Supplementary Information

H₂O₂-microwave treated graphite stabilized stearic acid as a

composite phase change material for thermal energy

storage[†]

Chuanchang Li *, Baoshan Xie, Jian Chen, Zhongsheng Chen, Xiaoqin Sun, Stuart W. Gibb *

Email: chuanchangli@csust.edu.cn

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Figure S1 Testing set-up of thermal storage and release performance

Notes: two samples was filled into two plastic tubes with a centred thermocouple, with a accuracy of ± 0.1 °C, at the same time, respectively, and then the whole device with a thermal balance (about 25 °C) were putted into the thermostatic waterbath which is a steady heat source (about 70 °C) and could cause a stable boudary condition. after reaching a temperature of 70 °C the samples were place into another themostatic waterbath (about 25 °C) to discharge the heat. Thus, the endothermal and exothermal process was measured by thermocouple.



Figure S2 DSC curves of SA/FG₃ composite after (a) 50 thermal cycles and (b) 100

thermal cycles.



Figure S3 FTIR spectra of the SA, FG₃, and SA/FG₃ composites.

Note: From the spectra of FG₃, the bands at 3695, 3565 cm⁻¹ were ascribed to the hydroxyl stretching modes of the inner surface hydroxyls; the vibration absorption band at 3410 cm⁻¹ was due to the inner hydroxyl groups; the band at 918 cm⁻¹ was attributed to the hydroxyl-deformation of the hydroxyls. From the spectra of pure SA, the characteristic vibration peak in a range of 2500-3500 cm⁻¹ signified the stretching vibration of -OH groups of SA; the vibration peaks of the SA contained the symmetrical stretching vibration of and -CH₂ (2850 cm⁻¹), symmetrical stretching

vibration of $-CH_3$ group (2916 cm⁻¹), the stretching vibration of C=O (1705 cm⁻¹), the in-plane bending vibration of the functional group of the -OH in SA (1465 and 1300 cm⁻¹), the out-of-plane bending vibration of thee OH functional group (933 cm⁻¹), and the in-plane swinging vibration of the -OH functional group (720 cm⁻¹).

Samples	BET Surface area (m ² g ⁻¹)	BJH Adsorption cumulative volume of pores between 1.7 nm and 300.0				
		nm diameter (cm ³ g ⁻¹)				
FG _r	0.824	0.00432				
FG_1	1.099	0.00467				
FG ₂	1.154	0.00427				
FG ₃	1.277	0.00425				

Table S1Specific surface areas and porous properties of the FG.

Table S2Thermal conductivities of FG and SA/FG composites.

Samples	FG _r	FG_1	FG ₂	FG ₃	SA/FG _r	SA/FG ₁	SA/FG ₂	SA/FG ₃
$\frac{\lambda \left(W \text{ m}^{-1} \text{ K}^{-1} \right)}{a}$	5.47	4.81	4.47	4.35	4.08	3.83	3.66	3.18

^a Number of replicate is 3, confidence interval \geq 95%, standard deviation is < 5%.