Electronic Supplementary Information

Highly Salt-Resistant and Efficient Dynamic Janus Absorber Based on Thermo-Responsive Hydroxypropyl Cellulose

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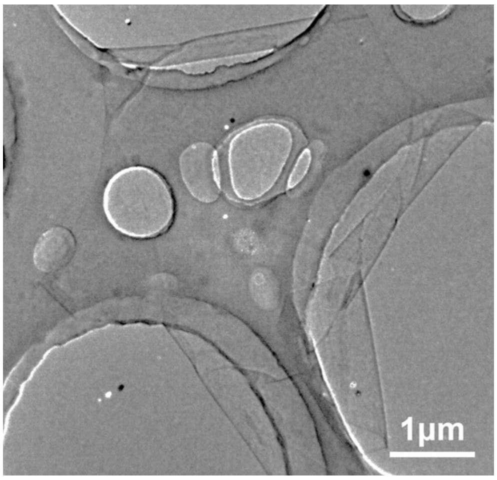

Figure S1. TEM images of MXene nanosheets. $Ti_3C_2T_x$ MXene nanosheets with a lateral size of about 3.5 μm were obtained by selectively etching the Al layer from bulk Ti_3AlC_2 MAX, followed by subsequent exfoliation.

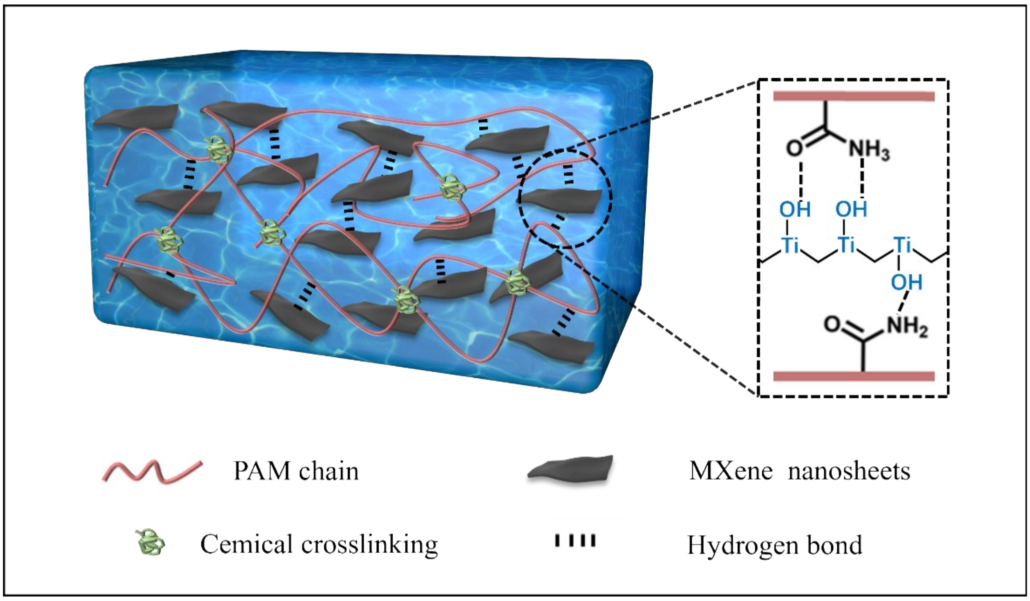

Figure S2. Schematic illustration of the structure of the MPH hydrogel.

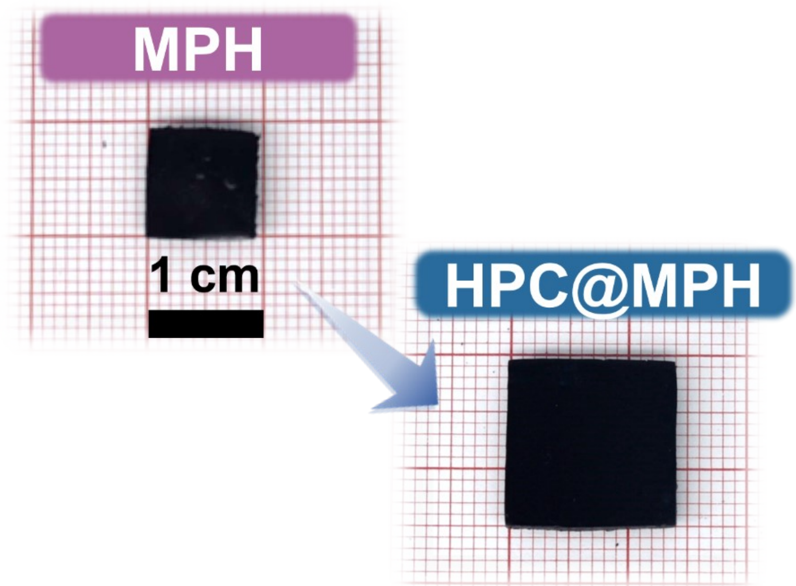

Figure S3. The photographs of the MPH and HPC@MPH, respectively.

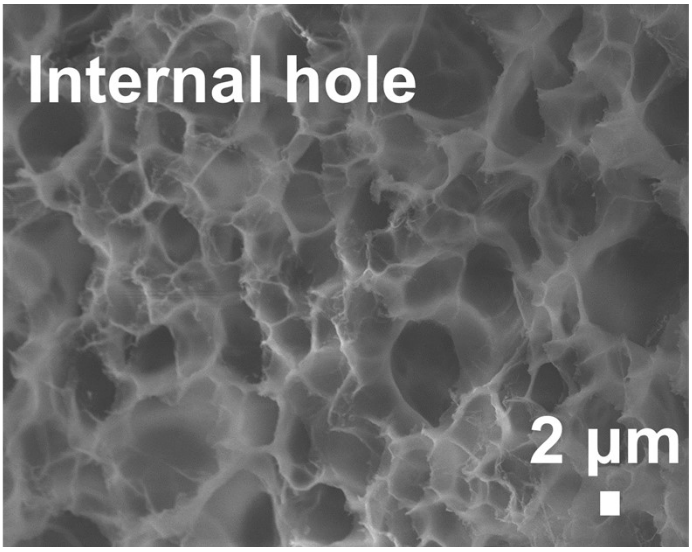

Figure S4. Cross-sectional SEM images of the MPH.

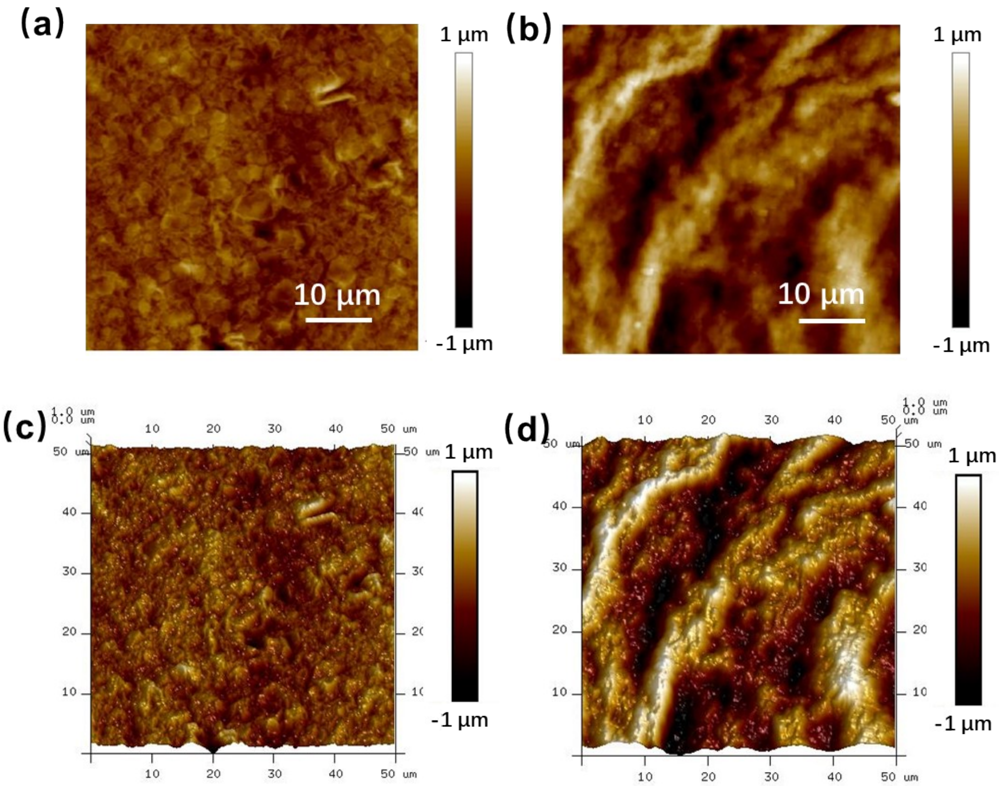

Figure S5. a) and b) AFM images of MPH hydrogel and HPC@MPH hydrogel, respectively. c) and d) Visualization of 3D AFM topographic images of the MPH hydrogel and HPC@MPH hydrogel, respectively.

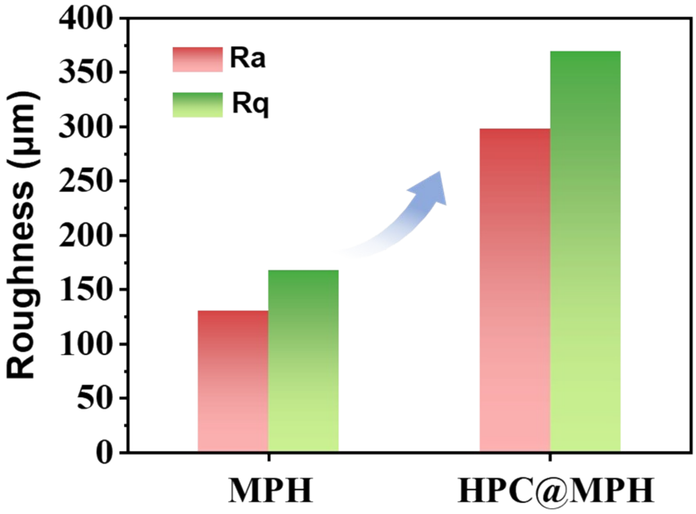

Figure S6. The roughness of the hydrogel and HPC@MPH hydrogel, respectively.

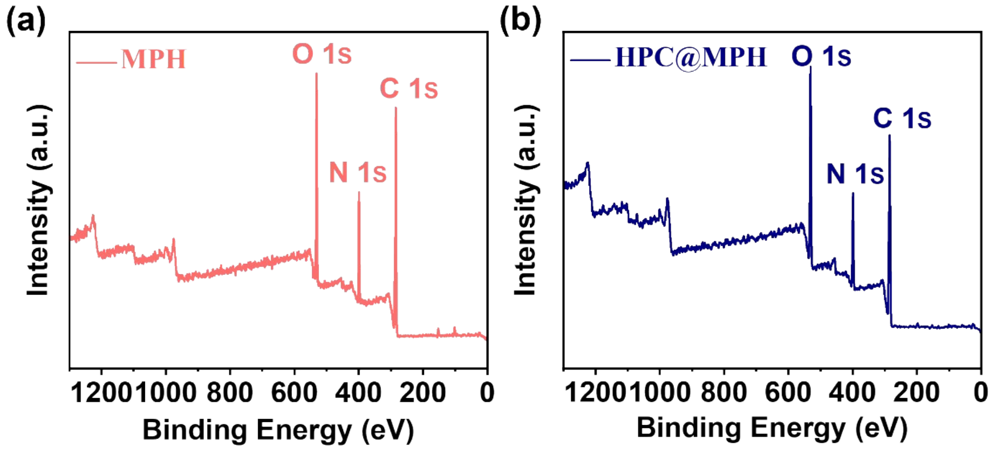

Figure S7. The XPS survey spectrum of (a) MPH and (b) HPC@MPH.

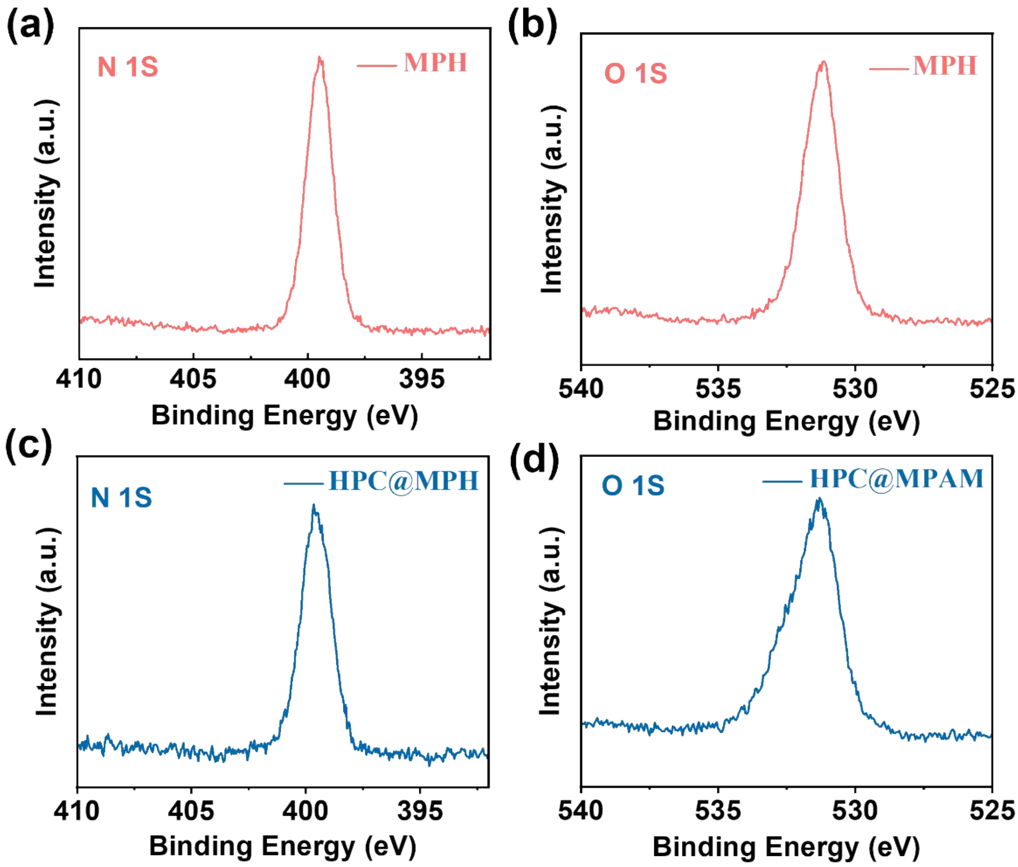

Figure S8. The N 1s and O1s spectrums of the MPH and HPC@MPH, respectively.

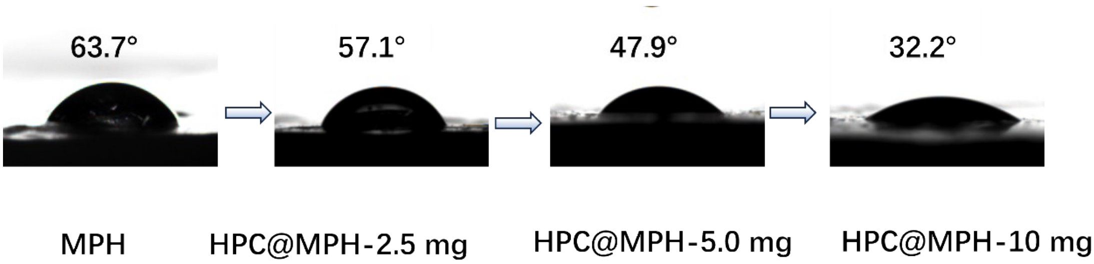

Figure S9. The contact angle changes of MPH surface modified by different HPC contents (2.5 mg, 5.0mg and 10 mg).

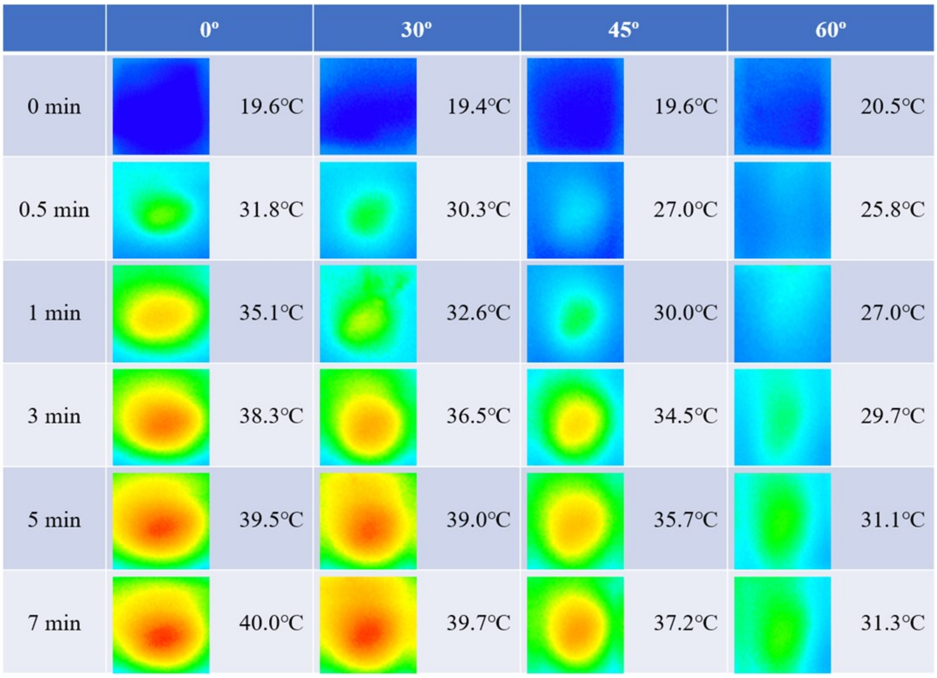

Figure S10. Infrared thermal images and temperatures of the MPH at incident angles of 0°, 30°, 45°, and 60° under one sun solar irradiation.

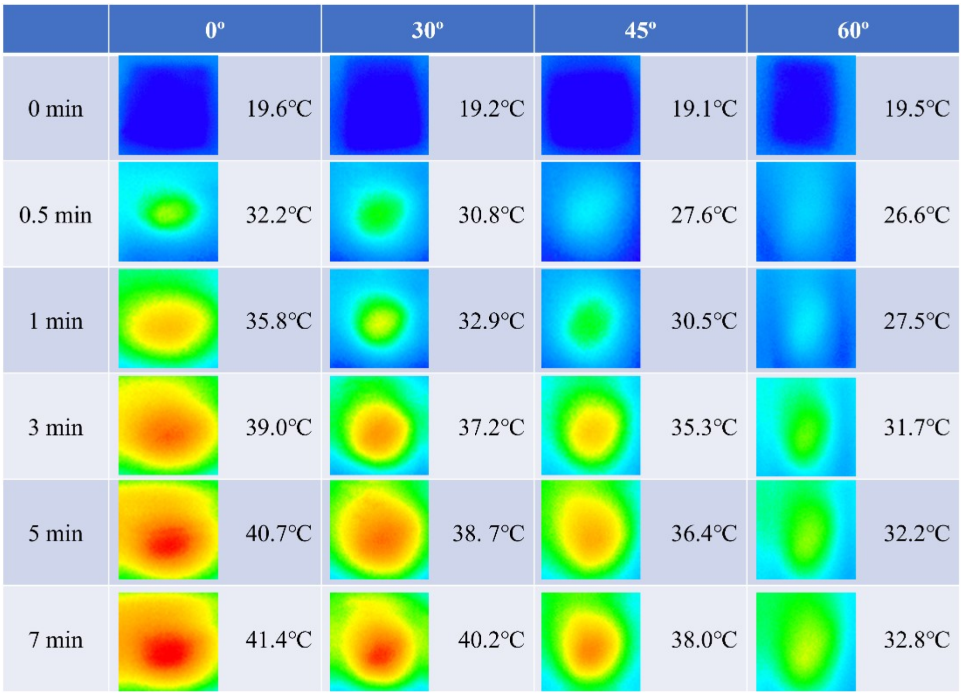

Figure S11. Infrared thermal images and temperatures of the HPC@MPH at incident angles of 0°, 30°, 45°, and 60° under one sun solar irradiation.

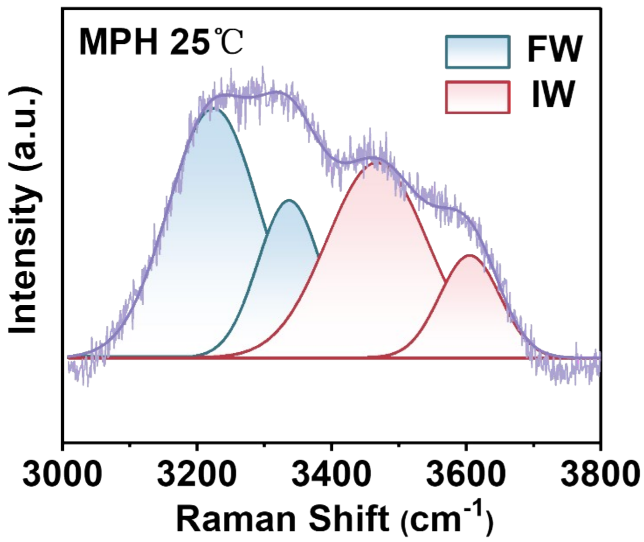

Figure S12. Raman spectra showing the fitting peaks representing IW and FW in the MPH at 25 °C.

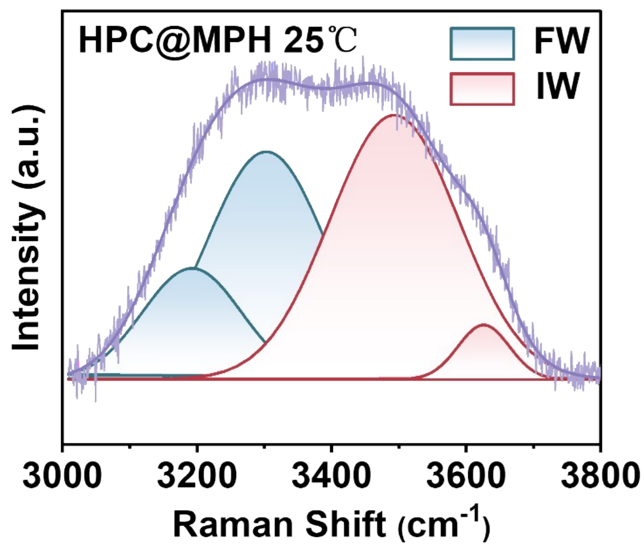

Figure S13. Raman spectra showing the fitting peaks representing IW and FW in the HPC@MPH at 25 °C.

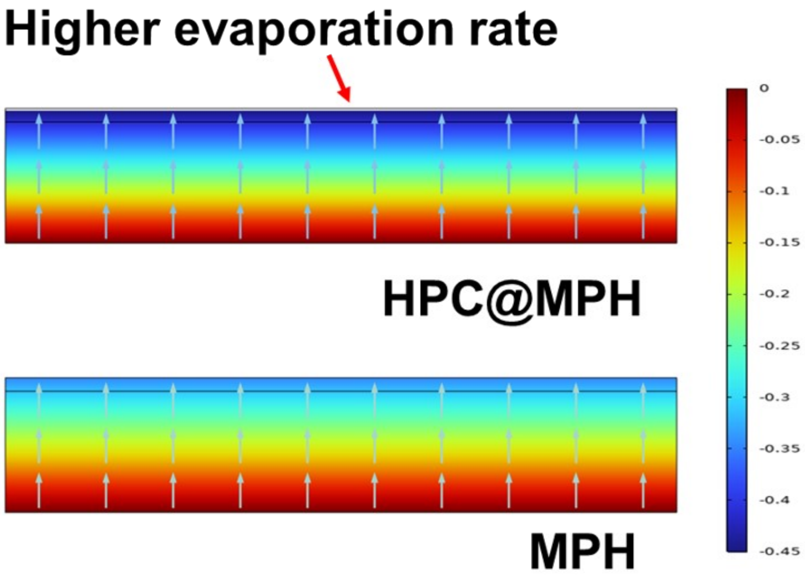

Figure S14. The water evaporation rate of MPH and HPC@MPH obtained by COMSOL simulation under one solar irradiation.

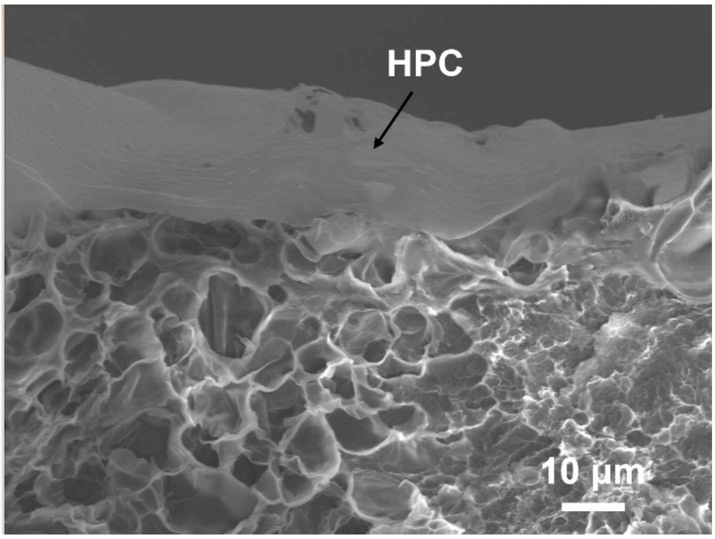

Figure S15. Cross-sectional SEM images of the HPC@MPH-10 mg absorbers.

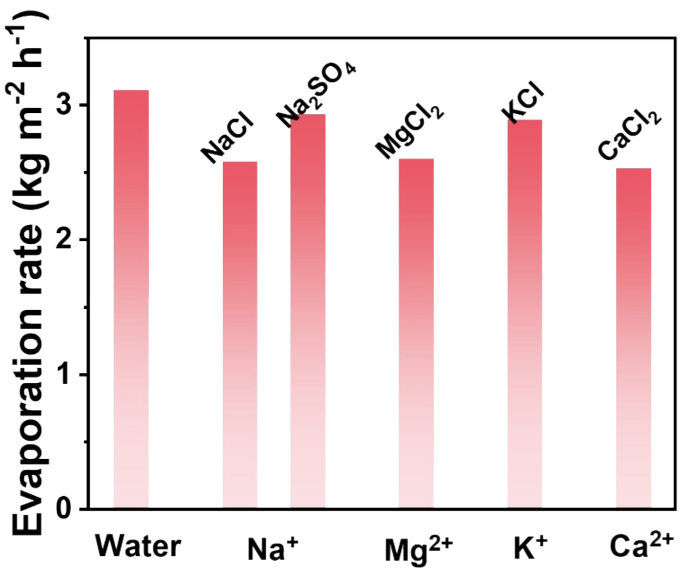

Figure S16. Evaporation rates of HPC@MPH absorber in different salt solutions (3.5 wt% NaCl, KCl, $MgCl_2$, $CaCl_2$ and Na_2SO_4).

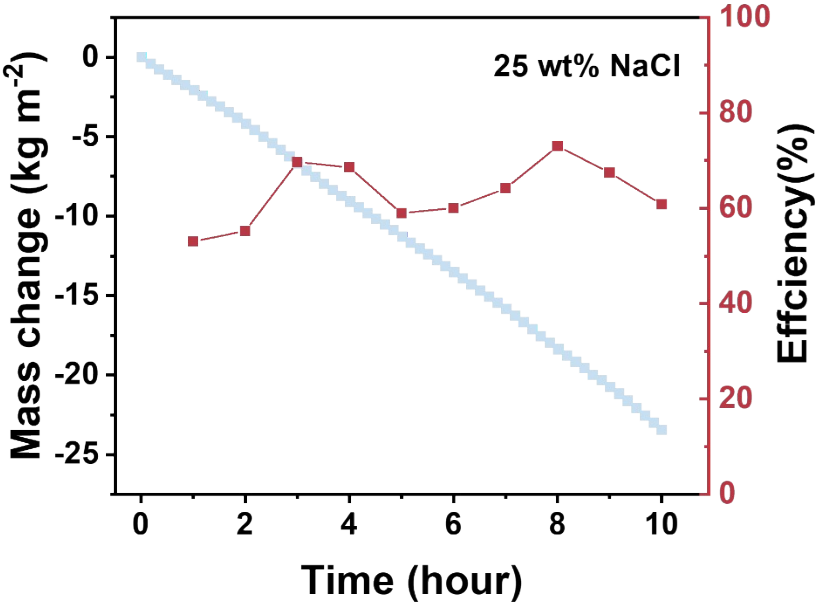

Figure S17. Changes in mass and evaporation efficiency of the HPC@MPH evaporator tested in 25 wt% NaCl simulated seawater.

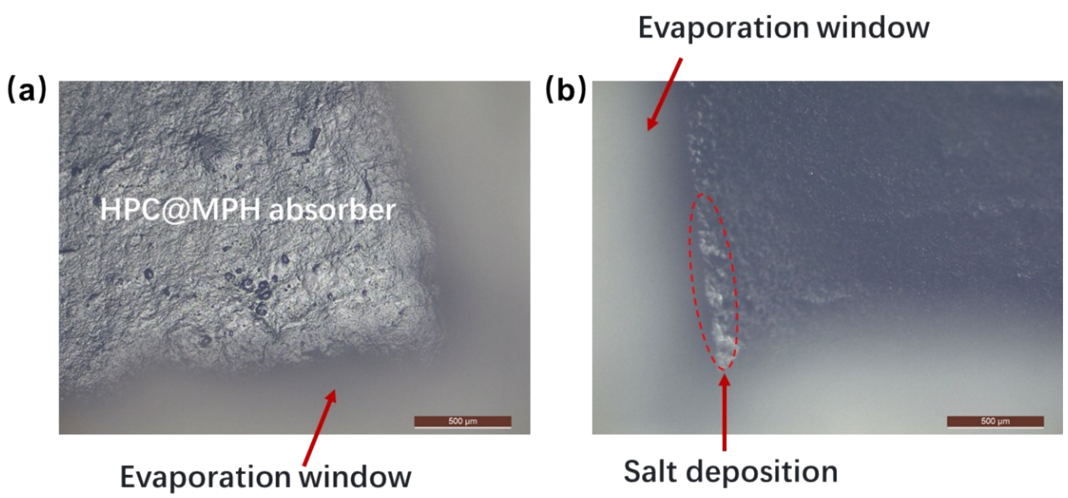

Figure S18 a and b) The salt deposition images of the HPC@MPH evaporator after 1 - hour and 10 - hour water evaporation tests in a 25 wt% NaCl solution.

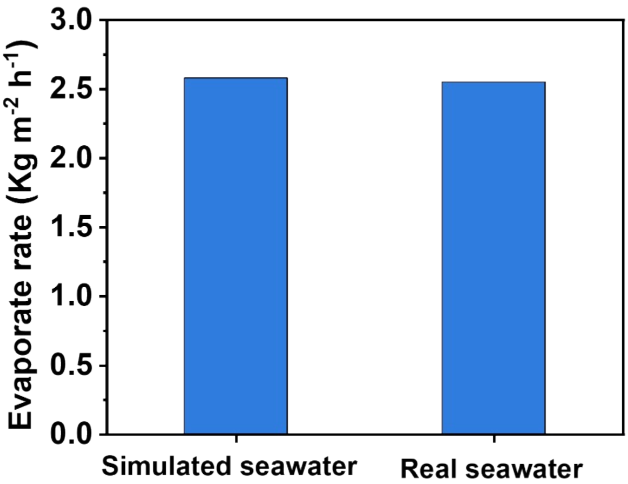

Figure S19. The performance comparison of the average evaporation rate of the HPC@MPH absorber in simulated seawater and real seawater.

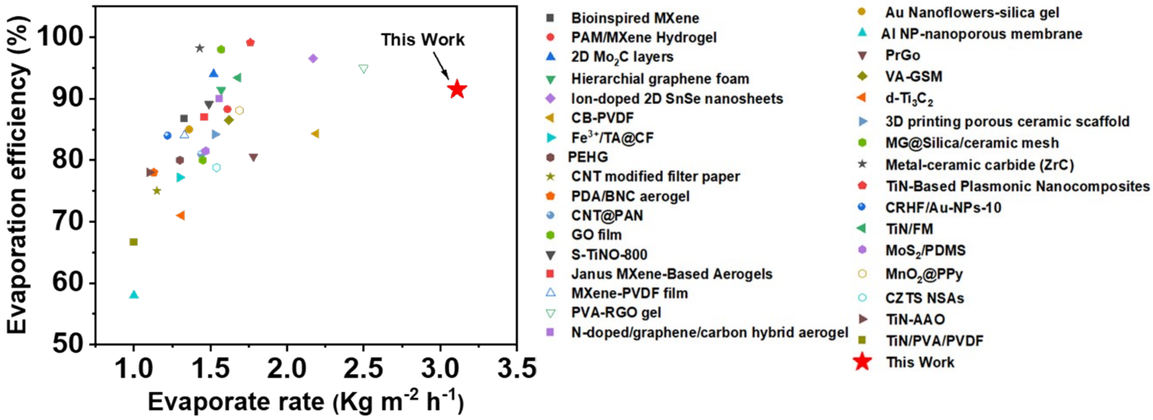

Figure S20. The comparison of the evaporation efficiency and evaporation rate of the previous materials.

Table S1 The comparison of the evaporation efficiency and evaporation rate of the previous advanced materials under 1 kW m $^{-2}$.

Materials	Evaporate rate ($Kg\ m^{-2}\ h^{-1}$)	Evaporation efficiency (%)	Ref.
Bioinspired MXene	1.33	86.7	1
PAM/MXene Hydrogel	2.61	88.3	2
2D Mo_2C layers	1.52	94.0	3
Hierarchial graphene foam	1.57	91.4	4
Ion-doped 2D SnSe nanosheets	2.17	96.5	5
CB-PVDF	2.19	84.3	6
Fe^{3+}/TA@CF	1.30	77.2	7

PEHG	1.30	80.0	8
CNT modified filter paper	1.15	75.0	9
PDA/BNC aerogel	1.13	78.0	10
CNT@PAN	1.44	81.0	11
GO film	1.45	80.0	12
S-TiNO-800	1.49	89.1	13
Janus MXene-Based Aerogels	1.46	87.0	14
MXene-PVDF film	1.33	84.0	15
PVA-RGO gel	2.50	95.0	16
N-doped/graphene/carbon hybrid aerogel	1.56	90.0	17
Au Nanoflowers-silica gel	1.36	85.0	18
Al NP-nanoporous membrane	~1	~58.0	19
PrGo	1.78	80.6	20
VA-GSM	1.62	86.5	21
d-Ti_3C_2	1.31	71.0	22
3D printing porous ceramic scaffold	1.53	84.2	23

MG@Silica/ceramic mesh	1.57	98	24
TiO_2 porous ceramics	2.05	/	25
Metal-ceramic carbide (ZrC)	1.43	98.2	26
TiN-Based Plasmonic Nanocomposites	1.76	99.1	27
CRHF/Au-NPs-10	1.22	84.0	28
TiN/FM	1.68	93.4	29
MoS_2/PDMS	1.47	81.5	30
MnO_2@PPy	1.69	88.1	31
CZTS NSAs	1.54	78.8	32
TiN-AAO	1.1	78.0	33
TiN/PVA/PVDF	1.0	66.7	34
HPC@MPH	**3.11**	**91.5**	**This work**

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