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Supporting Information

Enhanced solar steam generation using carbonized *Platanus Acerifolia* fruit with fibrous channels for improved water transport

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Experimental

Materials. Fruit of the *Platanus acerifolia* (PAF) was collected from the campus of Henan University. Anhydrous ethanol and zinc nitrate were obtained from Tianjin Kemio Chemical Reagent Co., Ltd. Sodium hydroxide was purchased from Guoan Group Chemical Reagent Co., Ltd.

Characterization. The scanning electron microscopy (SEM, JSM-7610F, JEOL Ltd., Japan) was used to characterize the surface morphology of PAF. The elemental content and chemical interaction of composites on the surface were studied by energy dispersive spectroscopy (EDS, JSM-7610F, Japan) and X-ray photoelectron microscopy (XPS, D8 Advance, Bruker, Germany), respectively. The water contact angle (WCA) of the sample surface was determined using a contact angle measurement angle measurement unit (SCI6000E, POWEREACH, China) using with

a 5μL water droplet. The absorption spectra of PAF were determined by UV/vis spectroscopy (UV-3600UH5700; Shimadzu, HITACHI, Japan). Infrared images and the temperature change of samples were procured by an infrared thermal imager (FLIR E8xtFLIR T440, USA). The interfacial solar vapor generation and water desalination was carried out on a lab-made setup. This analysis was performed using X-ray diffraction (XRD, Bruker D8 Advance instrument) to assess crystalline structures, and Fourier-transform infrared spectroscopy (FT-IR) (Bruker Optics Vertex 70 system) to analyze functional groups and chemical bonding.

Solar vapor generation measurement. The water evaporator unit is placed under a Xenon lamp (CELS500L) fitted with a Xenon lamp for the water evaporation test. The change in mass of the water during evaporation was recorded by an electronic balance. And the evaporation rate of water (kg m^{-2} h^{-1}) was obtained from equation (1):

$$m = dm/S{\cdot}t$$

where dm is the weight loss of water, S is the evaporation area of the water evaporator unit and t is the evaporation time. And the evaporation efficiency (η) is calculated by equation (2):

$$\eta = \dot{m}h_{LV}/Pin$$

where $\dot{m}$ is the evaporation rate of the water evaporator unit after subtracting the evaporation rate of the water, h_{Lv} is the enthalpy of phase change of water from liquid to vapor (2256 J • g^{-1}) and *Pin* is the solar illumination intensity.

Yield measurement. And the yield (*Y*) is calculated by equation (3):

$$Y\ [wt\%] = \frac{m_1}{m_0}$$

Where m_1, m_0 represent the saturated weight before carbonization of 300°C-Zn, 500 °C-Zn, 700 °C-Zn and 900 °C-Zn, the after carbonization of 300°C-Zn, 500 °C-Zn, 700 °C-Zn and 900 °C-Zn.

Figures

Fig. S1 Digital image of PAF.

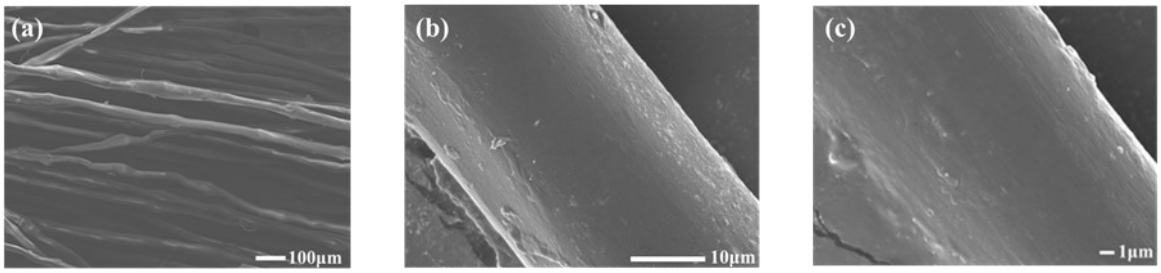

Fig. S2 (a) The SEM image of Natural fibers of PAF. (b-c) The different magnified SEM images of fiber of PAF before carbonization.

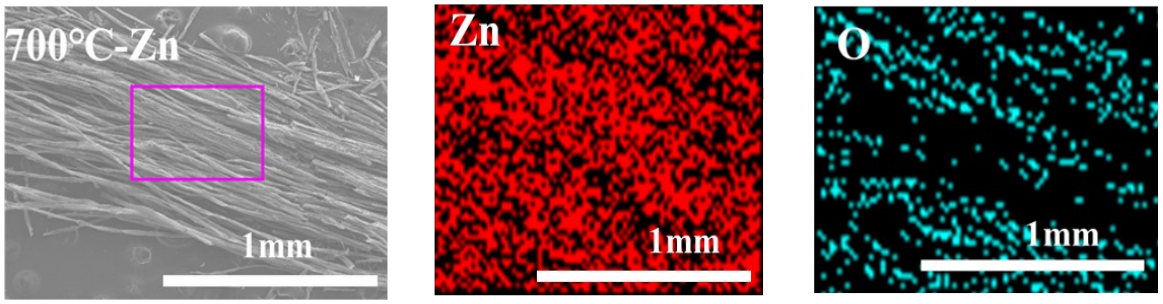

Fig. S3 EDS maps of 700°C-Zn.

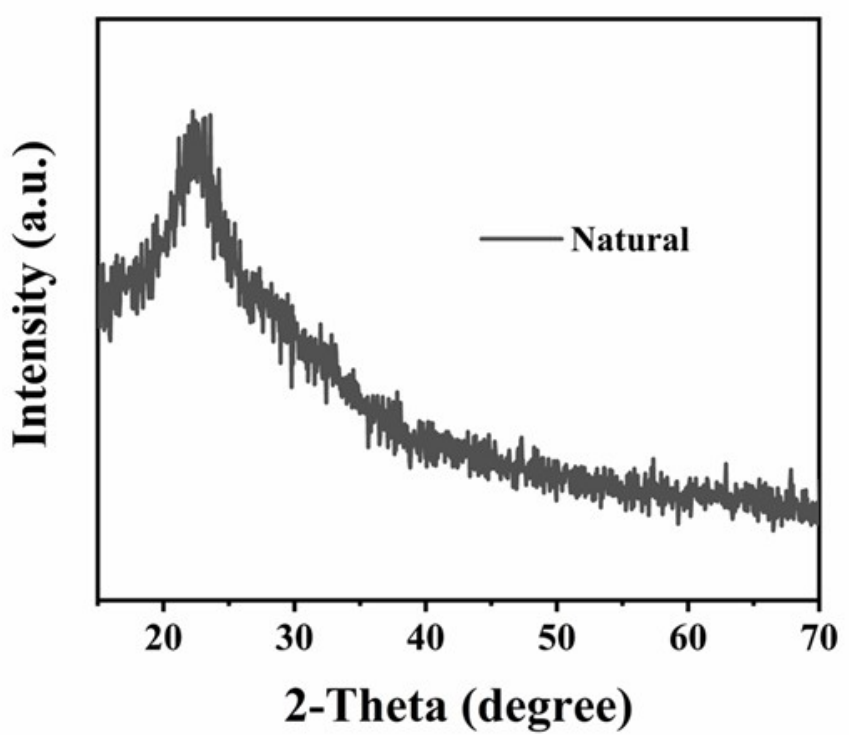

Fig. S4 XRD spectra of Natural.

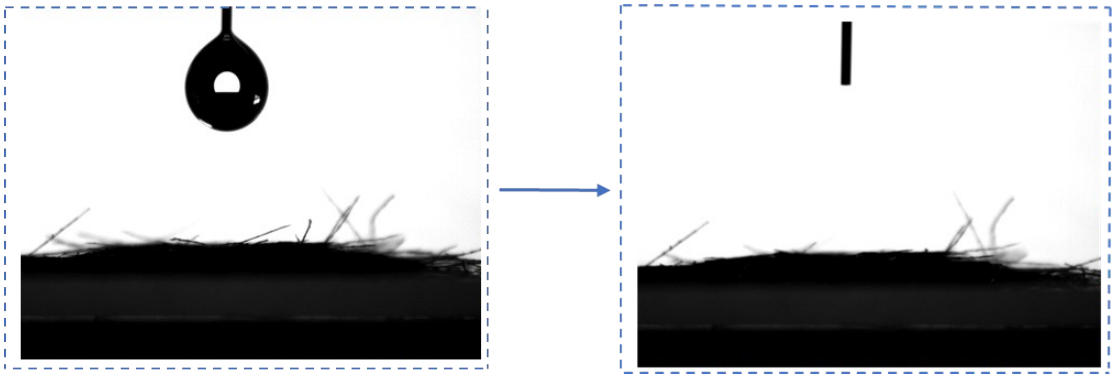

Fig. S5 Water contact angle images of Natural.

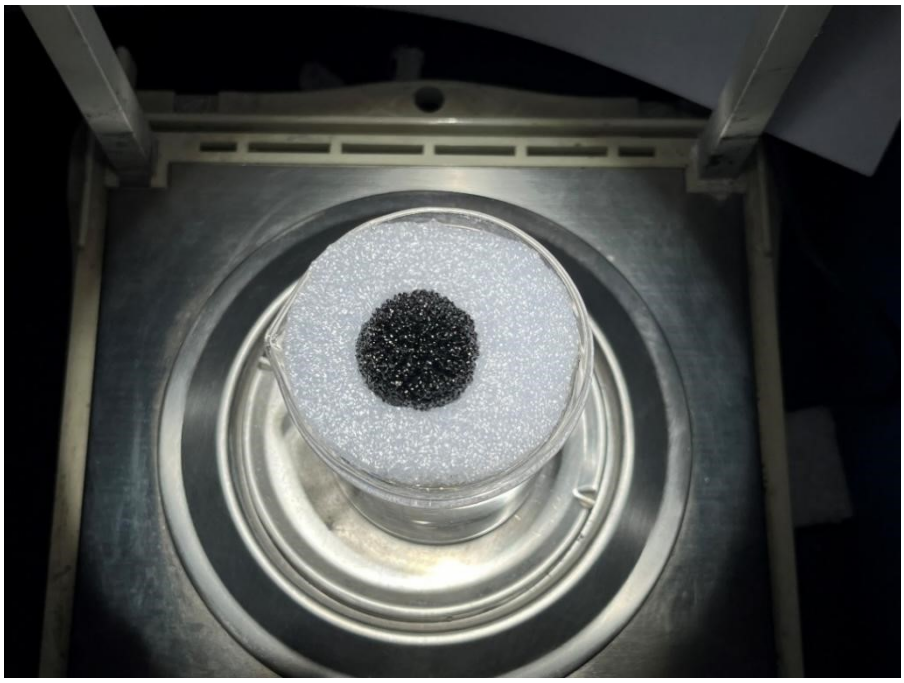

Fig. S6 Lab made water evaporator apparatus from top view.

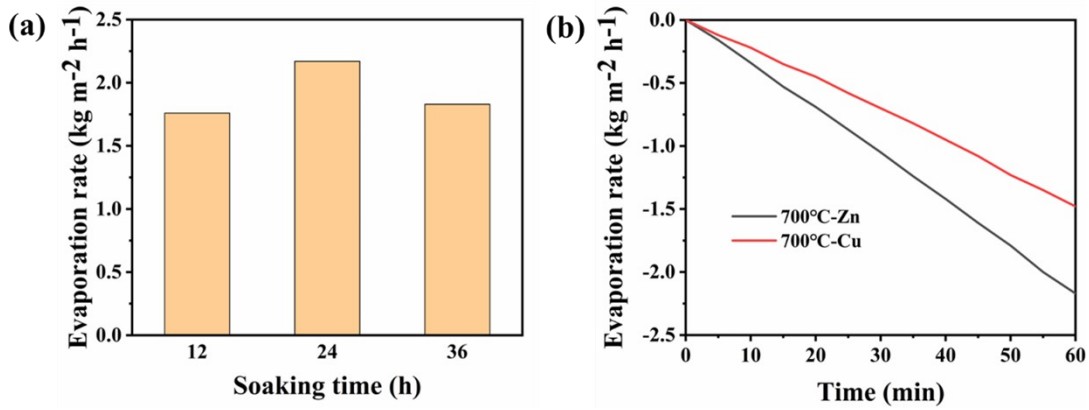

Fig. S7 Rate of evaporation with varying soaking durations and rate of evaporation when immersed in various solvents.

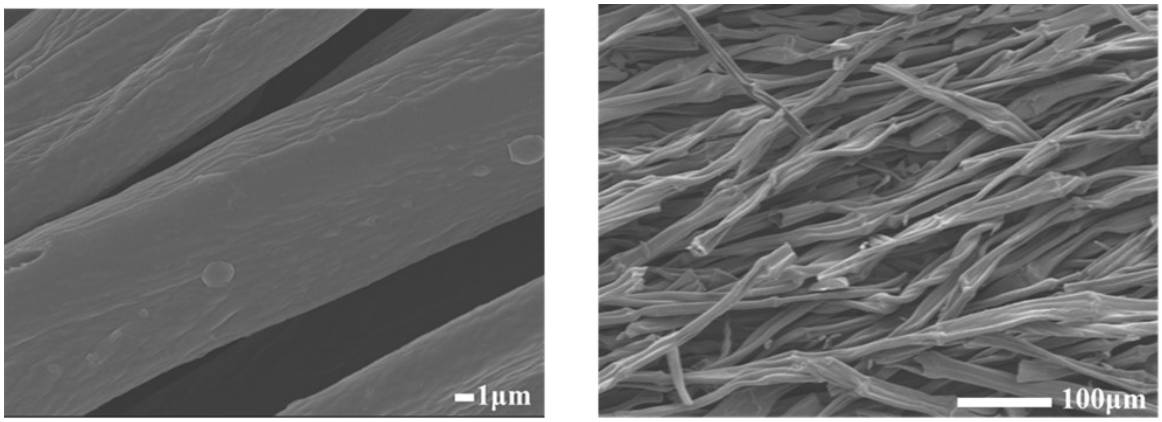

Fig. S8 SEM images of 700°C-PAF

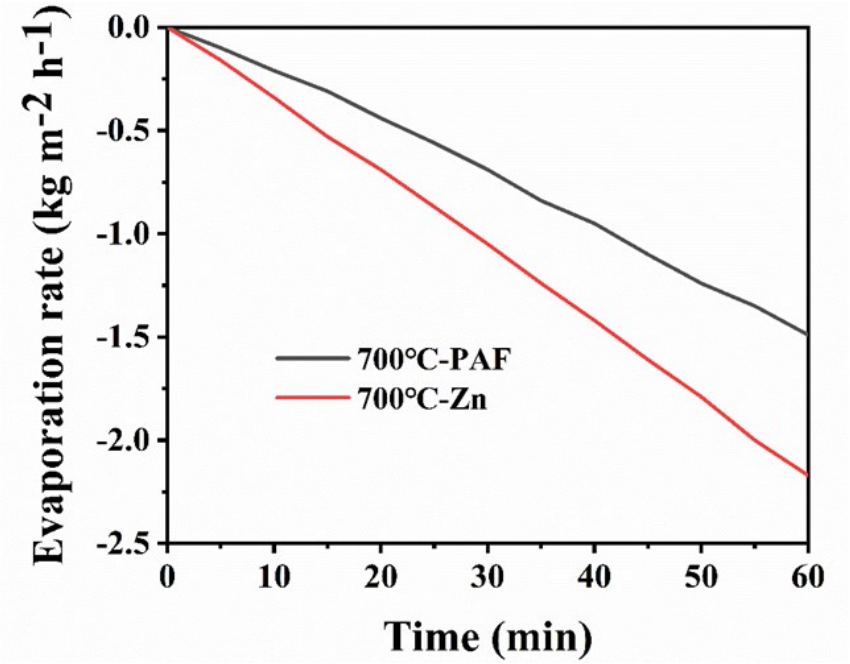

Fig. S9 Evaporation rate of 700°C-PAF and 700°C -Zn.

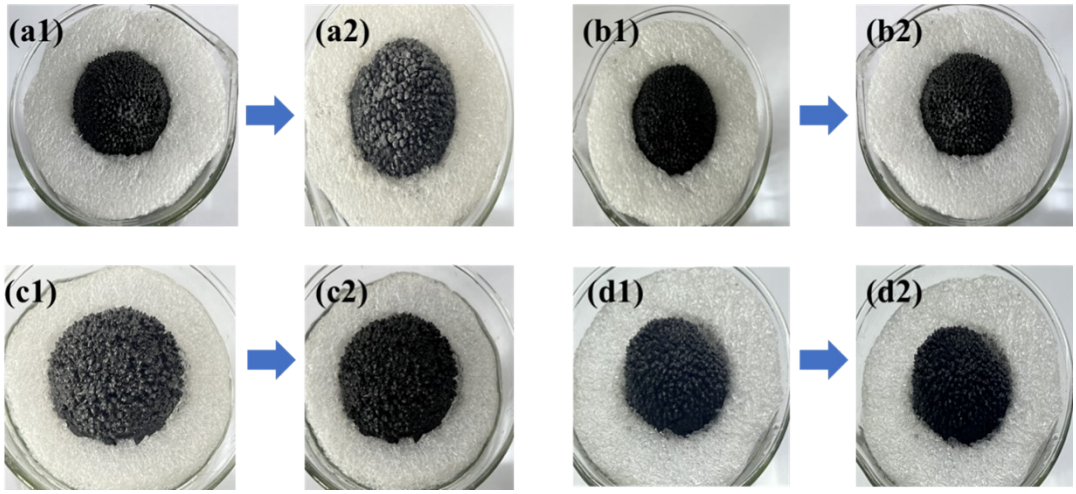

Fig. S10 Digital photographs of the (a1) 300°C-Zn-before evaporation, (a2) after evaporation, (b1) 500°C-Zn-before evaporation, (b2) after evaporation, (c1) 700°C-Zn-before evaporation, (c2) after evaporation, and (d1) 900°C-Zn-before evaporation, (d2) after evaporation in 1 h evaporation under 1 sun irradiation.