

Supporting Information

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Figure S1. The photograph of (a) the ANF/CNT/PPy evaporator; (b) the ANF/CNT/PPy aerogel under a weight of 500 g; (c) the experiment setup.

The photographs of the real evaporator and experiment setup were shown as Figure S1a, c. The cylindrical ANF/CNT/PPy aerogel monomer (30 mg) can withstand a weight (500 g) exceeding 1.67×10^4 times its own weight without rupture (Figure S1b), which proves that it has excellent compression resistance.

We carried out in situ polymerization of PPy in this report and the chemical equation is as

follows:

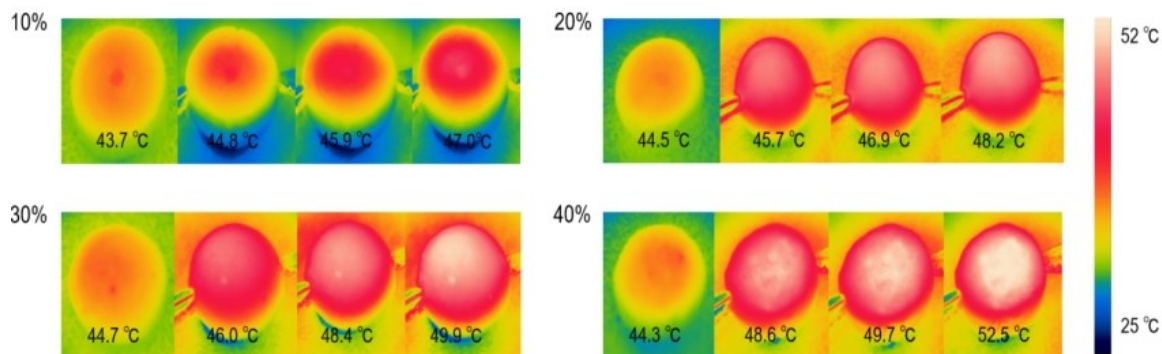
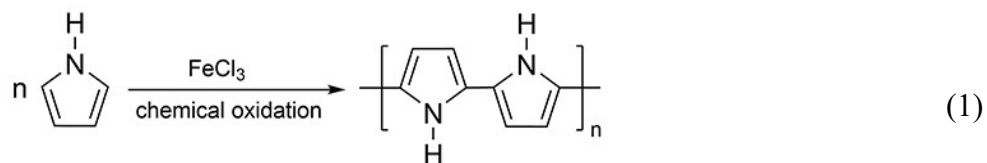


Figure S2. Infrared images of ANF/CNT evaporators of different CNT content under 1 sun, without or with voltage (1, 3, 5 V) applied (from left to right), respectively.

The stable saturation surface temperature of evaporators when the mass change achieved equilibrium is demonstrated in Figure S2, which shows the same rule of the input voltage and CNT content as the evaporation rate, reaching up to 52.5 °C. Meanwhile, these infrared images betoken that coupling photo-thermal and electro-thermal conversion is an effective strategy to promote vapor production by increasing the sample surface temperature.

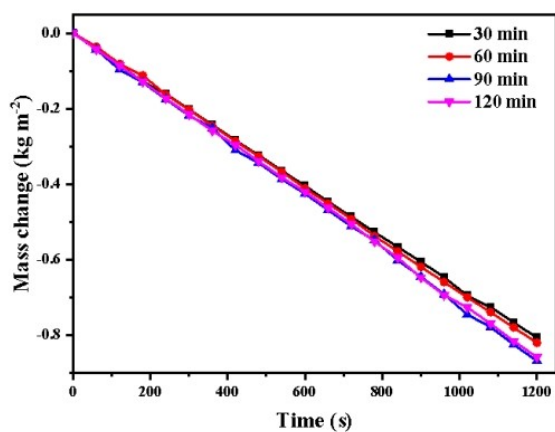


Figure S3. The mass changes over time of the ANF/PPy aerogels of different PPy polymerization time under 1 sun.

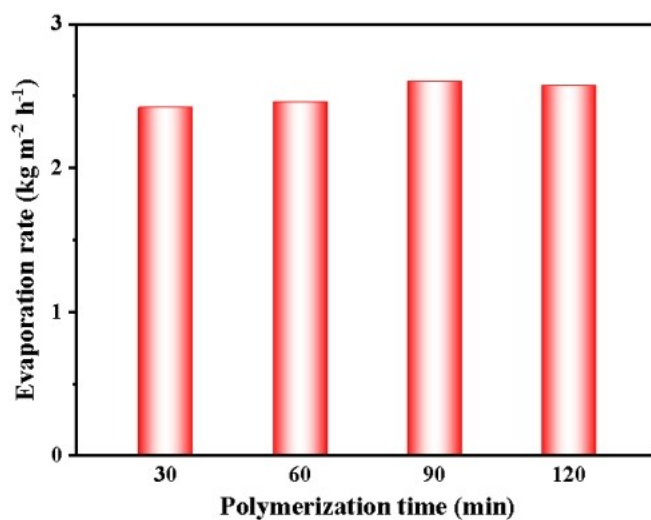


Figure S4. The evaporation rates of the ANF/PPy aerogels of different PPy polymerization time with 1 sun radiation.

The evaporation rates of ANF/PPy aerogels of different PPy polymerization time under 1 sun illumination are between 2.41-2.60 kg m⁻² h⁻¹, which are lower than ANF/CNT/PPy evaporators.

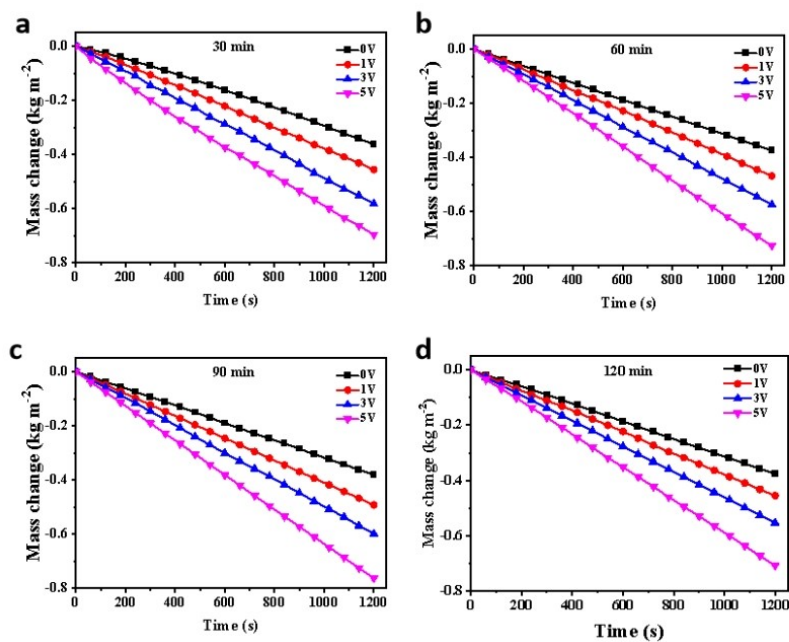


Figure S5. The mass changes over time of the ANF/CNT/PPy aerogels of different PPy polymerization time of 30 min (a), 60 min (b), 90 min (c) and 120 min (d) under 0.5 sun illumination.

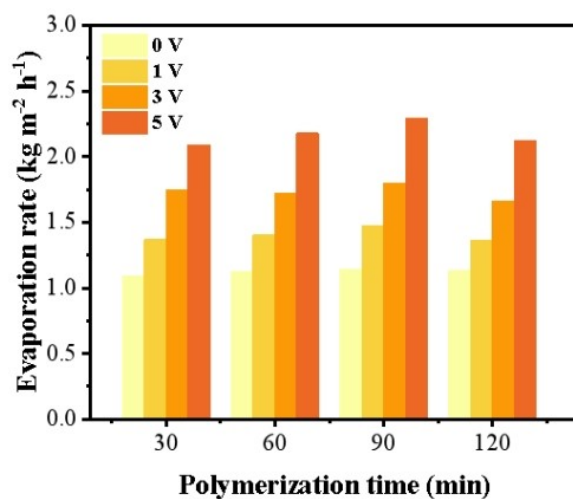


Figure S6. The evaporation rates of the ANF/CNT/PPy aerogels of different PPy polymerization time under 0.5 sun illumination.

With the extension of PPy polymerization time, the evaporation rate of each evaporator at the same voltage shows a trend of increasing and then decreasing, and the evaporation rate was as high as 2.28 kg m⁻² h⁻¹ at 5 V and 0.5 sun for polymerization time of 90 min (of 9.46wt% PPy).