# - Supplementary Data –

# Achieving fast interfacial solar vapor generation and aqueous acid purification in $Ti_3C_2T_x$ MXene/PANI non-woven fabric

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**Figure S1.** Digital image of $Ti_3C_2T_x$ dispersed in NMP (left) and $Ti_3C_2T_x$ DMAc dispersion at room temperature for 3 months (right).

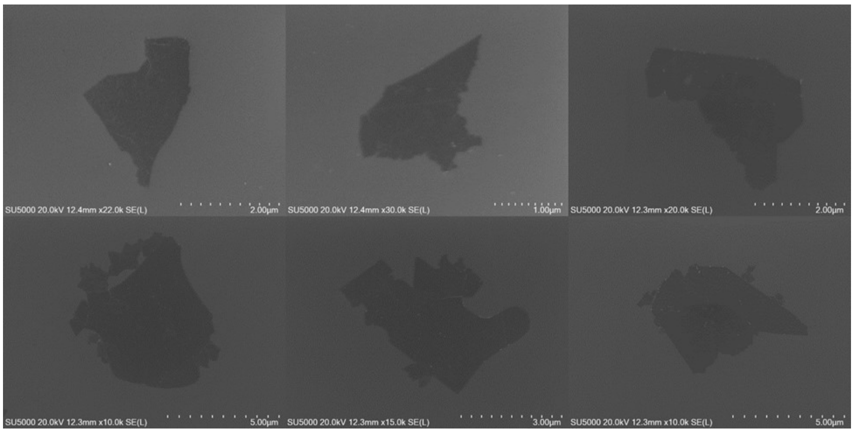

**Figure S2.** SEM image of $Ti_3C_2T_x$ nanosheets.

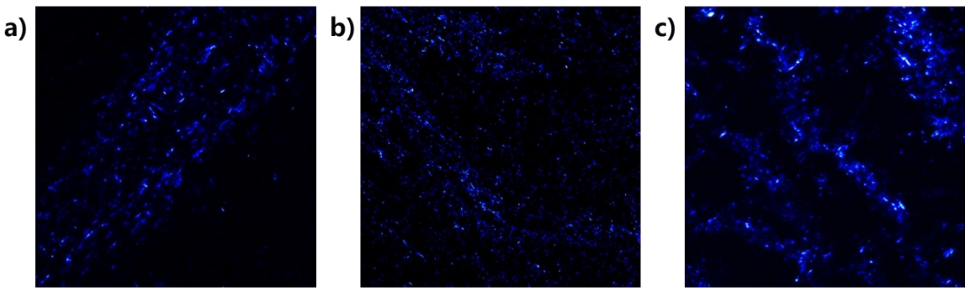


**Figure S3.** Liquid crystal of $Ti_3C_2T_x$ organic solvent dispersion. a) 15 mg/ml. b) 30 mg/ml. c) 40 mg/ml.

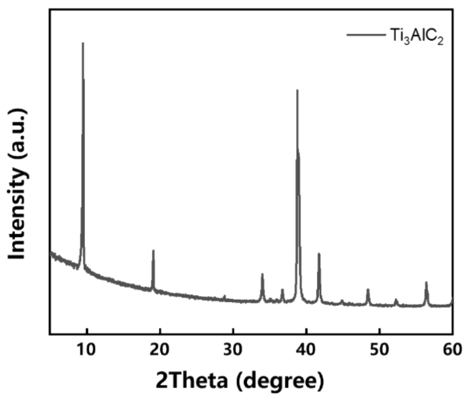


**Figure S4.** XRD pattern of MAX phase.

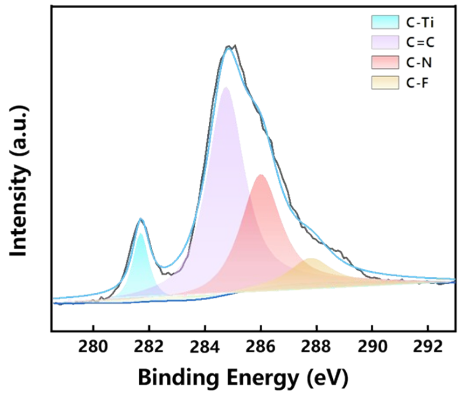


**Figure S5.** C 1S spectrum of MP1

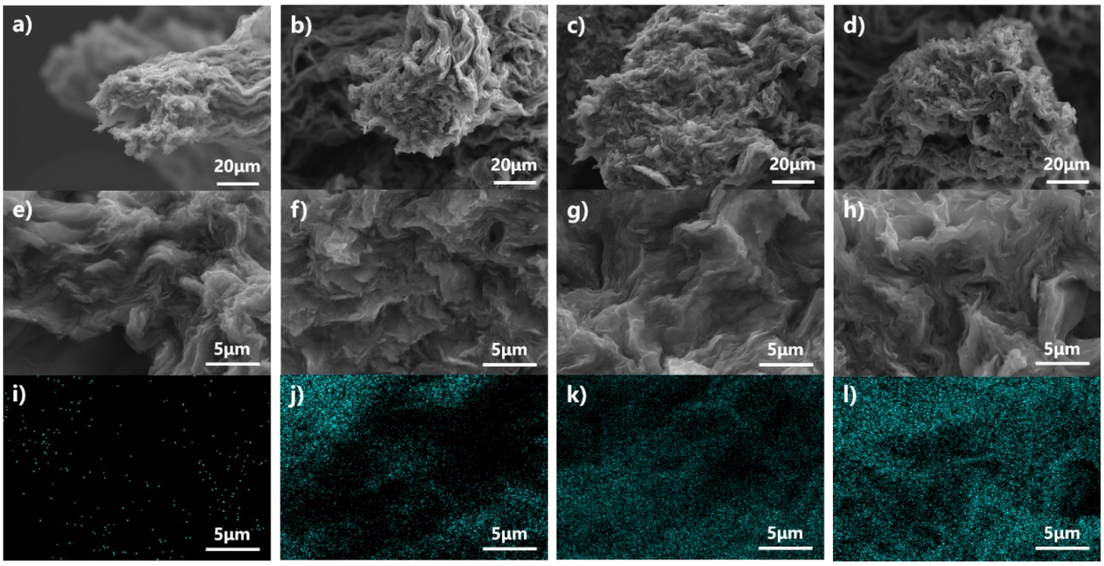


**Figure S6.** Cross sections and N mapping of composites fibers in MPs. a,e,i) MP0. b,f,j) MP1. c,g,k) MP2. d,h,l) MP3.

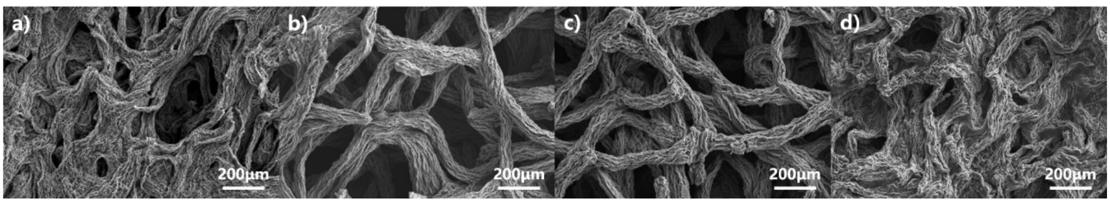


**Figure S7.** SEM image of MPs. a) MP0. b) MP1. c) MP2. d) MP3.

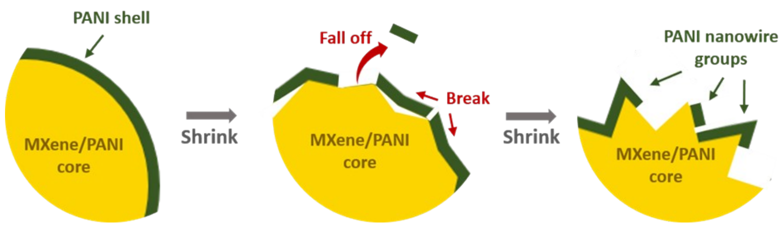


**Figure S8.** Schematic illustration of part of PANI falling off from composites fibers.

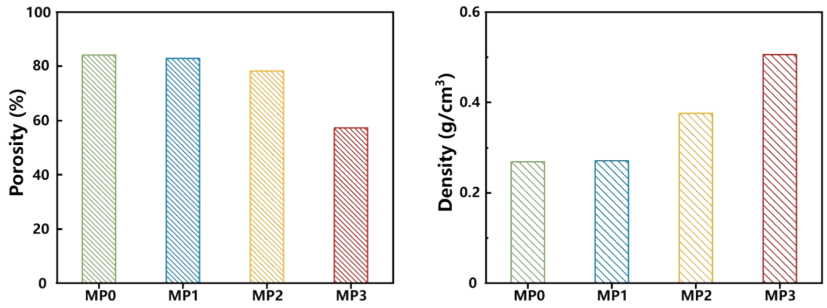


**Figure S9.** a) Porosity of MPs. b) Density of MPs.

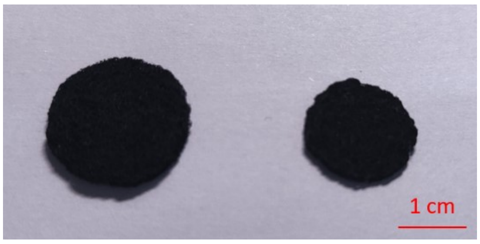


**Figure S10.** Digital image of MP1 (left) and MP3 (right).

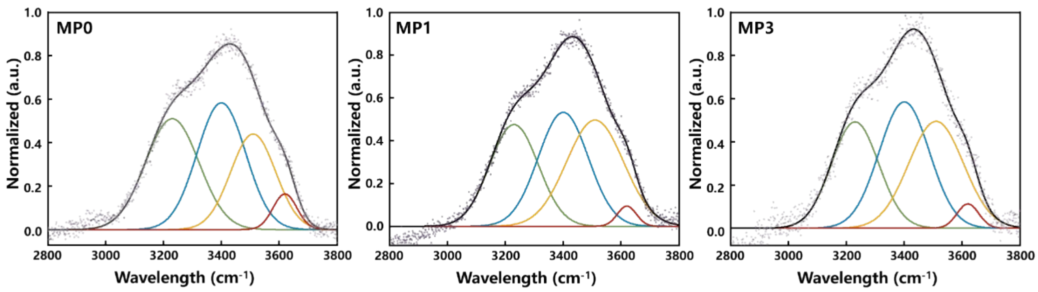


**Figure S11.** Raman spectra with fitting curves of MP0, MP1 and MP3.

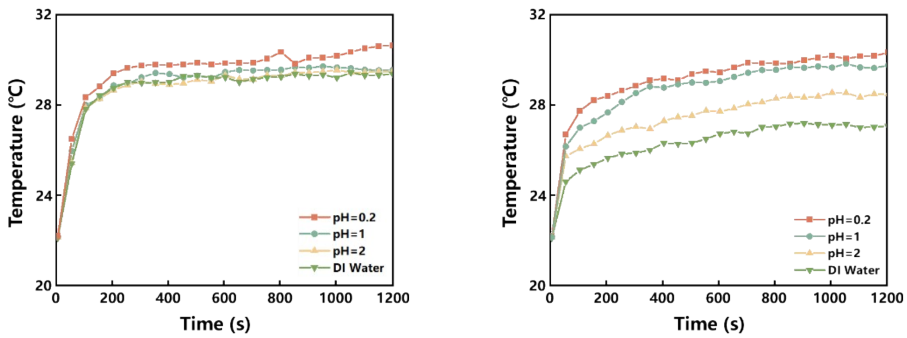


**Figure S12.** The surface temperature of MP1 (left) and MP2 (right) in water and aqueous acid with different pH value under one-sun illumination.

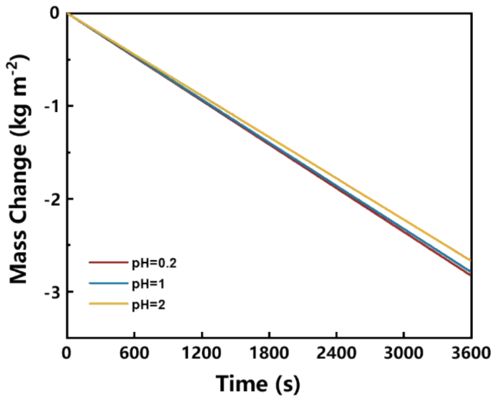


**Figure S13.** Time-dependent mass change of aqueous acid with MP2 working as steam generator.

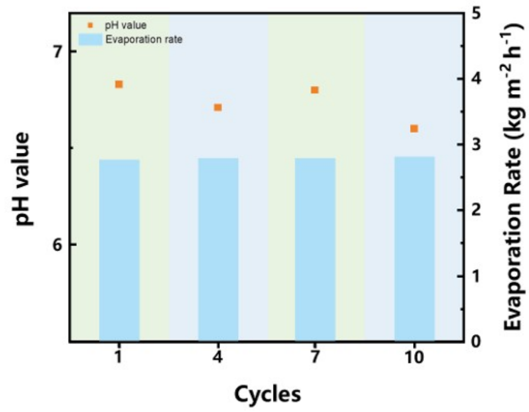


**Figure S14.** Cyclic tests of MP2 working as aqueous acid purifier and interfacial solar vapor generator in pH=1 aqueous acid.

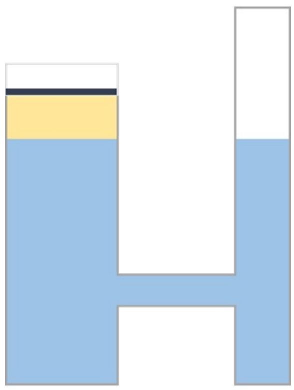

**Figure S15.** The designed water evaporation system for durable test.

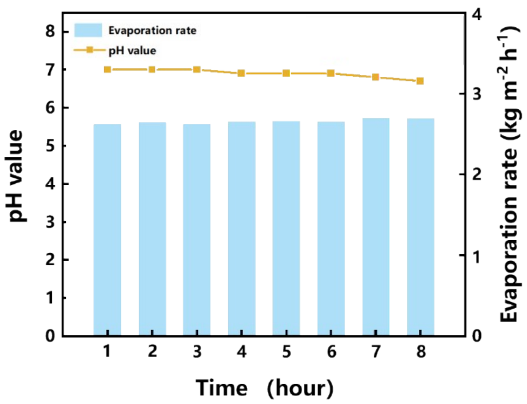


**Figure S16.** The durable test of MP2 in pH=4.5 aqueous acid.

**Table S1.** Comparison of solar vapor performances of MPs with other works.

| Materials | Types | Light density (kW $m^{-2}$) | Evaporation rate (kg $m^{-2}$ $h^{-1}$) | Evaporation efficiency (%) | References |
|---|---|---|---|---|---|
| PANI/PA | Membrane | 1 | 1.00 | | 1 |
| PANI/ZIF/PES | Membrane | 1 | 1.07 | 66.8 | 2 |
| PANI/PVDF | Membrane | 1 | 1.09 | 74.15 | 3 |
| PANI/$TiO_2$/Melamine | Bilayer aerogel | 1 | 2.12 | 88.9 | 4 |
| p-PEGDA/PANI | Hydrogel | 1 | 1.4 | 91.5 | 5 |
| $Ti_3C_2T_x$/PVA | Hydrogel | 1 | 1.82 | 73.5 | 6 |
| $Ti_3C_2T_x$/Porphyrin | Membrane | 1 | 1.41 | 86.4 | 7 |
| PANI/Graphene | Topographic PANI arrays | 1 | 1.42 | 96.6 | 8 |
| GO/PANI/ $Ti_3C_2T_x$ | Flower-shaped aerogel | 1 | 3.94 | 135.6 | 9 |
| PDA/PEI/ $Ti_3C_2T_x$ | Vertical yarns arrays | 1 | 3.95 | 177.8 | 10 |
| PANI/ $Ti_3C_2T_x$ | Non-woven fabrics | 1 | 2.65 | 93.7 | This work |

# References


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