Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting information

Graphene aerogel with reversibly tunable thermal resistance for battery thermal management

Shujian Cheng [a], Xiaoxiao Guo [a,c], Peng Tan [a], Bo Yan [a], Mingyuan Lin [a, b], Jiafa Cai [a, b], Yufeng Zhang [a, b] *, Weiwei Cai [a, b] * and Xue-ao Zhang [a, b] *

[a] *College of Physical Science and Technology, Xiamen University, Xiamen 361005, China;*

[b] *Jiujiang research institute of Xiamen University, Jiujiang 360404, China;*

[c] *Laboratory for Nanoelectronics and Nano Devices Department of Electronics Science and Technology Hangzhou Dianzi University, Hangzhou 310018, China*

** Corresponding author.*

E-mail address: xazhang@xmu.edu.cn, wwcai@xmu.edu.cn and yufengzhang@xmu.edu.cn.

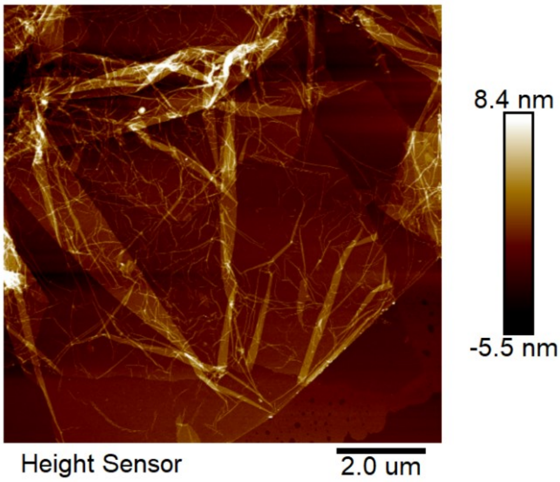

Figure S1 AFM image of GO obtained by modified hummers method.

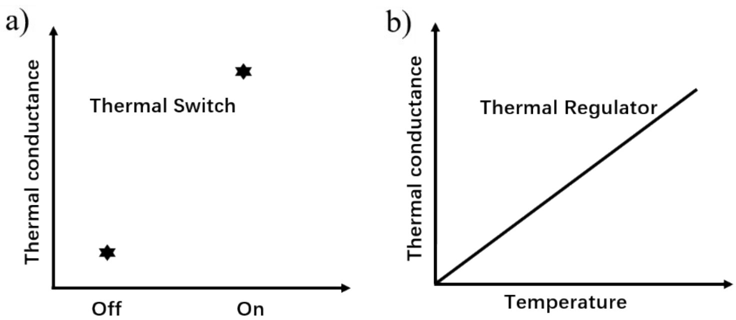

Figure S2 Thermal switch only has two possible thermal conductance states ("On" and "Off" states). b) The thermal conductance of thermal regulator changes passively based operating temperature.

In a typical testing procedure, two opposing meter bars of known thermal conductivity are used, with one heated to 65 ℃ and the other cooled to 25℃, to sandwich the samples, which emulate the mating heat transfer surfaces in practical applications. The embedded thermal probes can measure the associated temperature gradient (calculated by T_1, T2, T3, T4, T5 and T6), thus the hot and cold side temperatures could be derived. Heat flux (q) across the thermal joint containing the sample is obtained by the temperature gradient and the bar thermal conductivity.

$$q = \lambda_{bar} \cdot (T_1 - T_2) \qquad \text{(S1)}$$

Combining with the temperature difference in the hot and cold surface, the overall thermal resistance including the thermal resistance of sample and the interfacial thermal resistance could be calculated by equation (S2).

$$R_{TIM} = \frac{T_a - T_b}{q} \quad \text{(S2)}$$

where △T is the temperature difference between two surfaces of meter bar (T_a , T_b) with an unit of K, and q is the local heat flux with an unit of W/m^2.

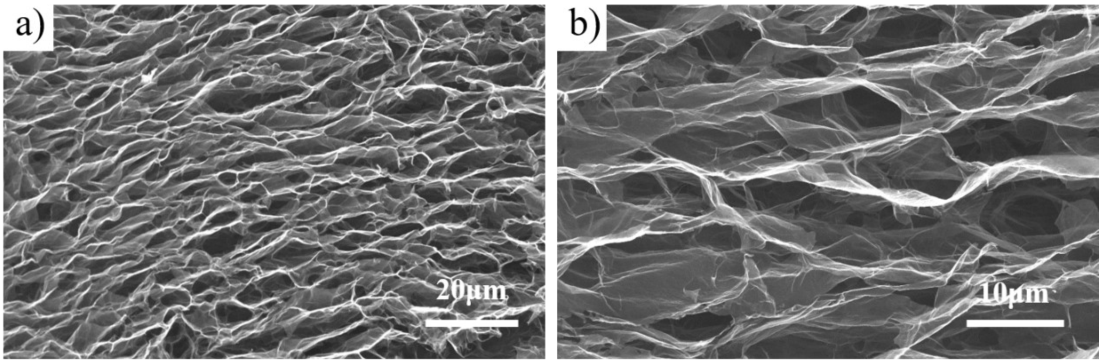

Figure S3 a) Low and b) high magnification SEM images of GA.

Table S1 Report of thermal resistance test results of GA3000

Hot surface temperature	Cold Surface Temperature	Thickness of sample	Area of sample	Heat flux	Thermal resistance	pressure
64.13	26.35	5.82	452	2.49	69.53	3.54
(℃)	(℃)	(mm)	(mm^2)	(W)	(cm^{2}K/W)	(KPa)