## **Supplementary Material for**

## Designing a Novel Photothermal Material of Hierarchical Microstructured Copper Phosphate for Solar Evaporation Enhancement

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Figure S1 to S10



Fig. S1 XRD pattern of the prepared HCuPO together with that obtained from JCPDS

No. 22-2548.



Fig. S2 (A) SEM image of sheet-like  $Cu_3(PO_4)_2 \cdot 3H_2O$ , (B) Temperature rise ( $\Delta T$ ) of sheet-like  $Cu_3(PO_4)_2 \cdot 3H_2O$ -water dispersion (0.3 mL) with gradient concentrations under 808 nm laser irradiation.



Fig. S3 Digital photographs of HCuPO powder and a piece of bare paper (A) before and (B) after 808 nm laser light irradiation.



Fig. S4 Digital images showing (A) HCuPO-PDMS sheet floating on the water surface, (B) HCuPO powder sinking to the water bottom. Inset of (A) shows top view images of porous and nonporous HCuPO-PDMS sheets.



Fig. S5 Weight loss profiles of 3.5% salt water with dispersed HCuPO (58.5 mg) under 808 nm laser illumination.



Fig. S6 (A) Weight loss profiles of 3.5% salt water showing influence of HCuPO-PDMS sheet thickness (with HCuPO content of 40%) on water
evaporation under 808 nm laser. (B) SEM image (by liquid nitrogen cleavage) captured for the cross-section of HCuPO-PDMS sheet. (C) UV-Vis-NIR abosrption spectra of HCuPO-PDMS sheet and pure PDMS sheet without HCuPO. (D-F) are digital images of a radiation meter in response to 808 nm laser before and after the laser transmitted a HCuPO-PDMS sheet or a pure PDMS sheet.



Fig. S7 The red line is the plot of  $(Ahv)^2$  versus photon energy (hv) derived from the data of Figure 5. The green line is the linear calibration plot between  $(Ahv)^2$  and hv.



Fig. S8 UV-Vis spectra of MB solution before and after 808 nm laser irradiation (1.25  $W \text{ cm}^{-2}$ ) for 10 h in the presence of HCuPO.



Fig. S9 Photoluminescence spectrum of HCuPO ( $\lambda_{EX}$ =808 nm).



Fig. S10 FTIR spectrum of HCuPO.