Supplementary Information for

# Bridge-arched and layer-structured hollow melamine foam/reduced graphene oxide composite with enlarged evaporation area and superior thermal insulation for high-performance solar steam generation

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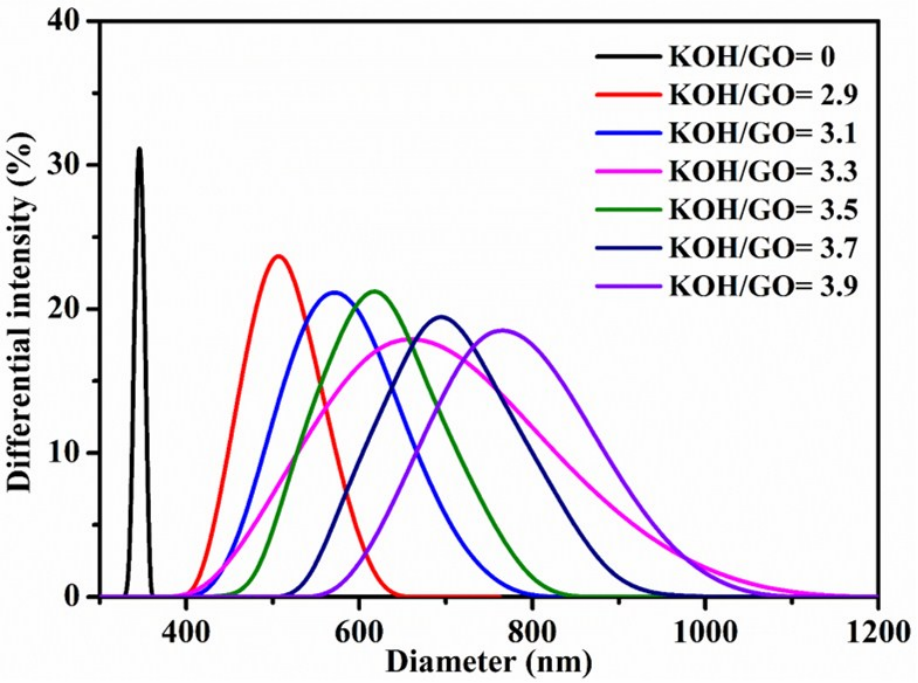


**Fig. S1** DLS spectra of GO nanosheets in deionized water with different content of KOH.

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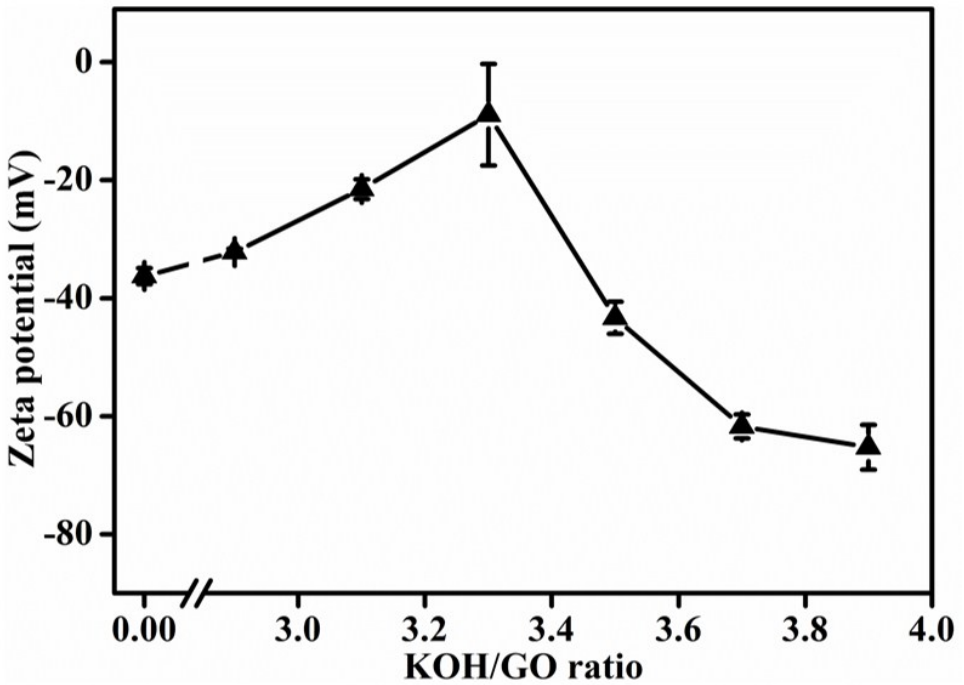



**Fig. S2** Zeta potential of GO nanosheets in deionized water with different content of KOH.

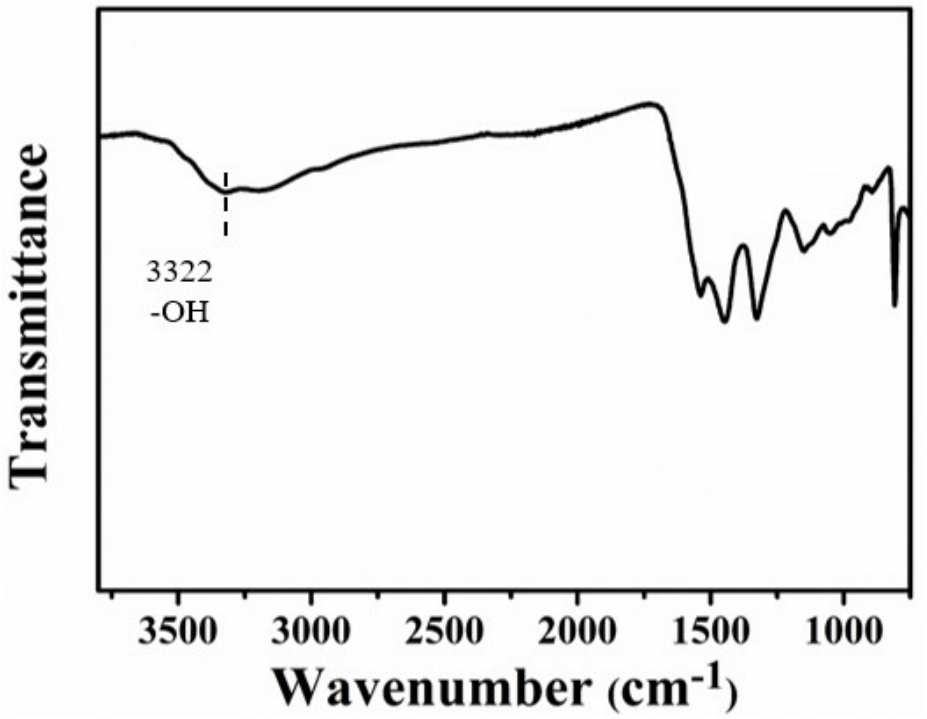
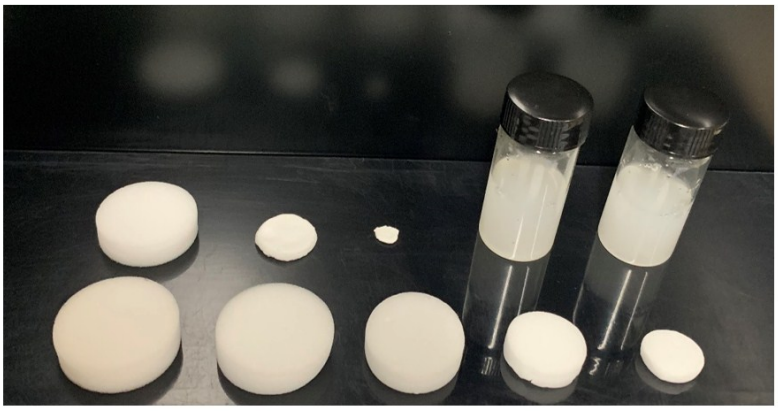



**Fig. S3** FTIR spectra of BHMG.



| | | | | |
|---|---|---|---|---|
| MF+water 1h | MF+water 2h | MF+water 3h | MF+water 4h | MF+water 5h |
| MF+KOH 1h | MF+KOH 2h | MF+KOH 3h | MF+KOH 4h | MF+KOH 5h |

**Fig. S4** Photograph of MF hydrothermally treated in water with/without KOH for different time at 180 °C

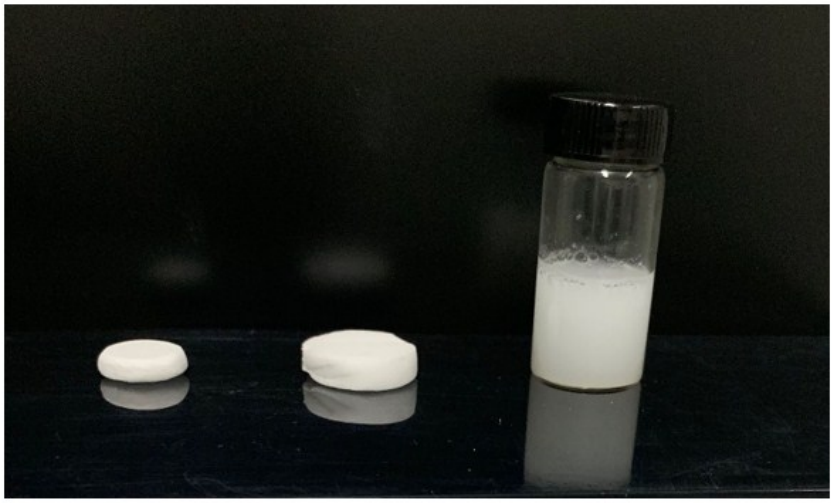



**Fig. S5** Photograph of MF hydrothermally treated for 5 hours in water with KOH/NaOH/KCl at 180 °C.

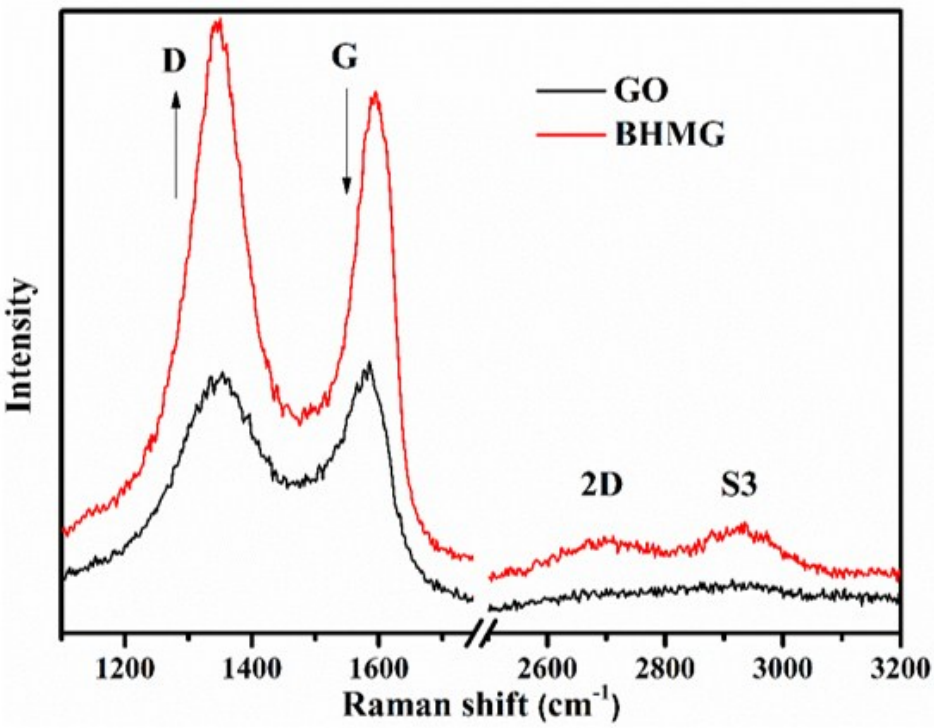



**Fig. S6** Micro-Raman spectra of GO (black) and BHMG (red).

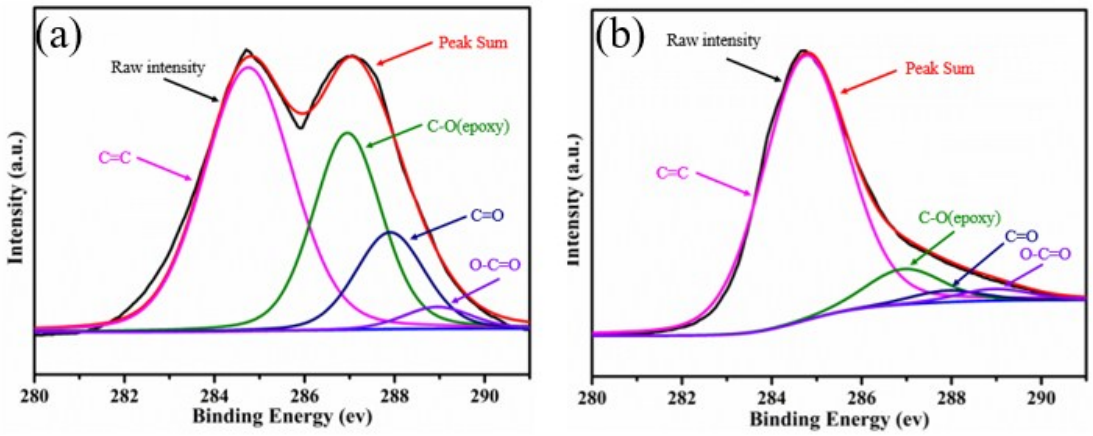



**Fig. S7** The C1s XPS spectra of GO (a) and BHMG (b).

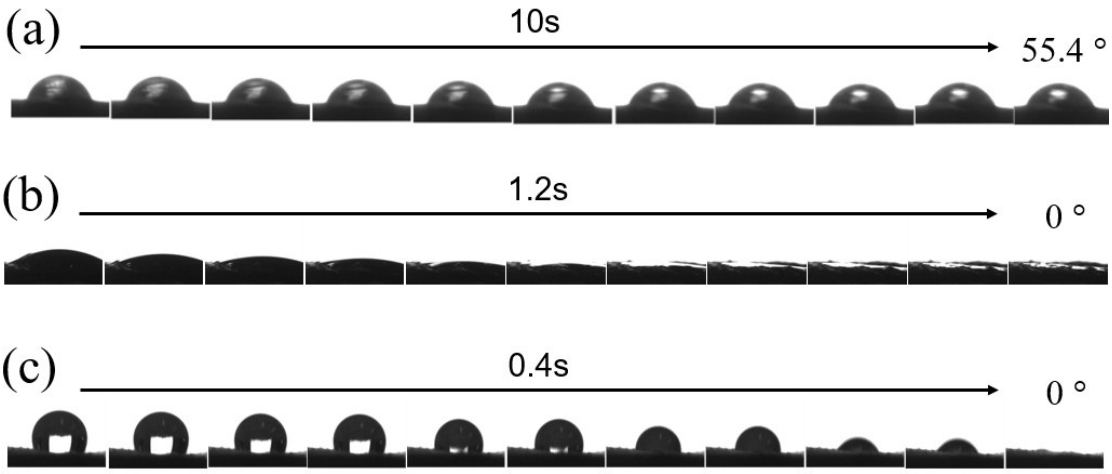



**Fig. S8** Contact angle measurement diagram of the raised upper surface, subface and internal surface of BHMG

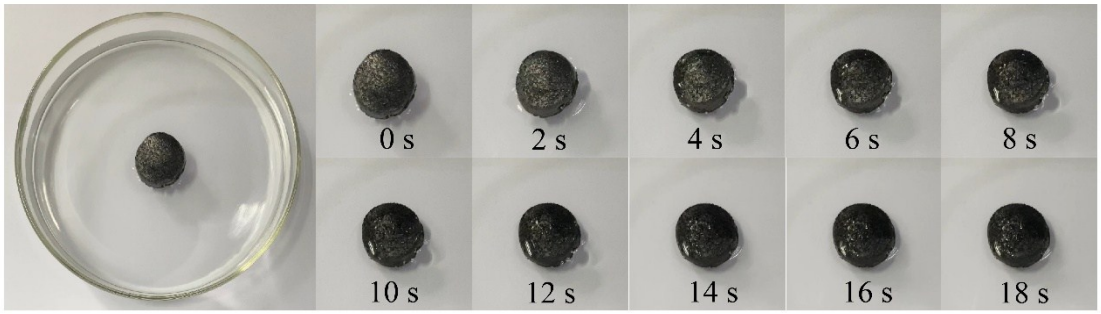



**Fig. S9** Digital images of the sample placed on the surface of water.

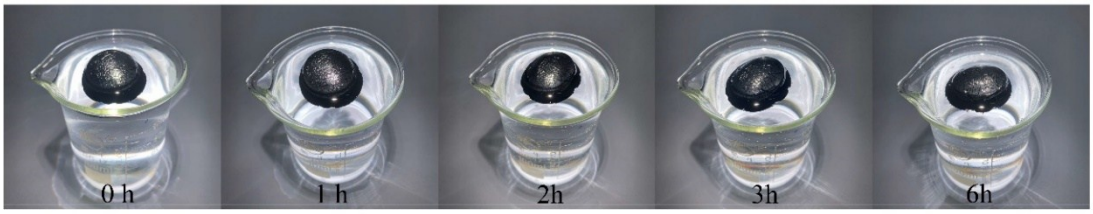



**Fig. S10** Digital images of the sample under one sun illumination for different time.

**Fig. S11** Photograph of BHMG self-floating on the surface of water.

**Section S1**. The evaporation efficiency analysis of BHMG solar steam generation device.

The raised surface of the sample is similar to the part of a sphere (spherical crown), the area of the spherical crown is mainly calculated by equation:

$$A_{raised} = \pi\left(r^2 + h^2\right)$$

And $r$ (12.5 mm) is the radius of the circle with the largest opening of the spherical crown. $h$ is the height of the spherical crown. So, the $A_{raised}$ ≈ 569 mm$^2$.

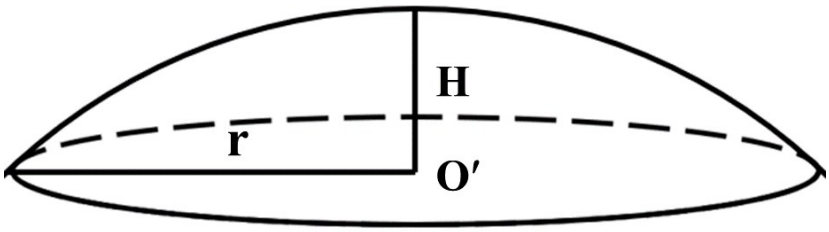



**Fig. S12** Schematic diagram of spherical crown.

The projection area of the sample is calculated by equation:

$$A_{projection} = \pi r^2$$

So, the $A_{projection}$ ≈ 490 mm$^2$.

The effect of increasing evaporation area can be described by formula

$$\frac{A_{raised}}{A_{projection}} = \frac{\pi\left(r^2 + h^2\right)}{\pi r^2} = \frac{r^2 + h^2}{r^2}$$

Thus, we can calculate that $A_{raised}$ / $A_{projection}$ is about 1.16. In addition, due to the surface amplification effect of

the integrated evaporator, the solar steam efficiency of 92.9 % can be achieved.

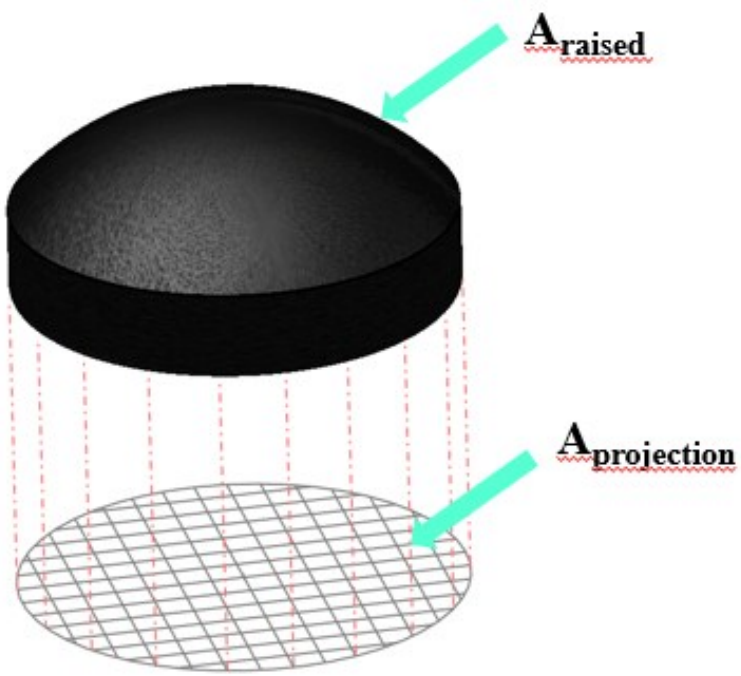



**Fig. S13** Schematic diagram of BHMG absorber model and projection area.


**Fig. S14** Photograph of the BHMG with 20 g weight on it

**Fig. S15** Photograph of the home-made condensed water collecting device.

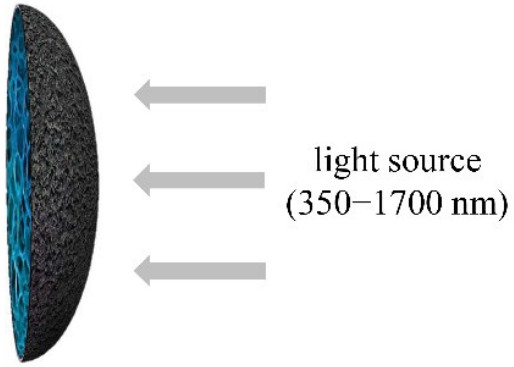



**Fig. S16**Schematic diagram of the light absorption measured.

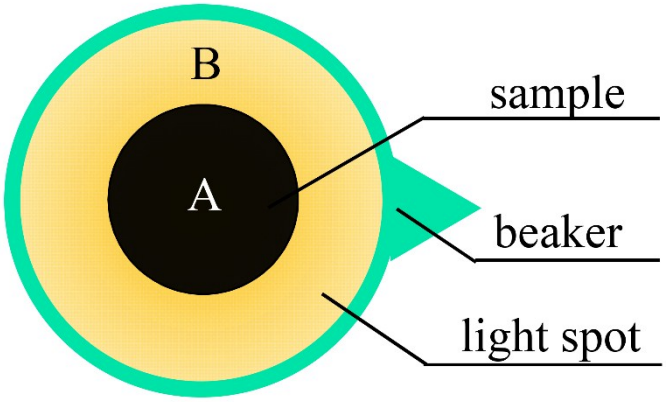



**Fig. S17** Schematic diagram of the distribution of light spot.

Table S1. Light power density settings and statistics (partial data)

| Sun | Randomly take 14 spots in the center of the light spot (region A) (mw/cm$^{-2}$) | | | | | | | Average |
|---|---|---|---|---|---|---|---|---|
| 1 | 97.9 | 101.4 | 96.0 | 97.9 | 93.5 | 97.9 | 98.3 | 96.2 |
| | 101.0 | 90.3 | 92.5 | 89.9 | 97.9 | 94.9 | 96.7 | |
| Sun | Randomly take 14 spots on the edge of the light spot (region B) (mw/cm$^{-2}$) | | | | | | | Average |
| 1 | 7.9 | 7.4 | 11.1 | 13.7 | 8.0 | 7.8 | 9.3 | 9.9 |
| | 10.6 | 9.0 | 9.5 | 8.4 | 12.3 | 12.1 | 11.6 | |