## **Supporting Information**

## All-weather-available electrothermal and solar-thermal wood-derived porous carbon-based

## steam generators for highly efficient water purification

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**Figure S1.** Schematic illustrating a steam generation device for evaluating its water evaporation efficiency.



Figure S2. (a, b) TEM and (c, d) HRTEM images of the candle soot.



Figure S3. BJH adsorption cumulative pore volume plot of ACW.



Figure S4. Solar light absorbance spectra of CW and ACW in the wavelength range of 250–2500

nm.



**Figure S5.** Water transport capability of ACW and CW. (a, b) The ACW can be wetted rapidly when it is floating on an aqueous solution of KOH (6M) with its top surface above the solution. (c, d) It takes a long time of 60 s for the KOH solution to transport from the bottom to the top of the CW.



Figure S6. Thermal conductivities of CW and ACW.



Figure S7. Time trace of the temperature curve for CPS-GACW in response to 1-sun irradiation.



**Figure S8.** (a) Schematic illustration of the setup; (b) Temperature curves of the dry CSP-GACW surface at different voltages applied.



Figure S9. Water evaporation efficiencies of CSP-GACW under different conditions.

Solar intensity	Evaporation rate	Efficiency	
$(kW m^{-2})$	$(\text{kg m}^{-2} \text{ h}^{-1})$	(%)	
1	1.49	77.2	
2	2.70	79.3	
3	4.33	89.9	
4	5.98	95.5	
5	7.54	98.0	

**Table S1.** Evaporation rates and solar-thermal conversion efficiencies of CSP-GACW under different solar intensities.

**Table S2.** Comparison of water steam generation performances of the CSP-GACW device with

 other wood-based devices reported.

Materials	Water evaporation rate (kg $m^{-2} h^{-1}$ )					
	1 sun	2 sun	3 sun	4 sun	5 sun	Ref.
Candle soot/wood	0.98	-	-	-	-	1
Plasmonic wood	~1	~2.3	~3.3	-	~6	2
Flame treated	1.05	-	3.46	-	-	3
wood						
Wood@AlP	1.423	-	-	-	-	4
CNT/Wood	0.95	-	2.88	-	5.14	5
Wood/Fe <sub>2</sub> O <sub>3</sub> /CN	1.42	-	4.22	-	7.08	6
Т						
CSP-GACW	1.49	2.70	4.33	5.98	7.54	This work

**Table S3.** Concentrations of salt ions in the original seawater and the solar-thermally-purified water with the CSP-GACW device.

Ions	Seawater	Purified seawater
$(mg L^{-1})$	$(mg L^{-1})$	$(mg L^{-1})$
Na <sup>+</sup>	5602	2.17
$Mg^{2+}$	326.6	1.12
$K^+$	238.7	1.43
Ca <sup>2+</sup>	419.3	5.11

Optical concentrations	Evaporation rate (kg $m^{-2} h^{-1}$ )			
$(kW m^{-2})$	0 V	1.5 V	3.0 V	6.0 V
0	0.30	0.75	2.29	6.86
0.5	-	1.95	2.50	7.18
1	1.49	2.86	4.15	11.73

**Table S4.** Evaporation rates of the CSP-GACW evaporator under different conditions.

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