Supporting Information for:

All-day solar-driven vapor generator via photothermal and Joule-heating effect

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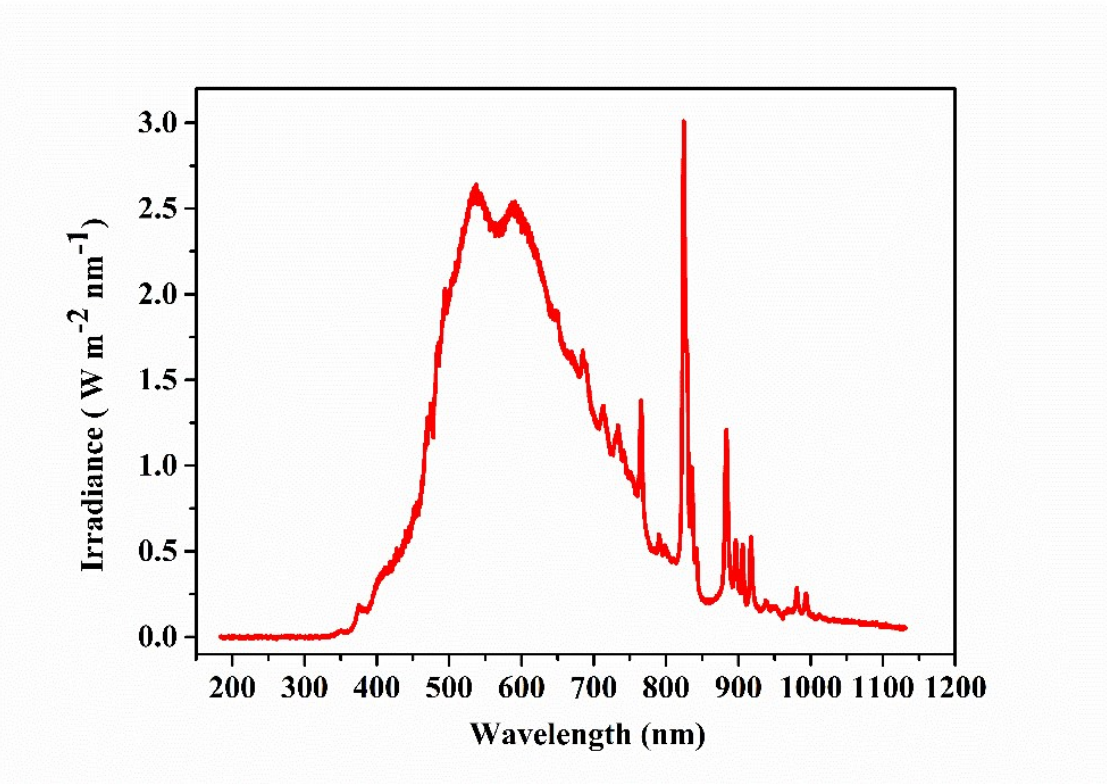

Fig. S1 The spectrum of the Xenon light harnessed in the experiment.

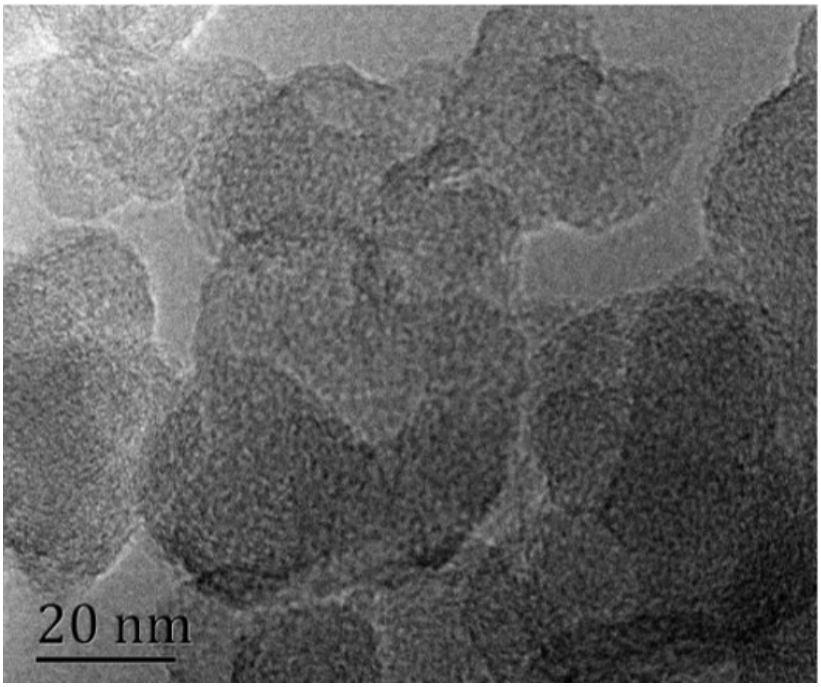

Fig. S2 (a) TEM image of CB dispersion.

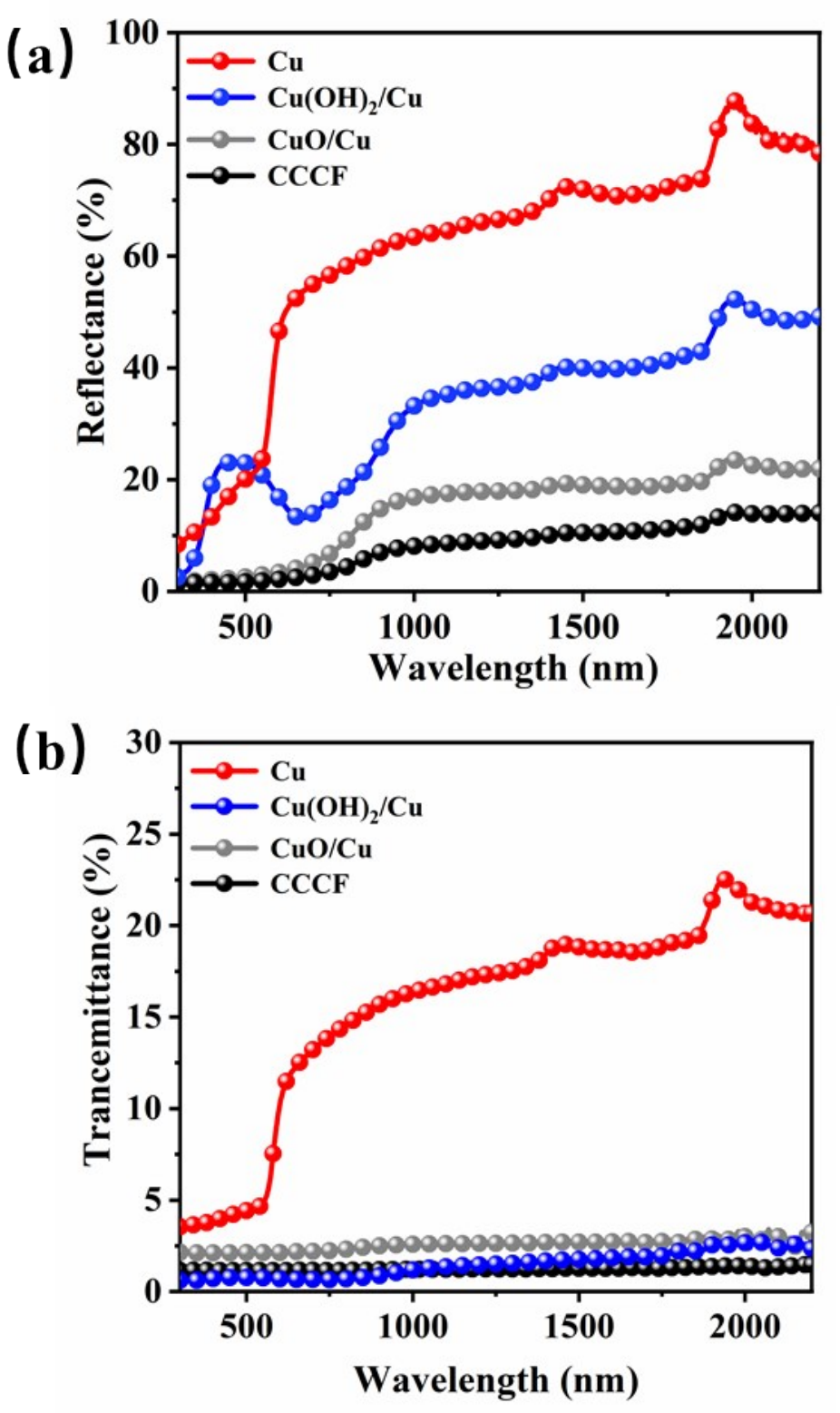

Fig. S3 (a) Reflectance and (b) transmittance spectra of different foams.

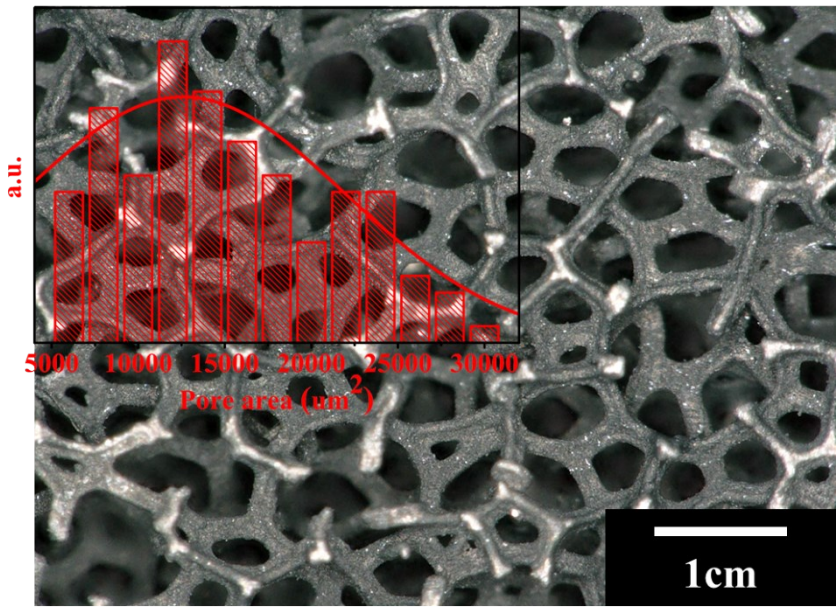

Fig. S4 The digital picture of CuO/Cu-CB foam and diameter distribution of inherent pores.

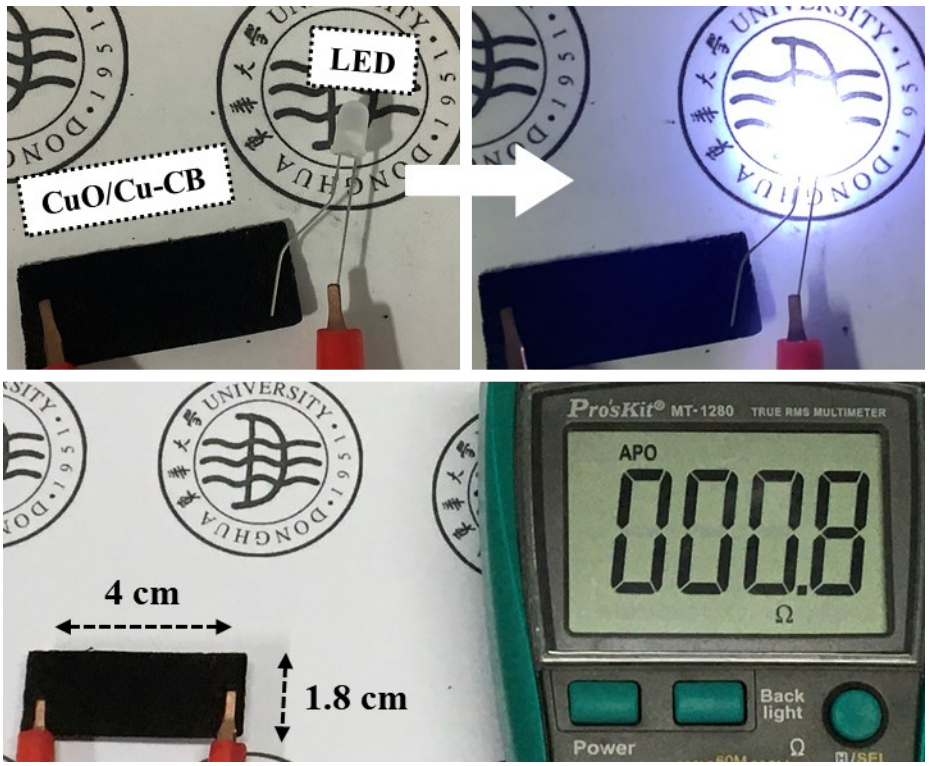

Fig. S5 The circuit of LED bulb and resistance measurement of CuO/Cu-CB foam (40 mm × 18 mm × 1.6 mm)

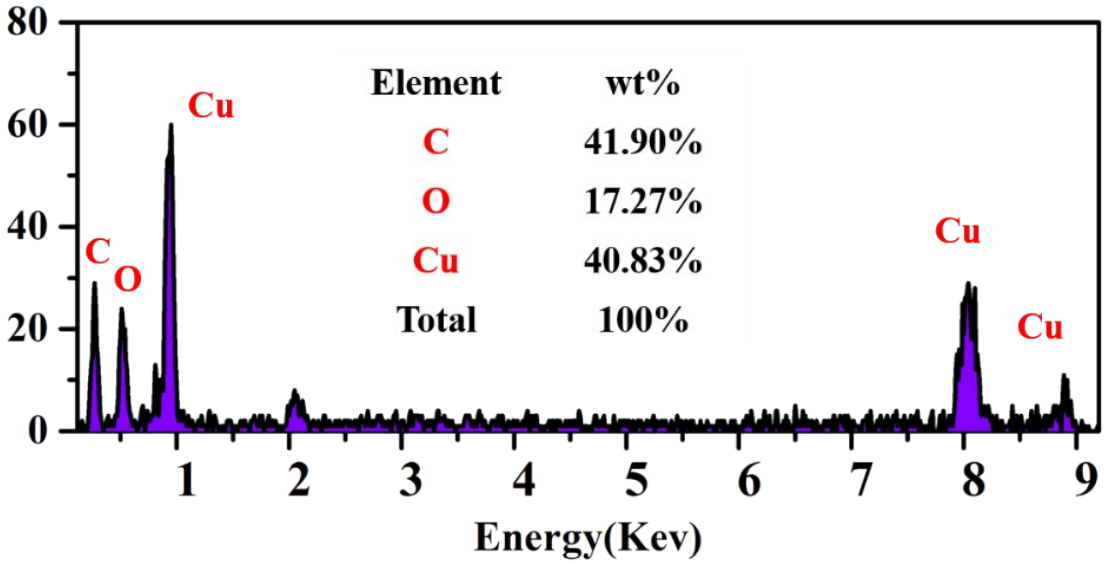

Fig. S6 EDXS spectra acquired over the CuO/Cu-CB foam surface.

H_{LV} value measurement

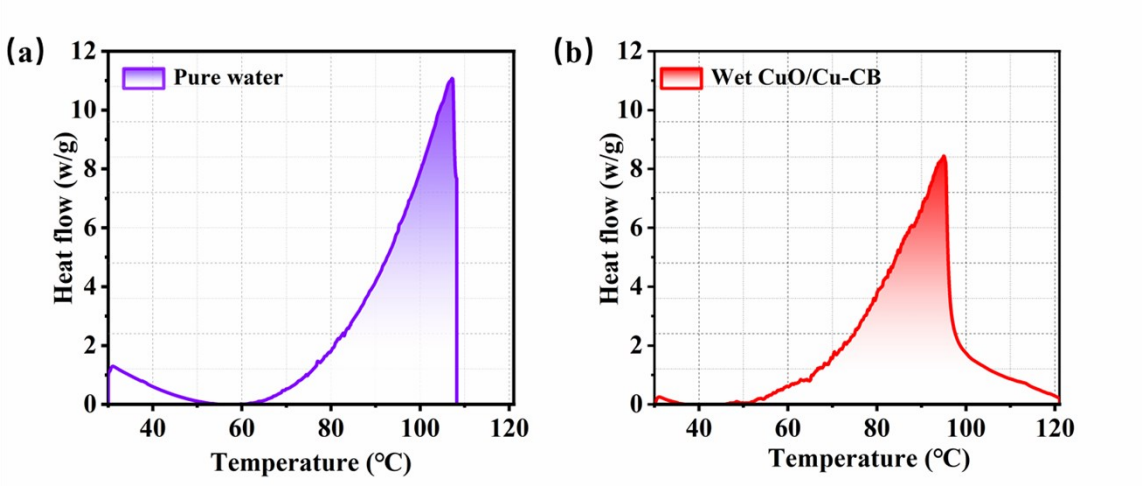

Fig. S7 DSC curve of (a) pure water and (b)wet CuO/Cu-CB

During the DSC measurement, the sample was measured with a linear heating rate of 5K min^{-1}over the temperature range of 30℃ to 120℃. When calculating the integral value, the abscissa needed to be switched to time (s). As shown in Fig. S3, the integral range included all color areas. As shown in Table S1, the measured latent heat of the pure water and water loaded in the black flocked fabric were 2320.9 J g^{-1} and 1991.8 J g^{-1}, respectively.

Table S1 Summary of DSC measurement result

	Total mass (mg)	Water (mass)	Integral value (mJ mg^{-1})	Latent heat of water (J g^{-1})
Pure water	6.24	6.24	2320.9	2320.9
Wet CuO/Cu-CB	12	6.12	1015.8	1991.8

H_{LV} is the total enthalpy that includes latent heat (1991.8J g^{-1}) and sensible heat (117.6 J g^{-1}).

Heat loss analysis

(a) Radiation loss

The radiation loss was calculated through Stefan-Boltzmann equation.

$$\phi = \varepsilon A \sigma (T_1^4 - T_2^4) \quad (1)$$

where Φ denotes the heat flux, ε denotes emissivity of CuO/Cu-CB foam (0.8), A is the evaporation surface area, σ is the Stefan-Boltzmann constant (5.67×10^{-8} W m^{-2} K^{-4}), T_1 is the temperature of the absorber under 1 kW m^{-2} solar illumination 316 K), and T_2 is the atmosphere temperature (298 K). The calculated radiation loss is ~9.46%.

(b) Conduction loss

The conduction loss was acquired using the following equation.

$$Q = Cm\Delta T \quad (2)$$

where Q demonstrate the heat energy, C indicate the specific heat capacity of water (4.2 J g^{-1} ℃$^{-1}$), m denotes the bulk water weight (19.41 g) and ΔT is the temperature change (2.5 ℃) of the bulk water after 1 h evaporation (2.5 ^{o}C). Therefore, the calculated conduction heat loss was ~ 15.73 %.

(c) Convection loss

The convection loss was obtained according to equation 3.

$$\phi = hA\Delta T \quad (3)$$

where ϕ represents the heat flux, h is the convection heat transfer coefficient (5 W m^{-2} K^{-1}), A is evaporation surface area, ΔT is the temperature difference (17 K) between the CuO/Cu-CB foam surface and surroundings. Therefore, the calculated convection loss is ~8.5 %.

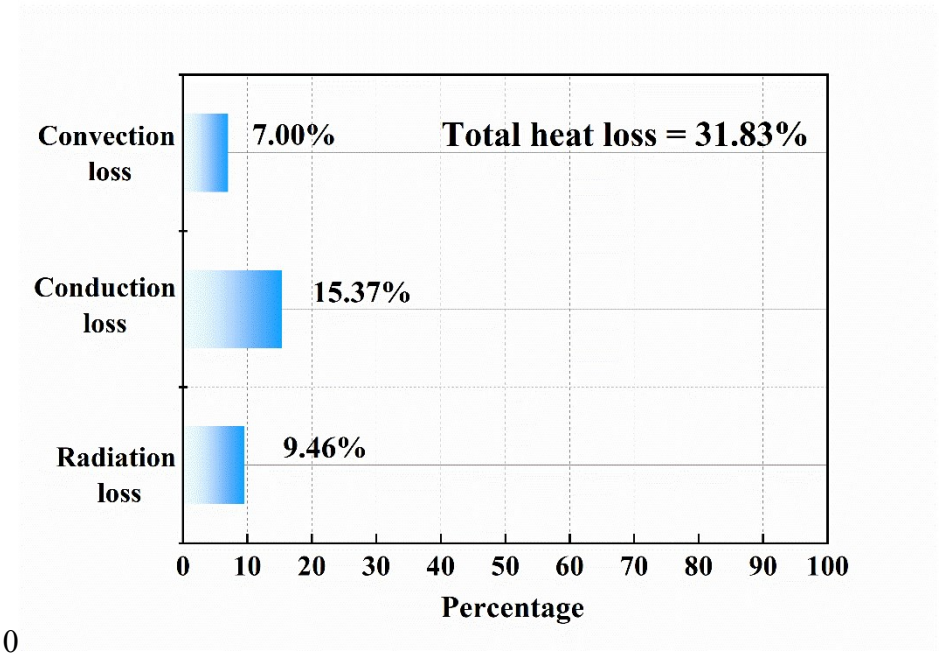

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Fig. S8 Different heat loss ratio.

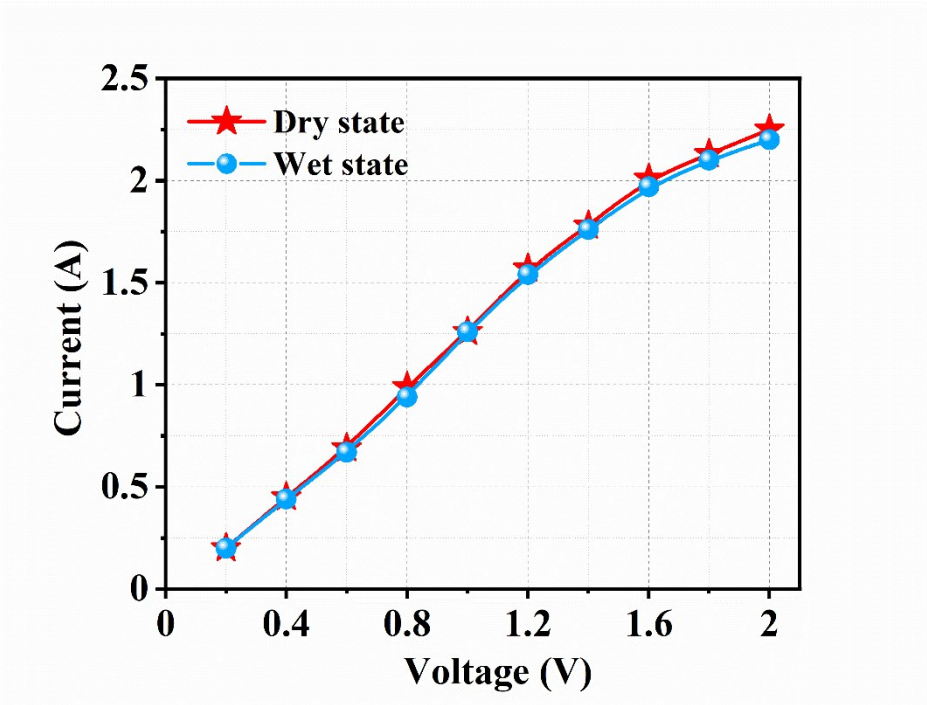

Fig. S9 The CV curve of CuO/Cu-CB foam in wet and dry condition

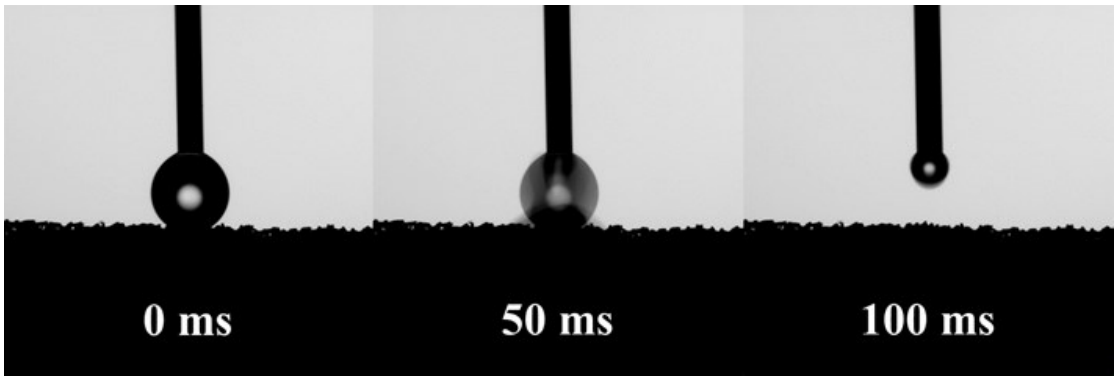

Fig. S10 The time-lapse WCAs of CuO/Cu-CB during cycling test.

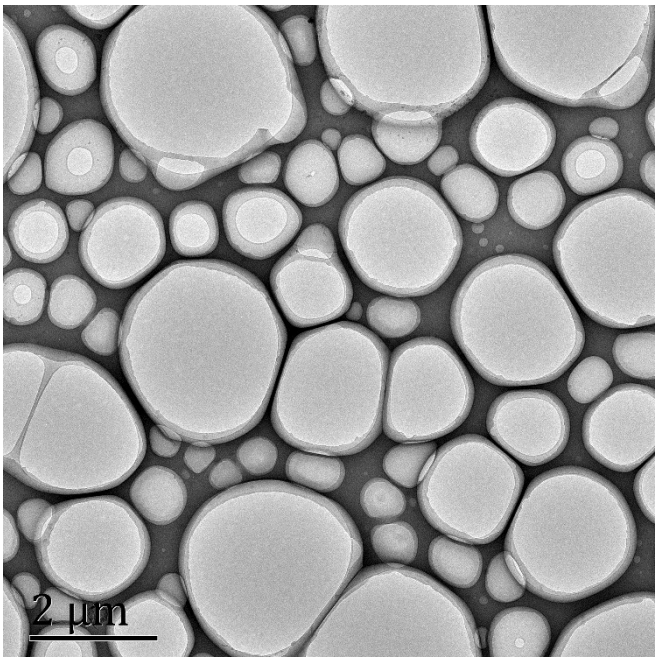

Fig. S11 TME image of bulk water.

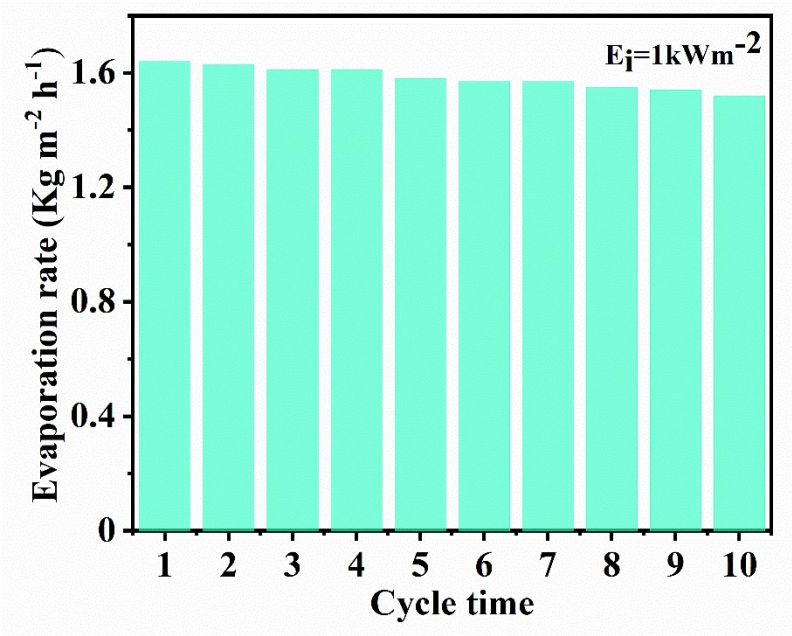

Fig. S12 The cycling test of evaporation rate in MB solution.