Supplementary Information

Fabricate high thermal conductivity rGO/polyimide nanocomposite films via freeze-drying approach

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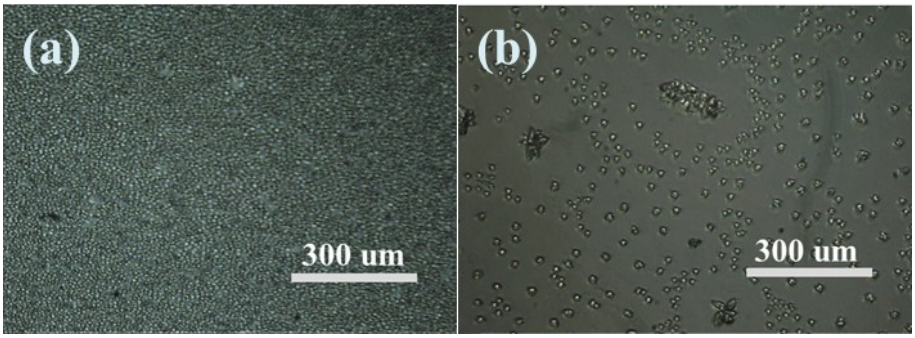

Fig. S1 POM images for the crystallization behavior of different solvents : (a) DMF, (B) NMP.

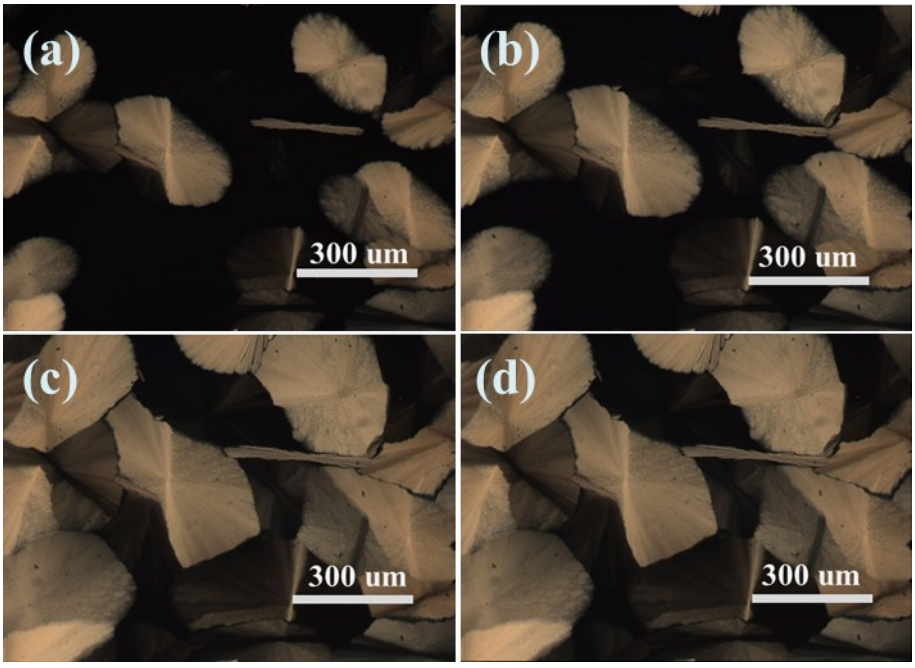

Fig. S2 Effect of growth time on crystallization of PAA with solid content of 4 wt% : (a) Beginning, (b) 10 s, (c) 60 s, (d) 120 s.

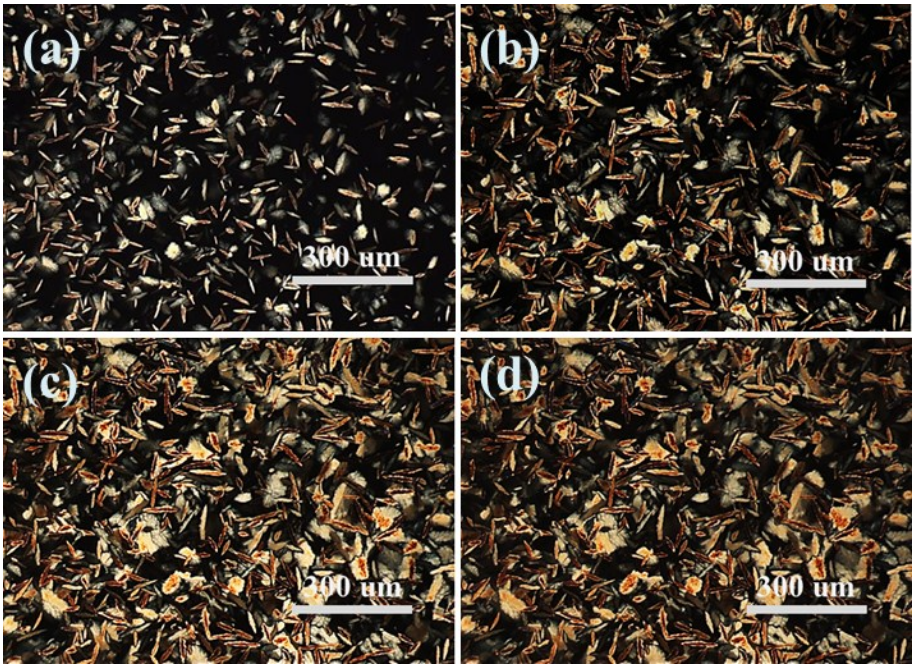

Fig. S3 Effect of growth time on crystallization of PAA with solid content of 8 wt% :(a) Beginning, (b) 60 s, (c) 120 s, (d) 300 s.

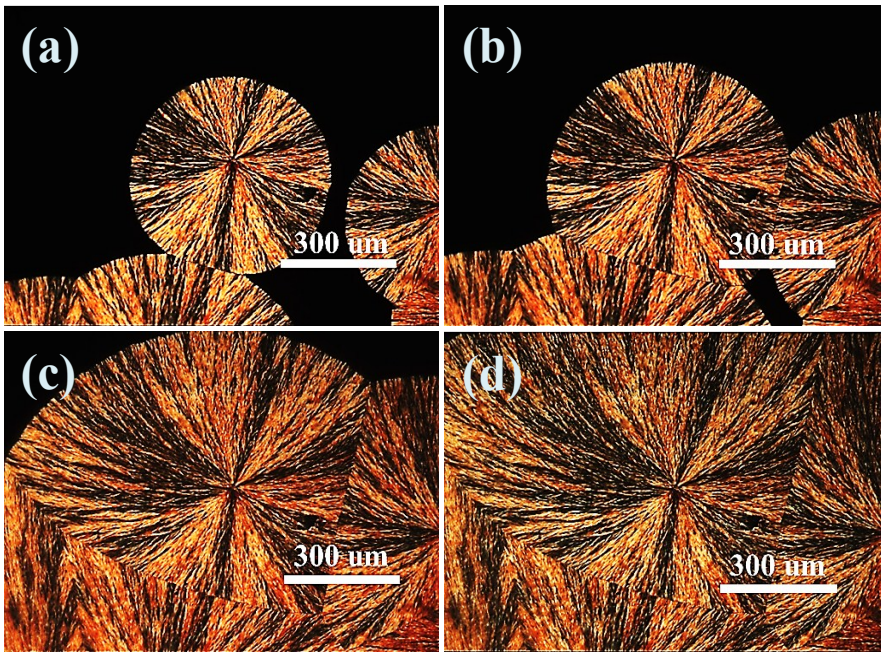

Fig. S4 Effect of growth time on crystallization of PAA with solid content of 12 wt%: (a) beginning, (b) 1 min, (c) 5 min, (d) 10 min.

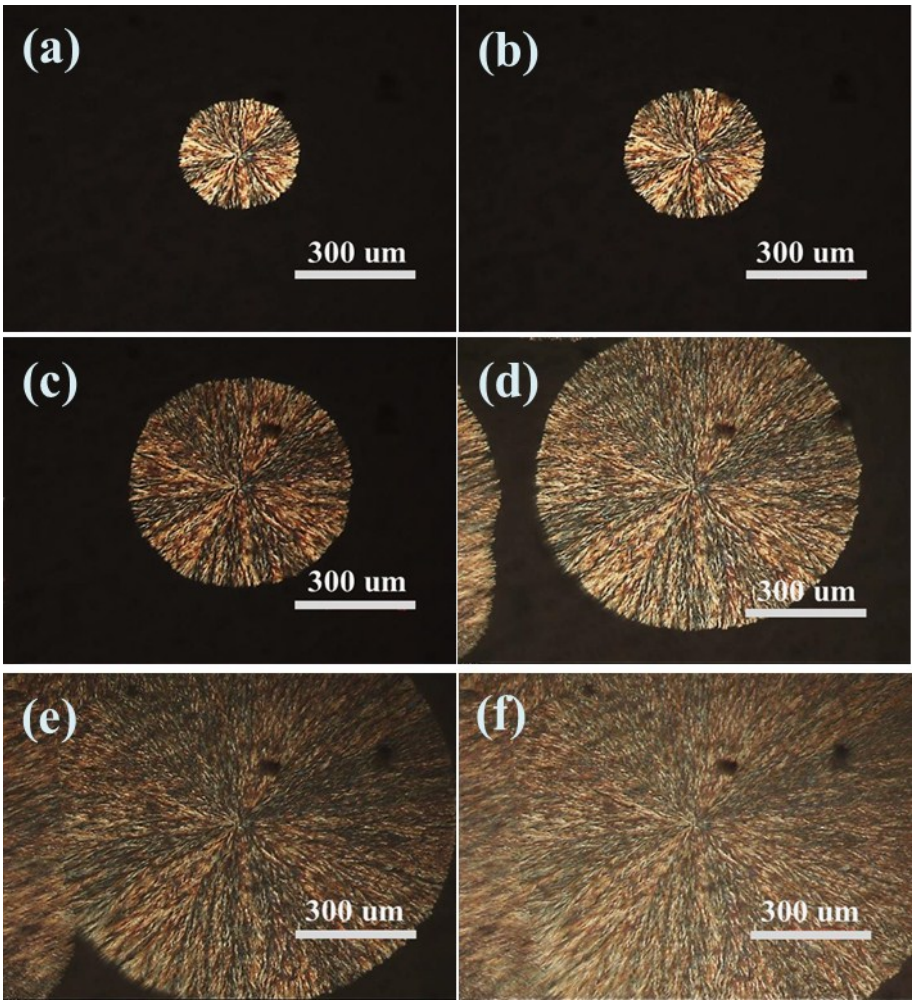

Fig. S5 Effect of growth time on crystallization of PAA with solid content of 15 wt% : (a) Beginning, (b) 2 min, (c) 10 min, (d) 20 min, (e) 30 min, (f) 40 min.

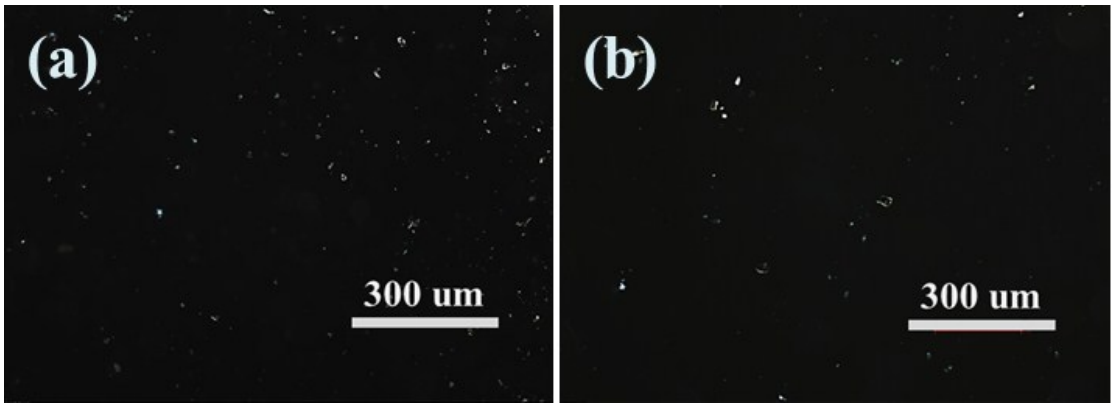

Fig. S6 POM images of PAA with different solvent ： (a) DMF, (B) NMP.

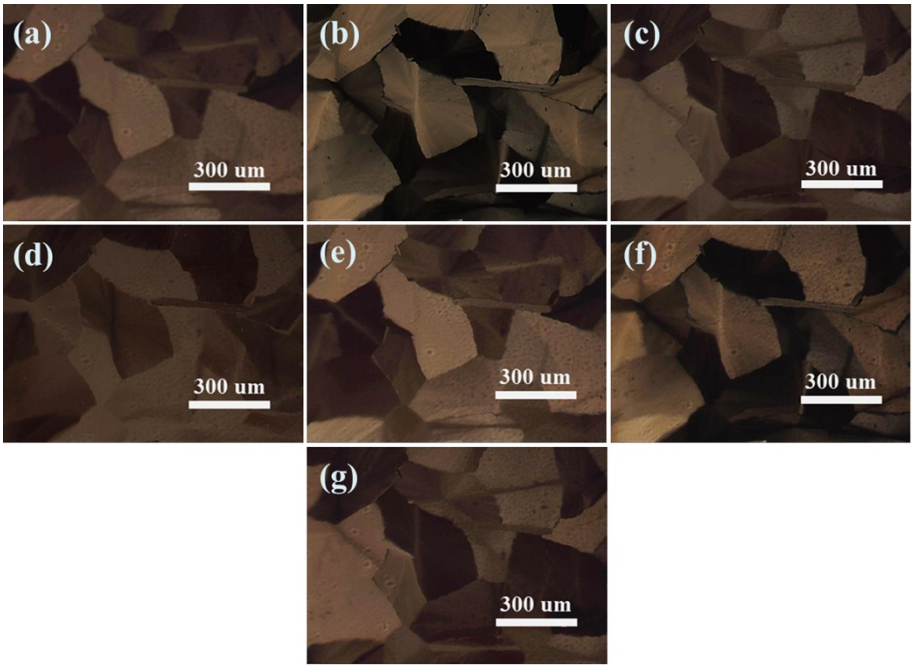

Fig. S7 POM diagram of solid content PAA of 4 wt% under different polarizing angles : (a) 45°, (b) 90°, (c) 135°, (d) 180°, (e) 225°, (f) 270°, (g) 315°.

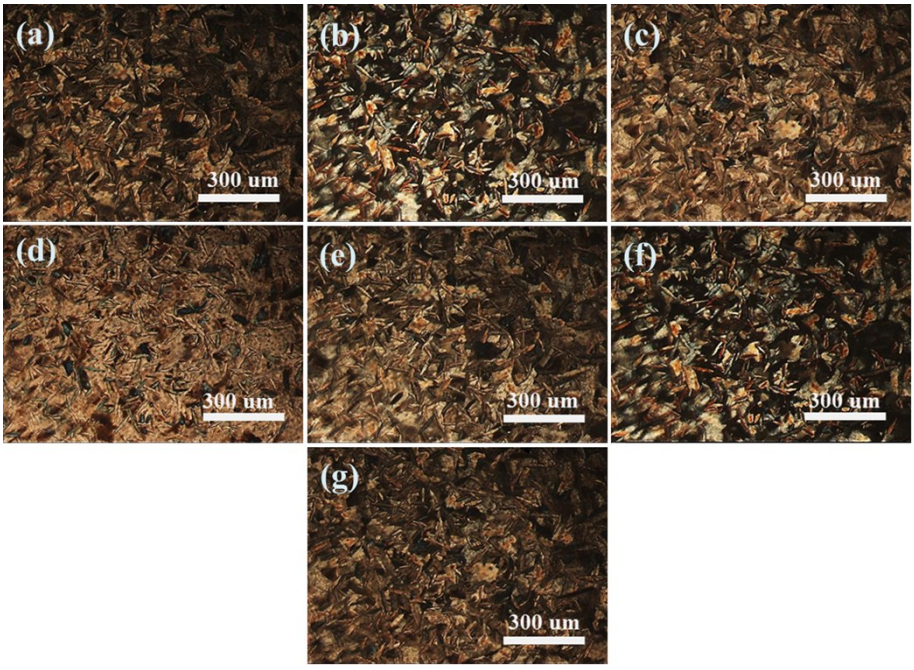

Fig. S8 POM diagram of solid content PAA of 8 wt% under different polarizing angles : (a) 45°, (b) 90°, (c) 135°, (d) 180°, (e) 225°, (f) 270°, (g) 315°.

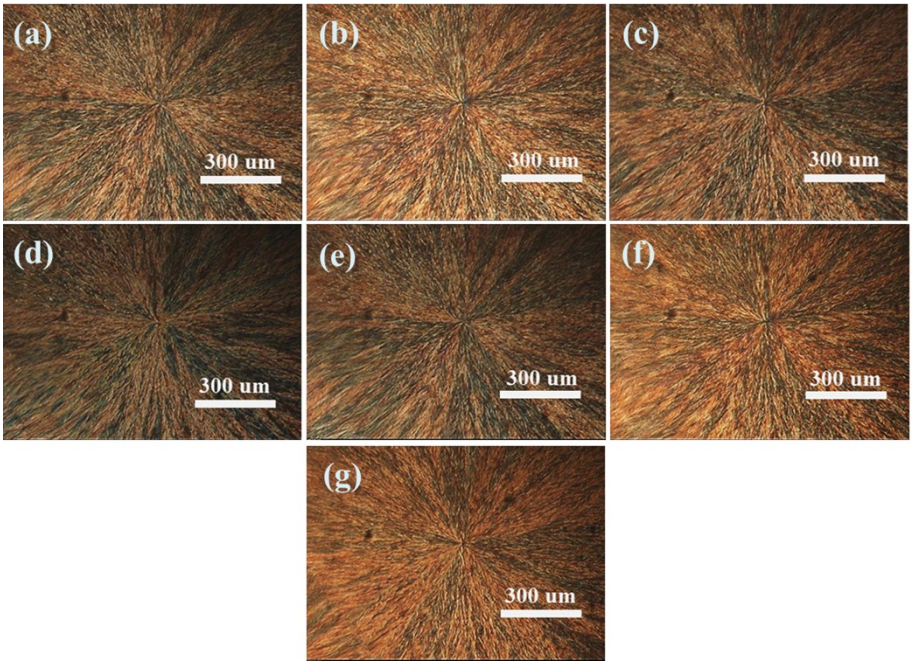

Fig. S9 POM diagram of solid content PAA of 12 wt% under different polarizing angles : (a) 45°, (b) 90°, (c) 135°, (d) 180°, (e) 225°, (f) 270°, (g) 315°.

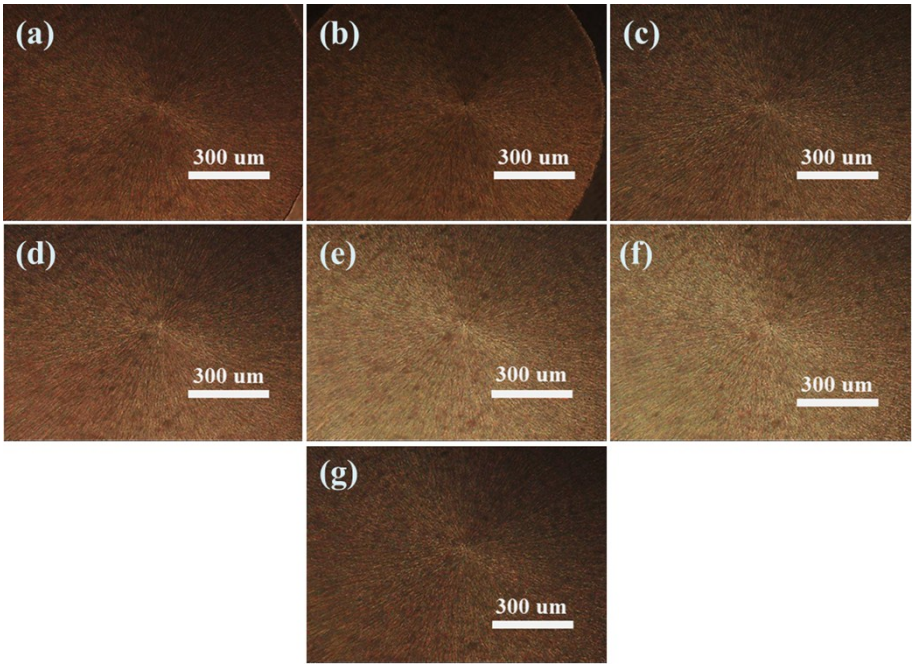

Fig. S10 POM diagram of solid content PAA of 15 wt% under different polarizing angles : (a) 45°, (b) 90°, (c) 135°, (d) 180°, (e) 225°, (f) 270°, (g) 315°.

Table S1 Thermal conductivity of rGO/PI prepared by conventional method with different mass fraction of rGO

The mass fraction of rGO in rGO/PI films (wt%)	Thermal Diffusivity ($m \cdot s^{-1}$)	Density ($g \cdot mL^{-1}$)	specific heat capacity ($J \cdot kg^{-1} \cdot K^{-1}$)
0	0.068	1.39	1.95
2	0.07	1.4	1.98
4	0.111	1.43	2.01
6	0.113	1.47	2.02
8	0.163	1.52	2.05

Table S2 Thermal conductivity of rGO/PI prepared by freeze-drying method with different mass fraction of rGO

The mass fraction of rGO in rGO/PI films (wt%)	Thermal Diffusivity ($m \cdot s^{-1}$)	Density ($g \cdot mL^{-1}$)	specific heat capacity ($J \cdot kg^{-1} \cdot K^{-1}$)
0	0.07	1.40	2.01
2	0.143	1.41	1.98
4	0.268	1.43	2.01
6	0.345	1.47	2.02
8	0.892	1.52	2.05