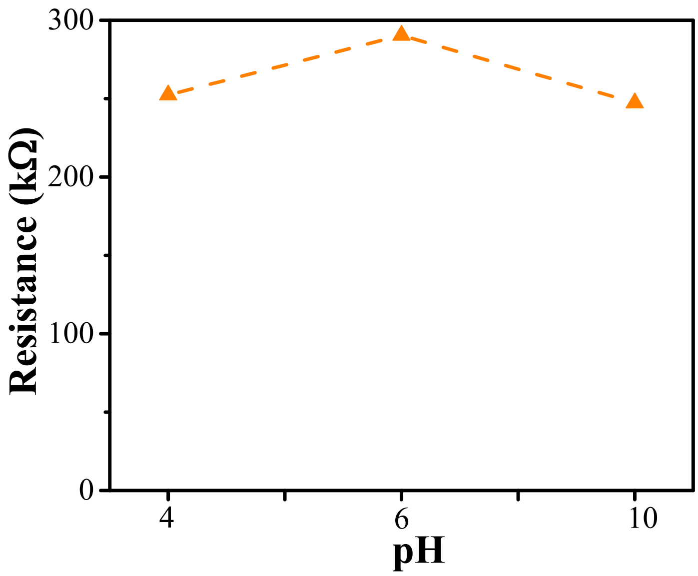

Figure S10. The resistance of membranes with different pH values.

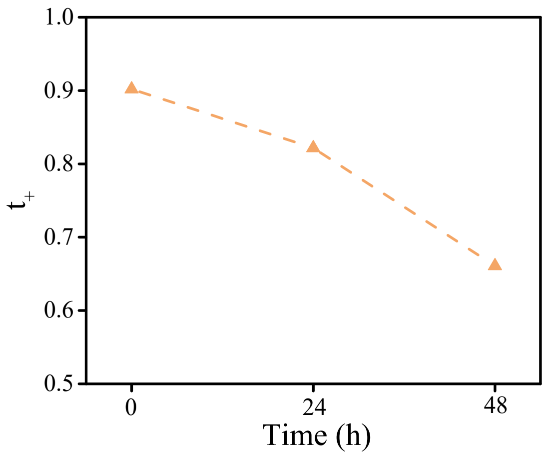

Figure S11. The cation selectivity of the membrane under 50-fold KCl concentration after 48 h.

Table S1. The zeta potentials of ZnTCPP nanosheets in different solutions.

ZnTCPP nanosheets	pH=4	pH=6	pH=10
water	6.27 mV	-33.3 mV	-27.9 mV
0.01M KCl	-4.39 mV	-21.5 mV	-13.8 mV
0.1 M KCl	-3.62 mV	-16.3 mV	-10.3 mV
0.5 M KCl	-7.27 mV	-15 mV	-7.8 mV

Table S2. The comparison of state-of-the-art membranes for harvesting salinity gradient energy. The power density and efficiency were measured at a 50-fold salinity gradient (0.5 M/0.01 M)

Membrane	Electrolyte	Measured area (mm^2)	Membrane thickness (μm)	Cation selectivity (t_+)	Efficiency (%)	Power density (W m^{-2})	ref
Silk/GO	NaCl	0.03	5	0.7-0.8	27.2	5.07	[1]
GO/CNFs	NaCl	0.03	9	0.58-0.8	30	4.19	[2]
MXene/BN	NaCl	0.03	10	0.7-0.8	21.1	2.3	[3]
AAO/SNF	NaCl	0.03	5	-	17.2	2.43	[4]
AAO/ionomer	KCl	0.03	10.3	0.823	27.2	3.15	[5]
PSS-MOF/AAO	NaCl	0.03	1.6	-	--	2.87	[6]
IDM	NaCl	0.03	4.2	0.77	26.5	3.46	[7]
MXene	NaCl	0.03	15	-	45.6	0.53	[8]

GOM	NaCl	0.8	10	0.6-0.9	36.6	0.77	[9]
Block copolymer membrane	NaCl	0.03	14	-	24.3	2.1	[10]
ZnTCPP	KCl	0.03	8	0.79-0.9	30	2.85	This work

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