SUPPORTING INFORMATION

In-situ formation of cellular graphene framework in thermoplastic composites leading to superior thermal conductivity

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SUPPLEMENT

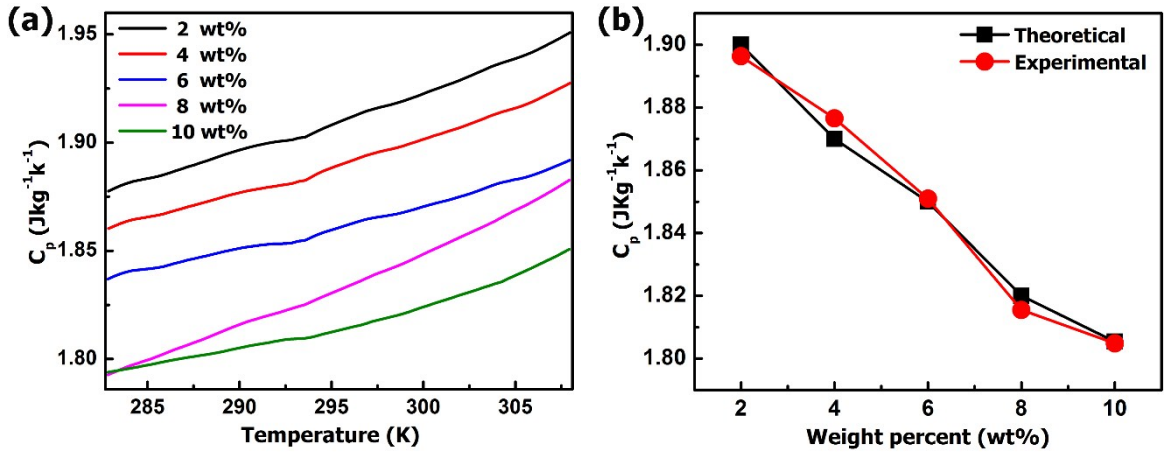

Fig. S1. Specific heat capacity (C_p) of GNP/PP composites with various GNP loadings at temperature range of 282 – 308 K. (b) The comparison between theoretical and experimental C_p of GNP/PP composites at room temperature.

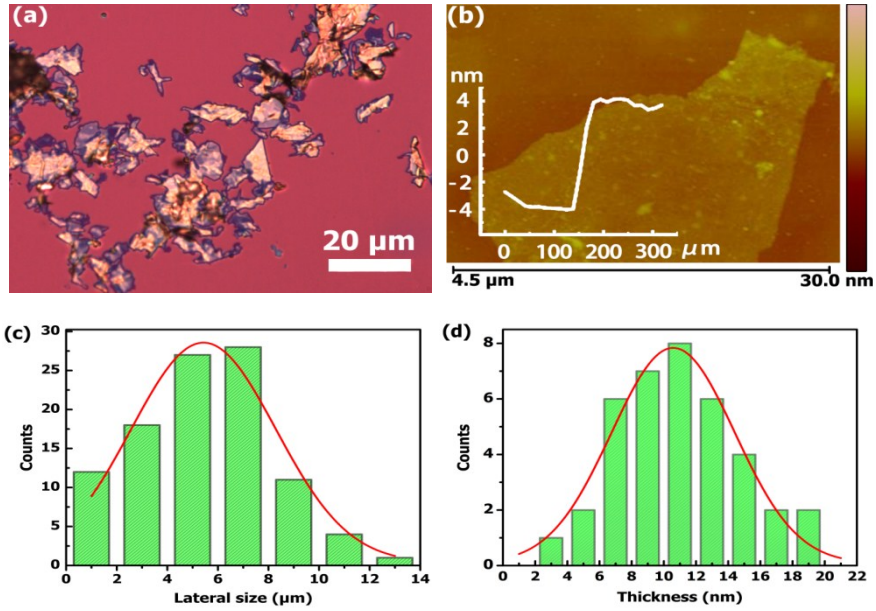

Fig. S2. The characterization of GNPs: (a) OM and (b) AFM images; the distribution of (c) lateral size and (d) thickness.

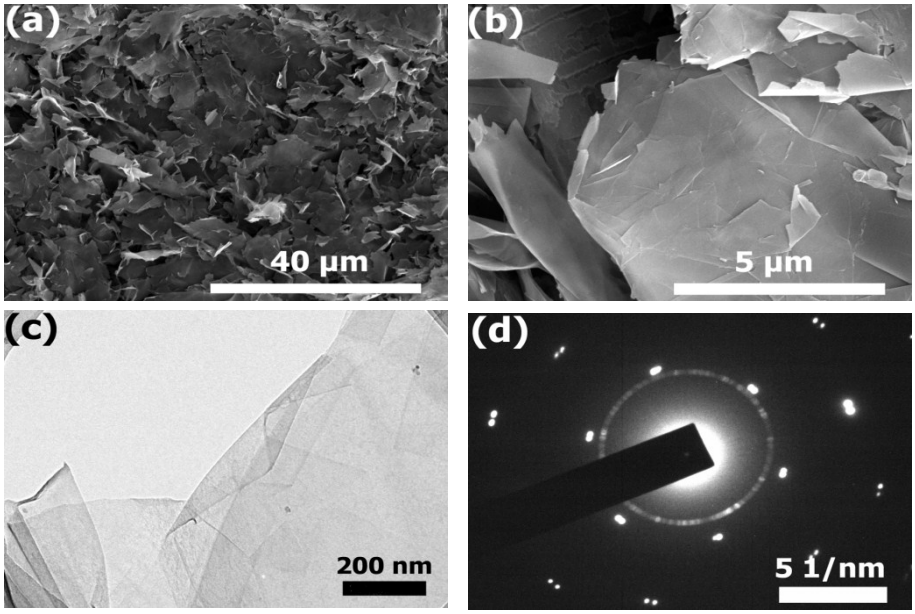

Fig. S3. (a) Low and (b) High-magnification SEM images of GNPs. (c) TEM image of an individual GNP and (d) Selected area diffraction pattern of (c).

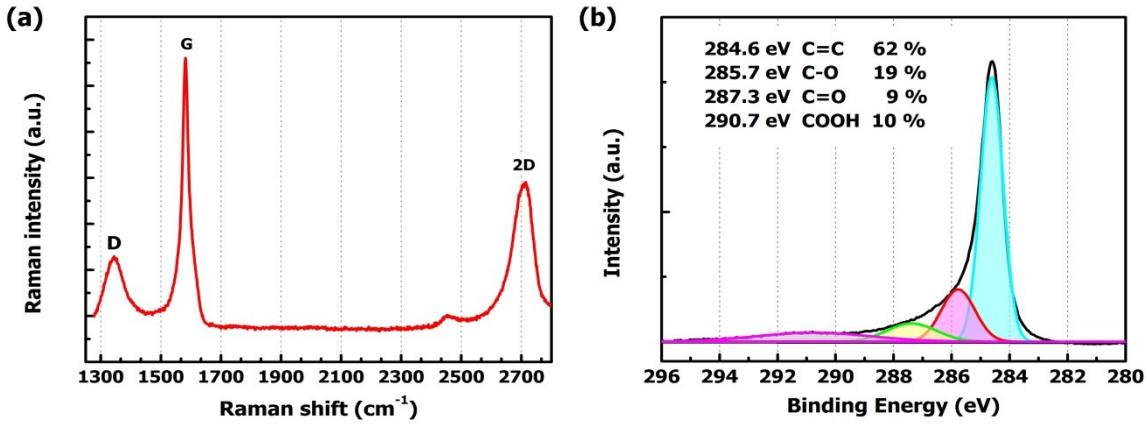

Fig. S4. (a) Raman and (b) XPS C1s spectra of GNPs.

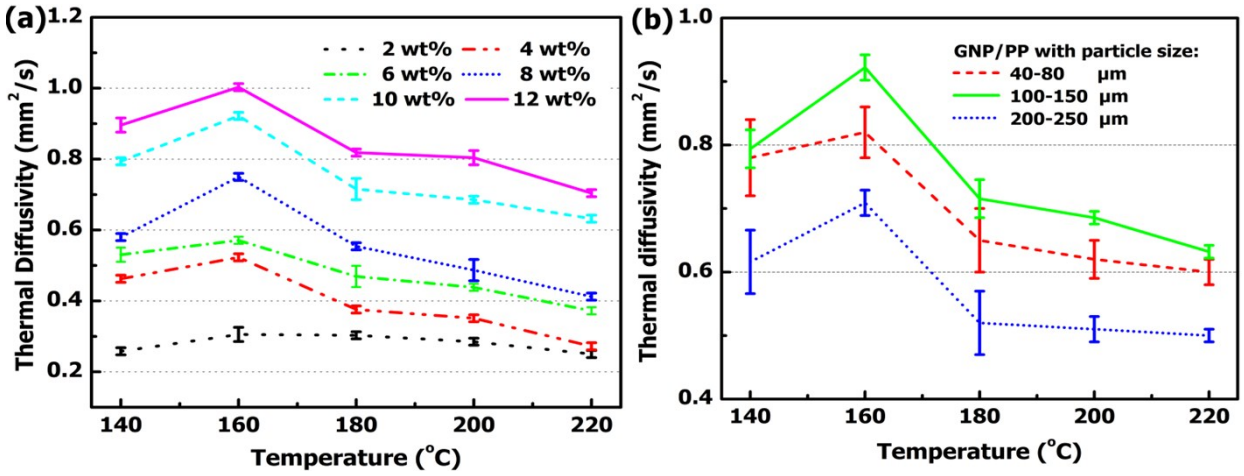

Fig. S5. Thermal diffusivity of GNP/PP composites (a) prepared at various GNP loadings and hot-pressing temperatures and (b) made with different PP particle sizes.

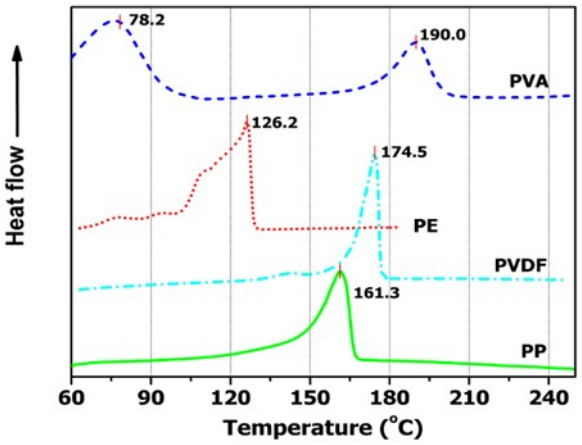

Fig. S6. DSC curves of neat thermoplastic polymers used in this study.

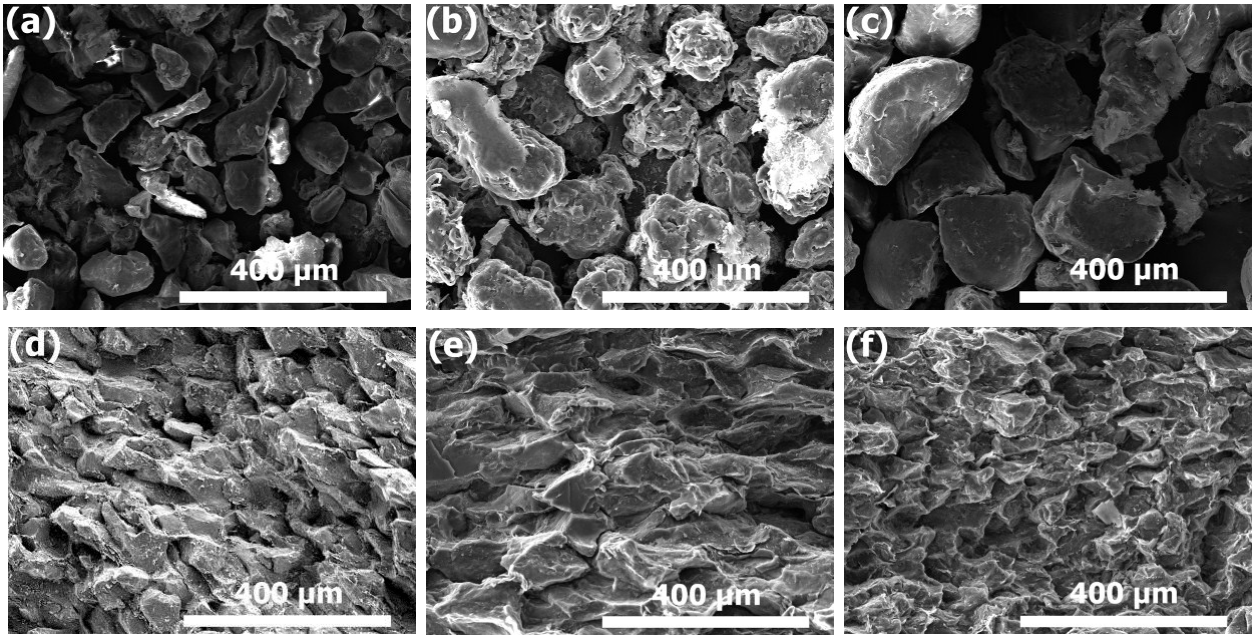

Fig. S7. SEM images of GNP-coated PP particles with the size of (a) 40 – 80; (b) 100 – 150; (c) 200 – 250 μm and the section view of hot-pressed PP composites made using (d) 40 – 80; (e) 100 – 150; (f) 200 – 250 μm sized PP.

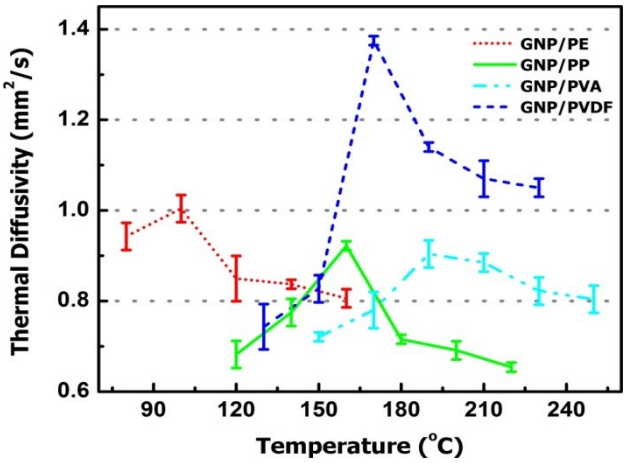

Fig. S8. Thermal diffusivity of the thermoplastic composites with 10 wt% GNP loading as a function of the pressing temperatures.

Table S1. A comparison of the thermal conductivity and TCE of thermoplastic composites made with graphene and white graphene (boron nitride, BN).

Filler	Matrix	Content (wt%)	Thermal Conductivity ($Wm^{-1}K^{-1}$)	TCE (%)	Reference
BN	PE	50	1.38	319	[1]
BN Nanosheets	PE	50	1.19	260	[1]
GNPs	PE	10	1.84	457	Our work
Expanded Graphite	PVDF	15	0.9	373	[2]
Graphite Nanosheets	PVDF	15	1.28	573	[2]
BN	PVDF	20	0.97	322	[3]
GNPs	PVDF	10	1.47	673	Our work
BN	PVA	10	0.44	109	[4]
GNPs	PVA	10	1.43	580	Our work

References

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2. S. Deng, Y. Zhu, X. Qi, W. Yu, F. Chen and Q. Fu, *RSC Adv.*, 2016, **6**, 45578-45584.
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