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

Supporting Information for:

Accommodating Volume Change and Imparting Thermal Conductivity by Encapsulation of Phase Change Materials in Carbon Nanoparticles

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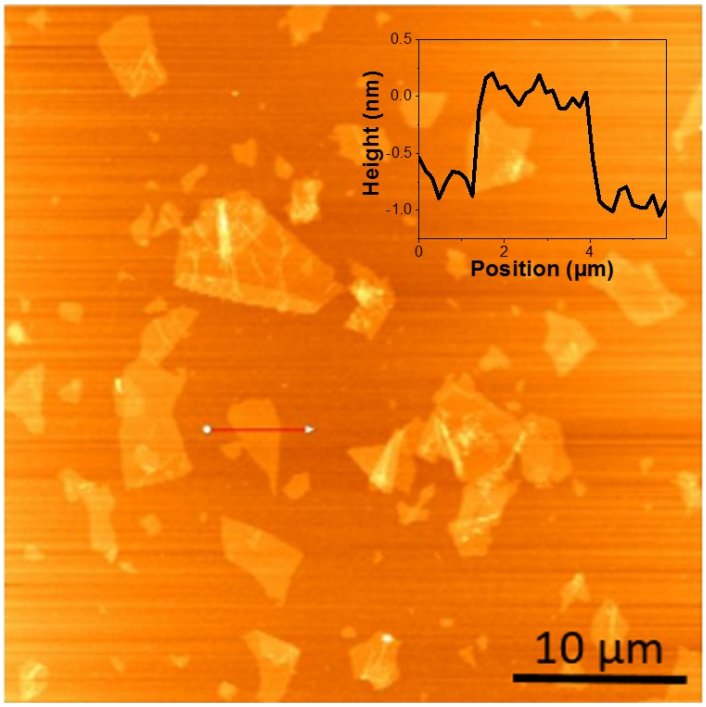

Figure S1. AFM image of GO nanosheets; inset on top right shows the line profile of the nanosheet denoted by red. The thickness of the nanosheet is ~1 nm and is consistent with previous reports of single-layered GO.

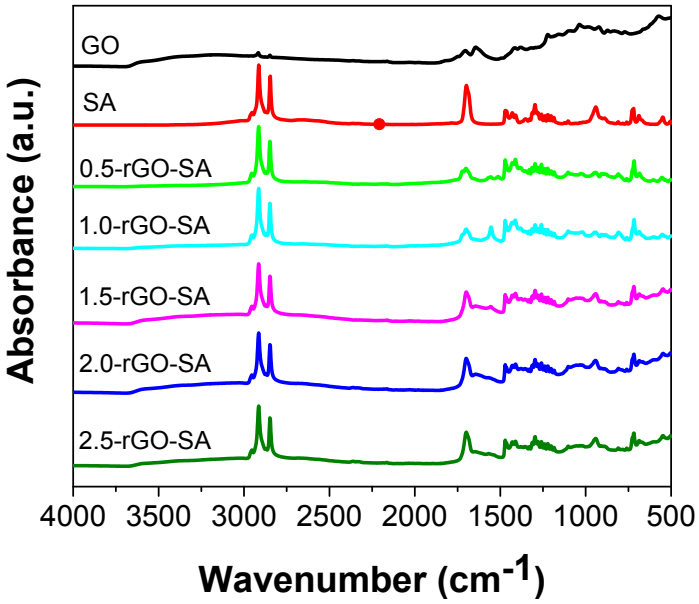

Figure S2. FTIR spectra of GO, SA, all #-rGO-SA particles.

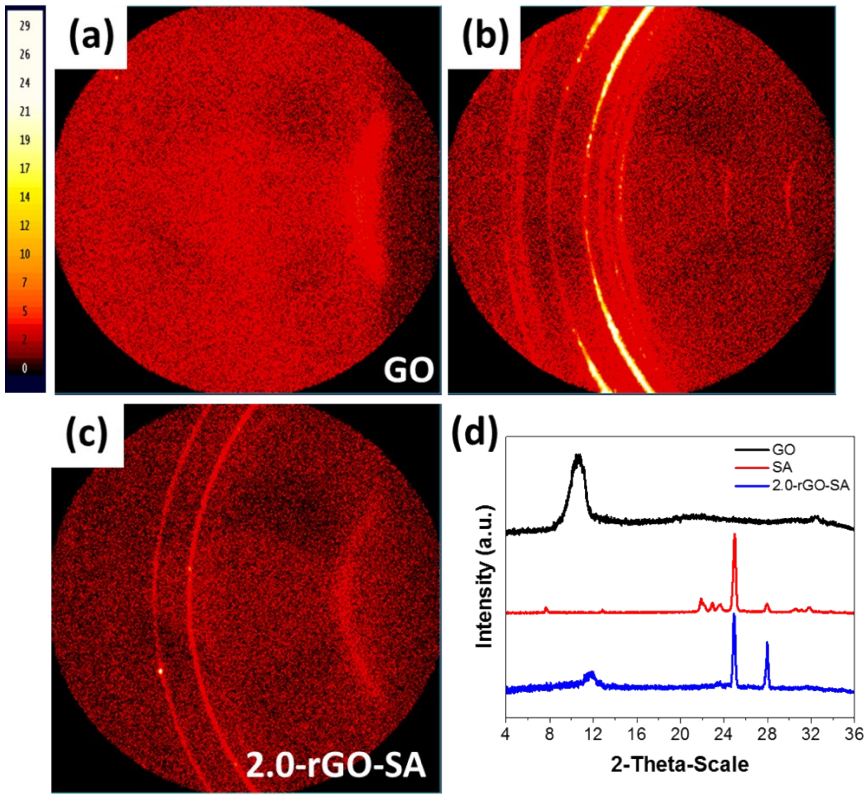

Figure S3. 2-D and 1-D XRD graphs of: a) GO; b) SA; and c) 2.0-rGO-SA.

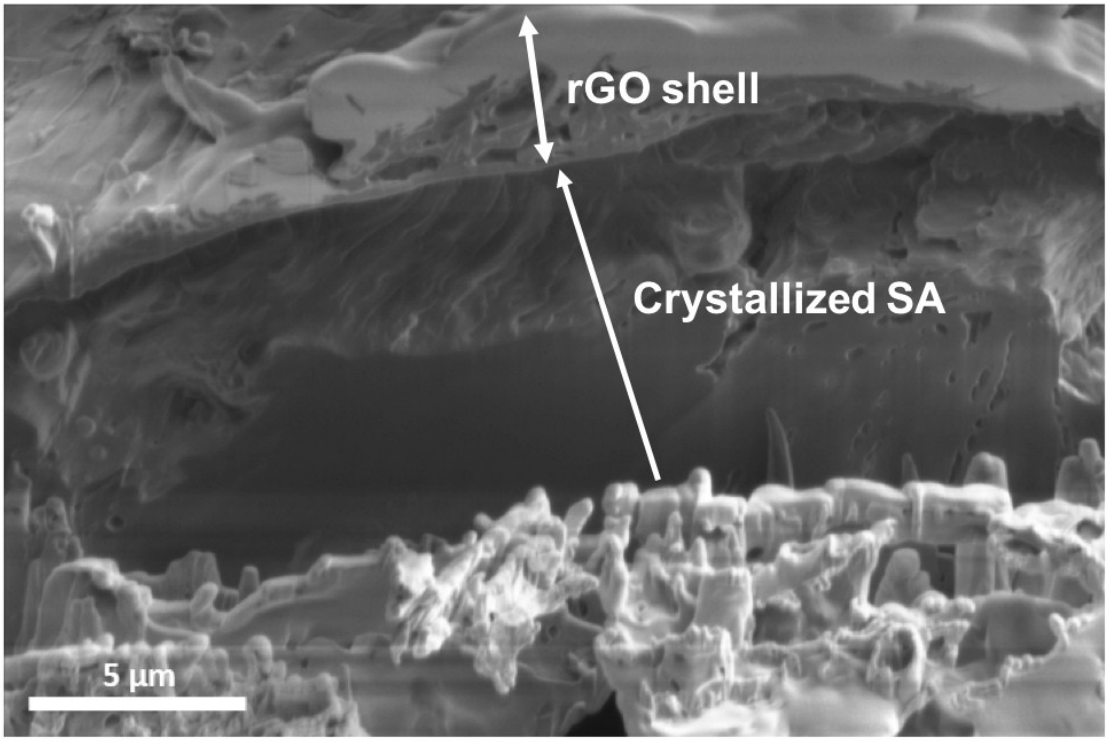

Figure S4. SEM image of 2.0-rGO-SA after partial microtoming; the thickness of the rGO shell can be determined, but the full SA core is not observed.

Figure S5. Heating 2.0-GO-SA on a hot plate resulted in melting and leakage of encapsulated SA, demonstrating that treatment with ethylene diamine to reduce the nanosheets and stitch them together is vital for encapsulation after melting the SA core.

$$E = \frac{(\Delta H_{m,\ Micro-PCMs} + \Delta H_{c,\ Micro-PCMs})}{(\Delta H_{m,\ PCMs} + \Delta H_{PCMs})}$$

Equation S1. Equation provided by Zhang et. al to calculate encapsulation efficiency of phase change material. (Sol. Energy Mater. Sol. Cells, 2009, 93, 1366).

	Diameter (µm)	ΔH_c (J/g)	ΔH_m (J/g)	T_c (°C)	T_m (°C)	Encapsulation Efficiency (%)
SA	-	219	214	64.7	69.9	-
0.5	114	85.3	105	65.2	68.9	44.0
1	94	163	155	63.2	69.3	73.3
1.5	91	177	160	62.1	69.6	77.9
2	62	156	146	61.3	69.9	69.8
2.5	50	157	159	63.3	69.5	72.9

Table 1. Synopsis of encapsulation efficiency for various loadings of rGO microcapsules.

2.5-rGO-SA				
#	Sensor	Valid	Effusivity (Ws½/m²K)	k (W/mK)
1	H308	TRUE	926.4782407	0.558913179
2	H308	TRUE	934.4895919	0.567217806
3	H308	TRUE	943.3548691	0.576423413
4	H308	TRUE	946.7587429	0.579962375
5	H308	TRUE	953.3990279	0.586873259
SA				
#	Sensor	Valid	Effusivity (Ws½/m²K)	k (W/mK)
1	H308	TRUE	759.3380834	0.388687636
2	H308	TRUE	763.6487269	0.393006371
3	H308	TRUE	763.6910759	0.393048818
4	H308	TRUE	764.8857232	0.394246377
5	H308	TRUE	763.2270317	0.39258372

Table S2. Thermal conductivity data for 2.5-rGO-SA and SA.