Supporting Information

Morphology-controlled Self-assembly and Synthesis of Biopolyimide Particles from 4-Amino-L-phenylalanine

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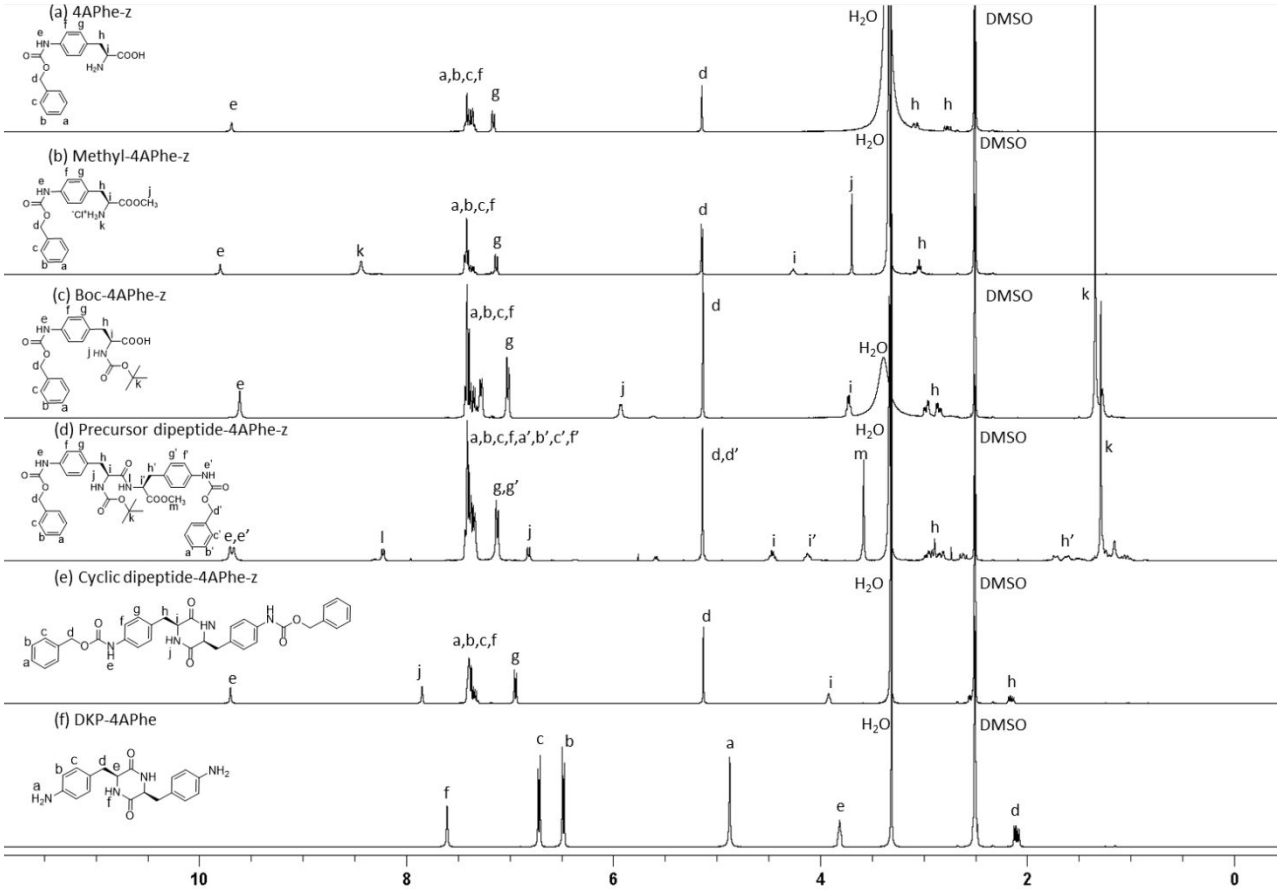
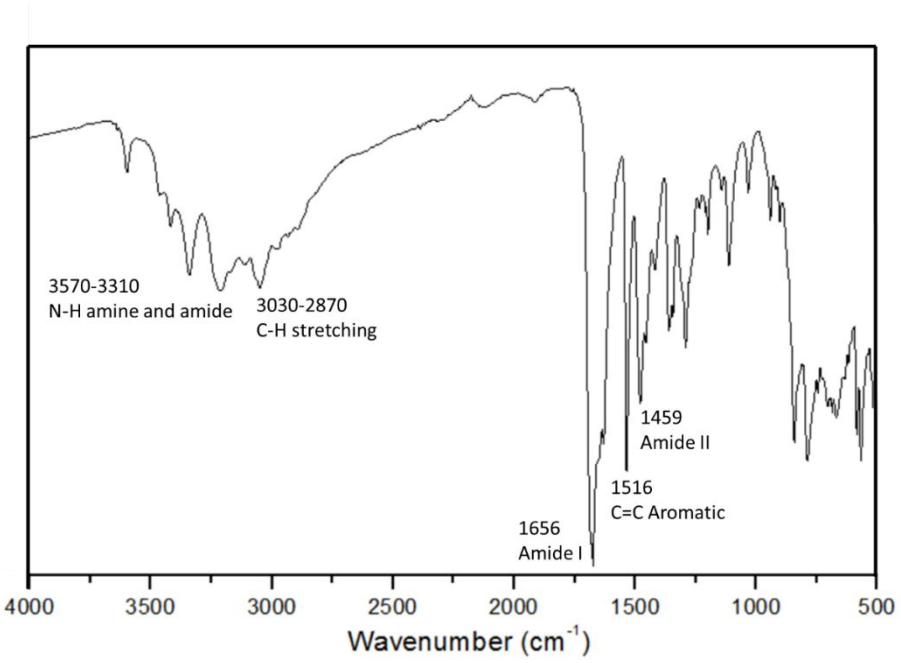

(a) 4APhe-z
(b) Methyl-4APhe-z
(c) Boc-4APhe-z
(d) Precursor dipeptide-4APhe-z
(e) Cyclic dipeptide-4APhe-z
(f) DKP-4APhe
H2O
DMSO
10
8
6
4
2
0

Figure S1. ^{1}H NMR spectra of (a) 4APhe-z, (b) Methyl-4APhe-z, (c) Boc-4APhe-z, (d)



Precursor dipeptide of 4APhe-z, (e) Cyclic dipeptide-4APhe-z, and (f) DKP-4APhe.

Figure S2. FT-IR spectrum of DKP-4APhe

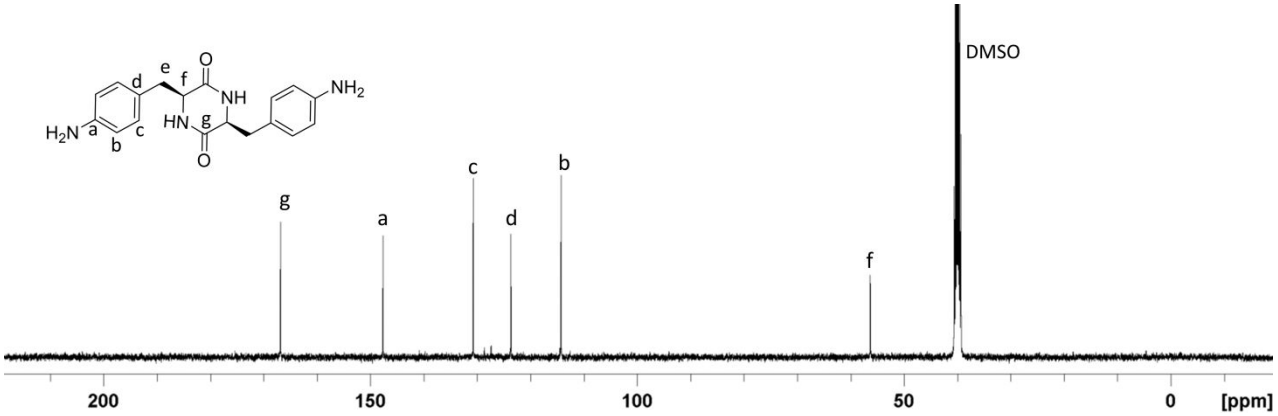


Figure S3. ^{13}C NMR spectrum of DKP-4APhe.

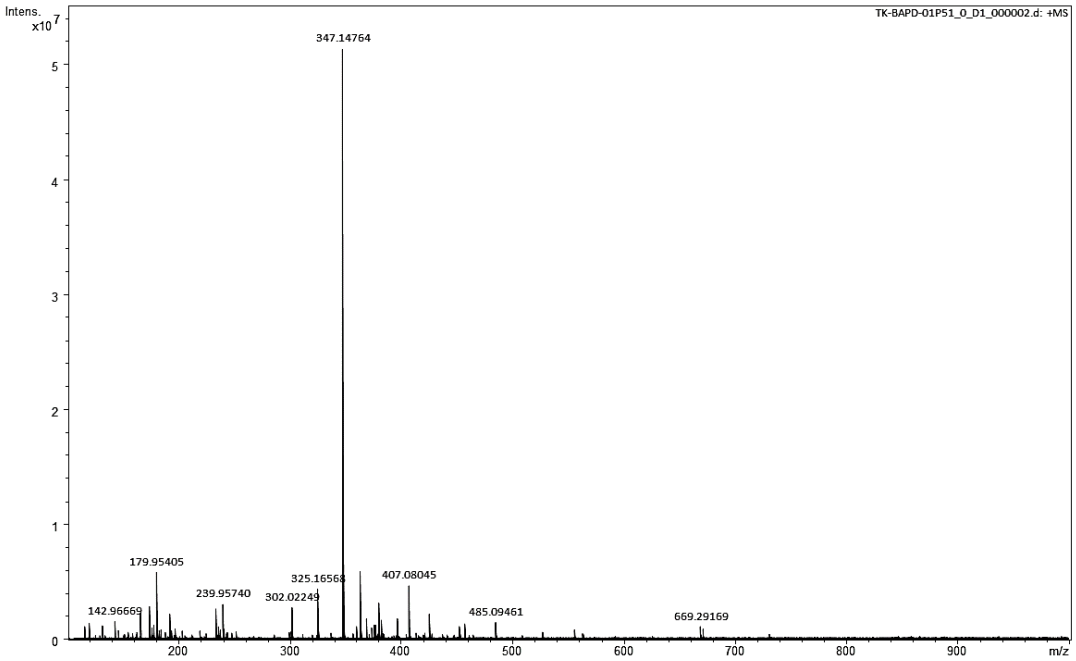


Figure S4. Mass spectrum of DKP-4APhe.

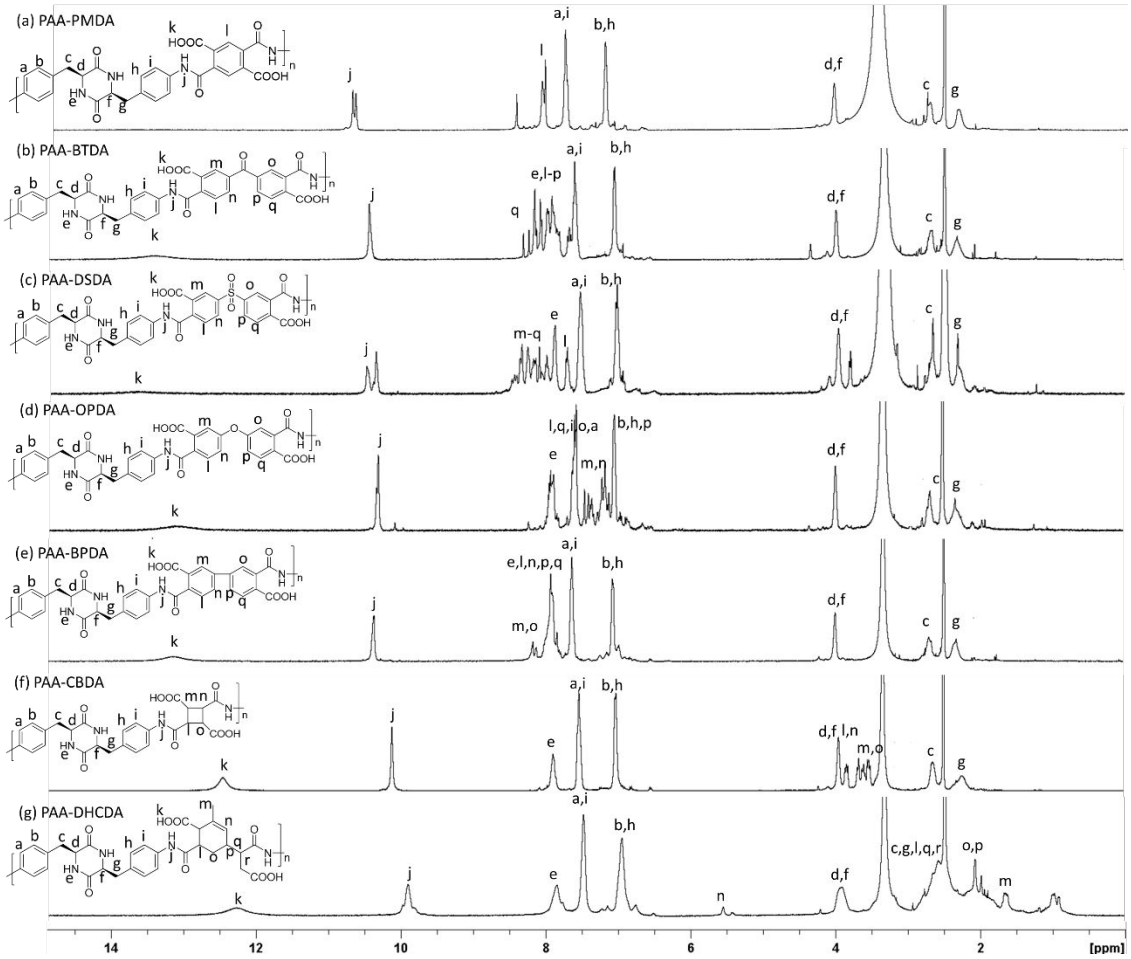


Figure S5. ^{1}H NMR spectra of (a) PAA-PMDA (b) PAA-BTDA, (c) PAA-DSDA, (d) PAA-OPDA, (e) PAA-BPDA, (f) PAA-CBDA, and (g) PAA-DHCDA.

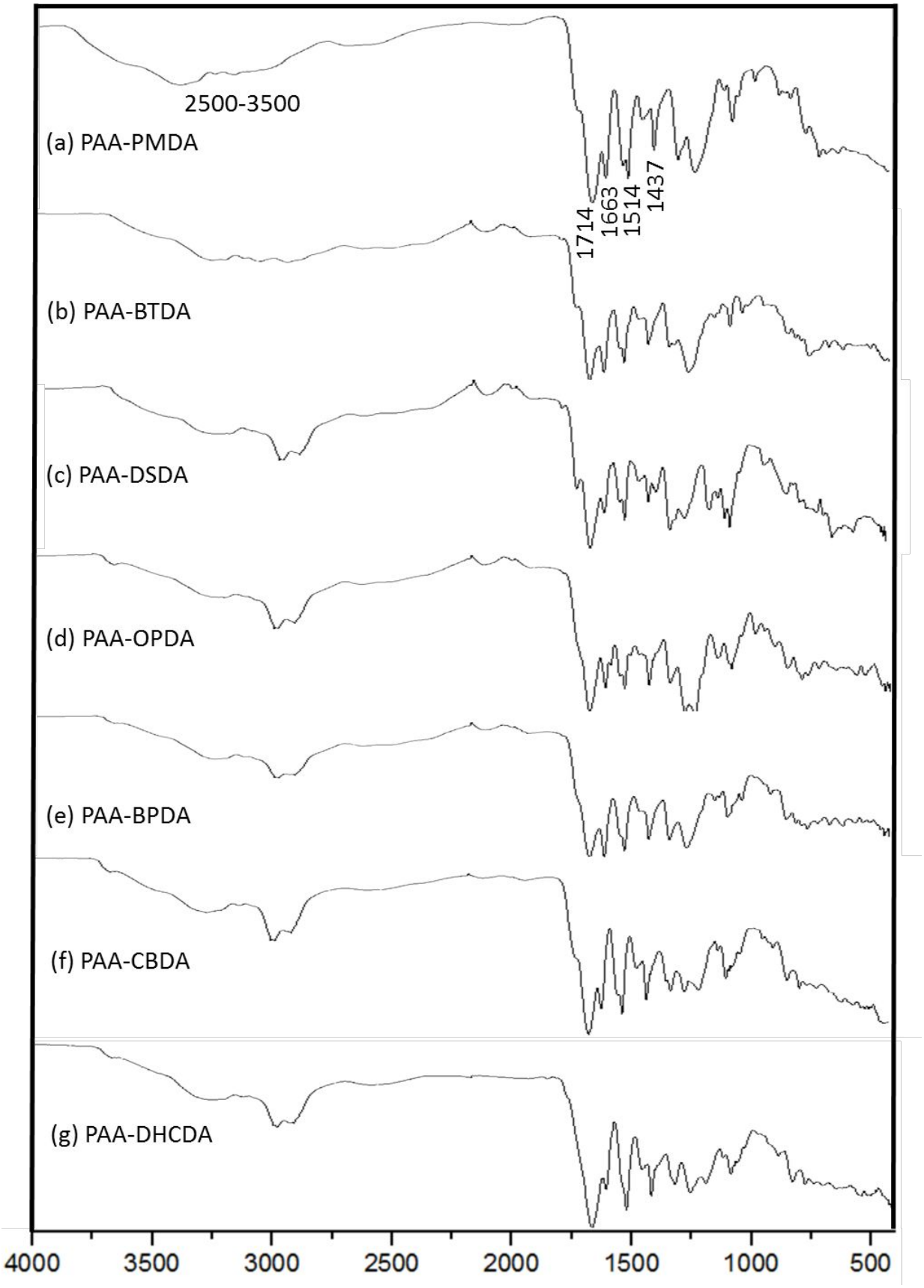


Figure S6. FT-IR spectra of (a) PAA-PMDA (b) PAA-BTDA, (c) PAA-DSDA, (d) PAA-

OPDA, (e) PAA-BPDA, (f) PAA-CBDA, and (g) PAA-DHCDA.

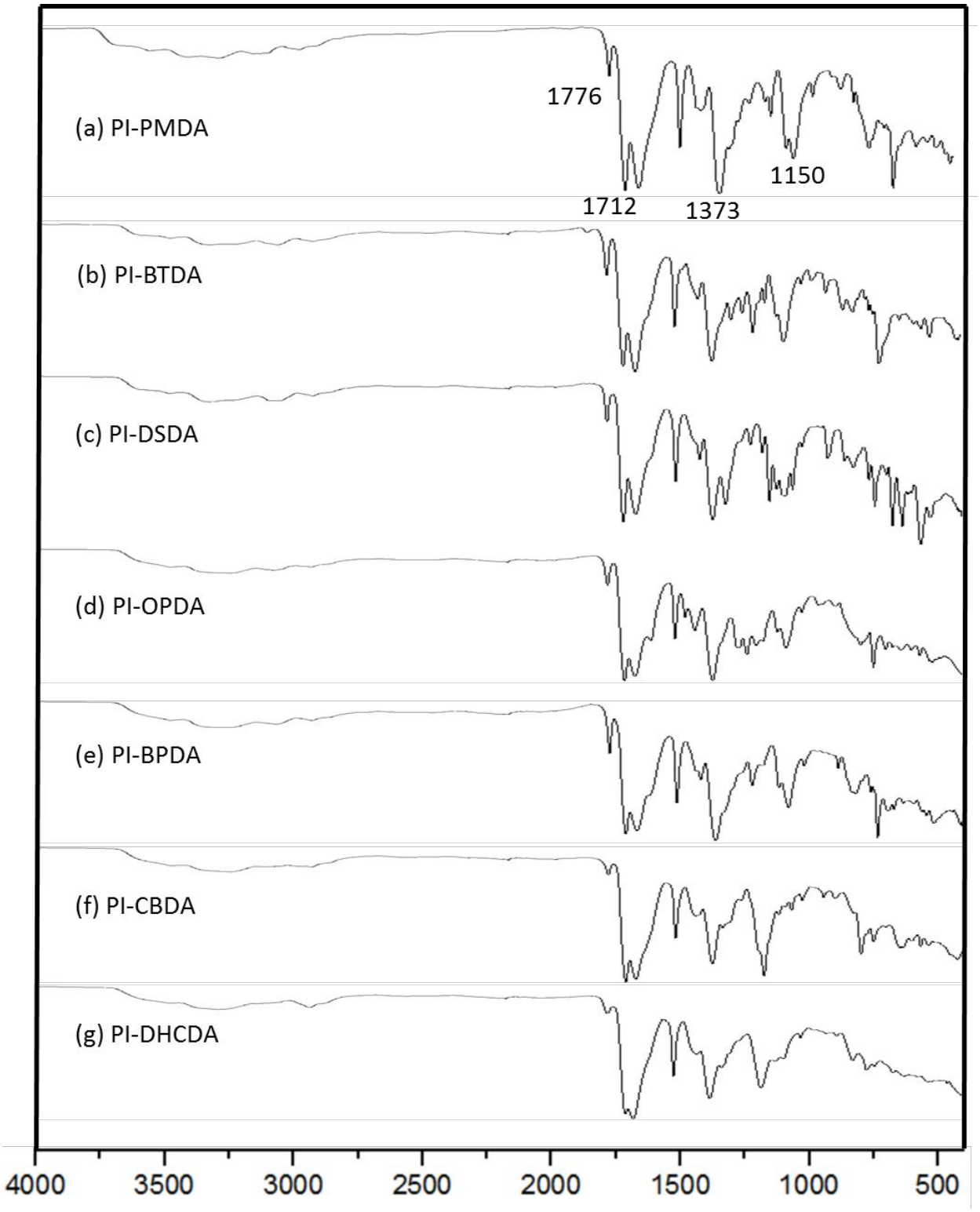


Figure S7. FT-IR spectra of (a) PI-PMDA, (b) PI-BTDA, (c) PI-DSDA, (d) PI-OPDA, (e) PI-BPDA, (f) PI-CBDA, and (g) PI-DHCDA.

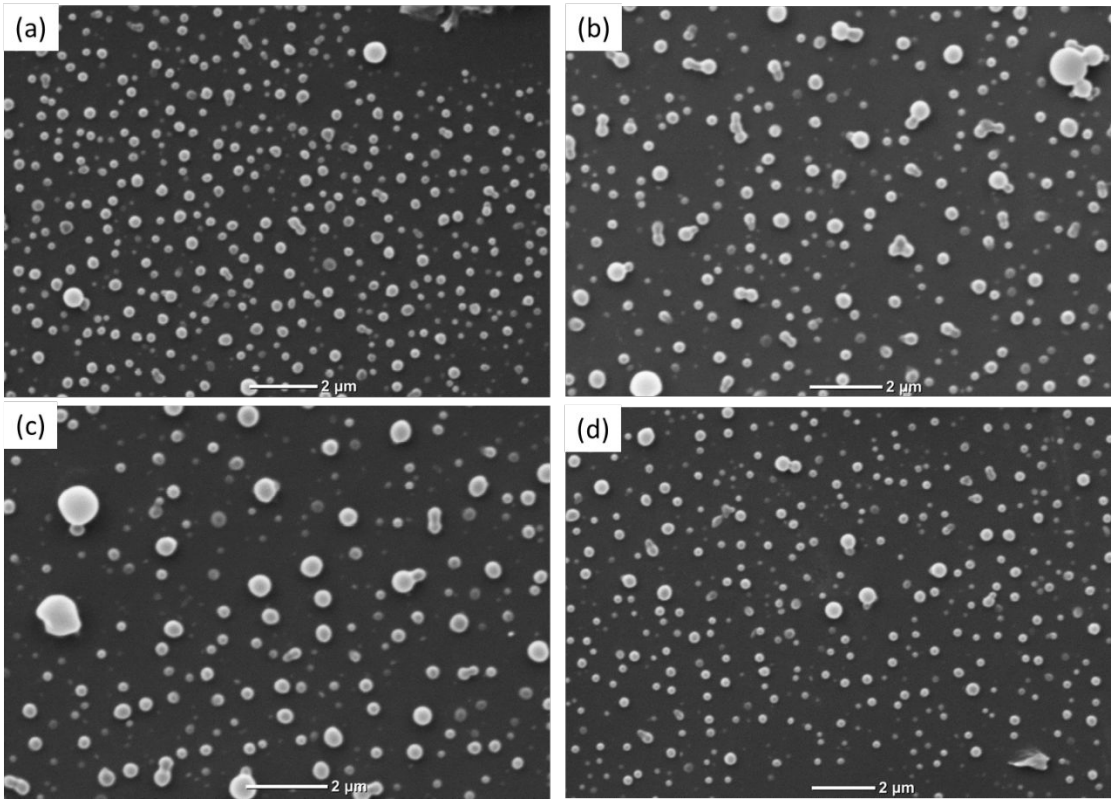


Figure S8. SEM images of PAA particles formed under PAA concentration of 4 wt% and triton X-100 of 1 wt%. (a) PAA-BTDA, (b) PAA-CBDA, (c) PAA-DSDA and (d) PAA-PMDA. The diameter of PAA particles were estimated as (a) 284±82, (b) 375±128, (c) 448±159 and (d) 279±69 nm.

Table S1. Particle size and size distribution of PAA and PI particles measured by DLS

Polymers	Particle size (nm)	Size distribution
PAA-BTDA	295	0.100
PAA-CBDA	397	0.194
PAA-DSDA	531	0.219
PAA-PMDA	303	0.150
PI-BTDA	396	0.214
PI-CBDA	459	0.259
PI-DSDA	531	0.349
PI-PMDA	780	0.472

Table S2. Zeta potential of PAA particles dispersed in water measured by DLS

Nanoparticles	Zeta potential (mV)
PAA-BTDA	-39.9±7.7
PAA-CBDA	-23.7±4.8
PAA-DSDA	-38.1±4.8
PAA-PMDA	-26.3±4.7

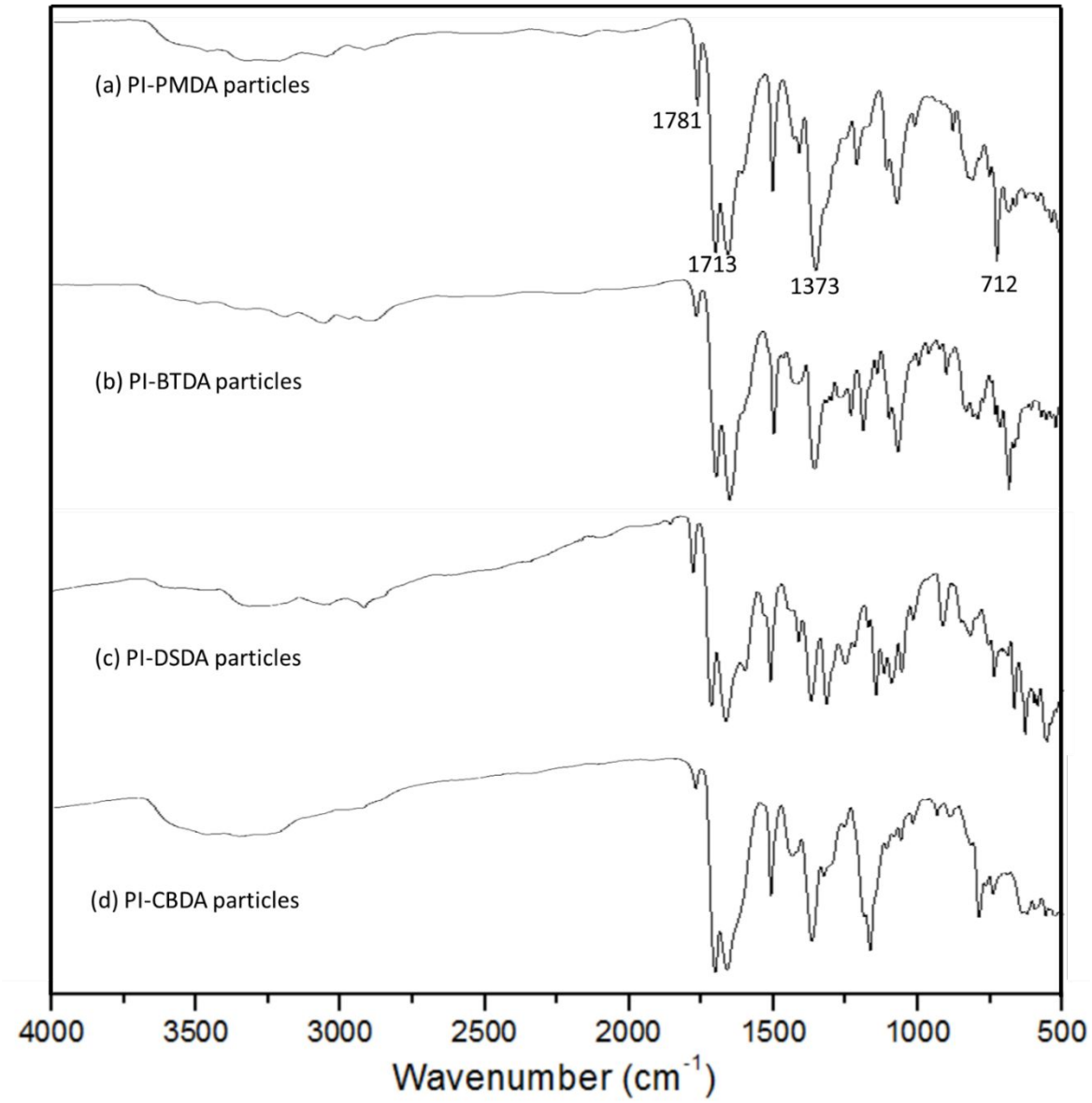


Figure S9. FT-IR spectra of PIs particles. (a) PI-PMDA, (b) PI-BTDA, (c) PI-DSDA, and (d) PI-CBDA.

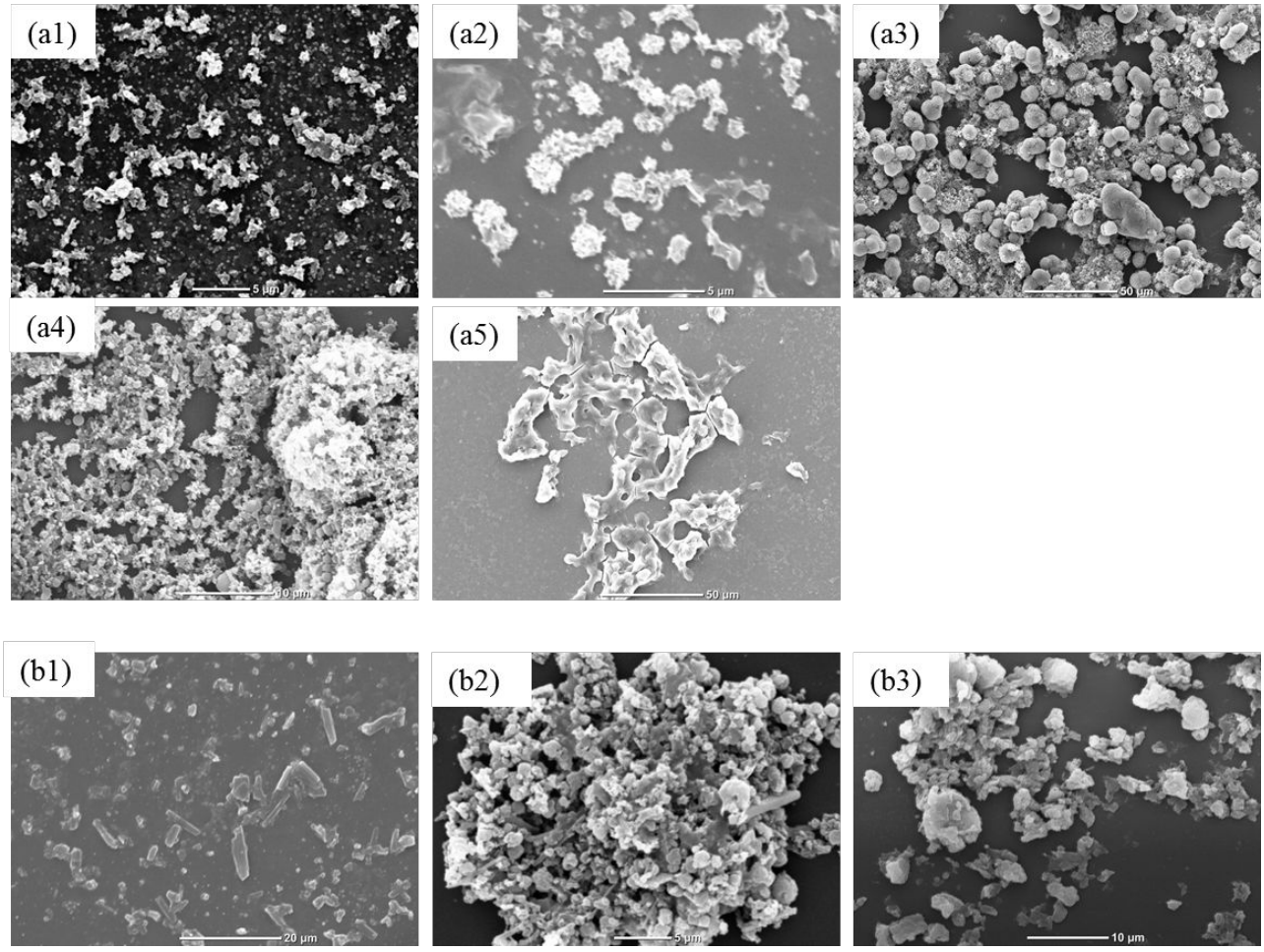


Figure S10. SEM images of PI-BTDA particles obtained by PAA-BTDA particles by a two-step imidization. The PAA particles were prepared by redispersion of PAA spheres into various mixed solvents of acetone with water (acetone compositions (a1) 5%, (a2) 10%, (a3) 50%, (a4) 70% and (a5) 100%) and of methanol with water (methanol compositions (b1) 20%, (b2) 70% and (b3) 100%), and by following sonication.

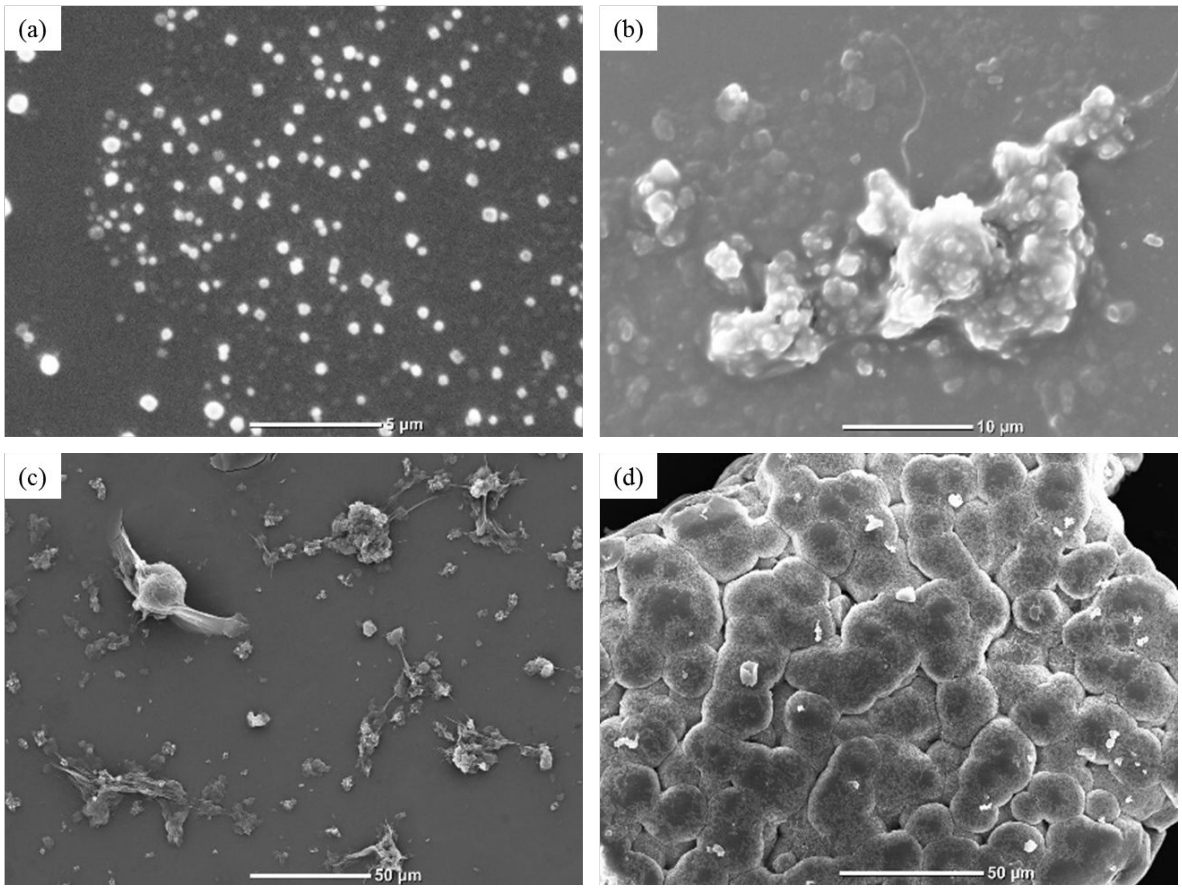


Figure S11. SEM images of PAA derived from 4ATA dimethyl ester with BTDA. (a) Particles formed by solvent displacement from DMAc solution into water. (b, c, d) Particles or aggregates formed by subsequent redispersion into solvent mixtures of (b) 20% acetone/80% water, (c) 40% methanol/60% water, and (d) cyclohexane, and following sonication.