Supporting information

Thermal transition behaviors, solubility, and mechanical properties of wholly aromatic para-, meta-poly(ether-amide)s: effect on numbers of para-aryl ether linkages

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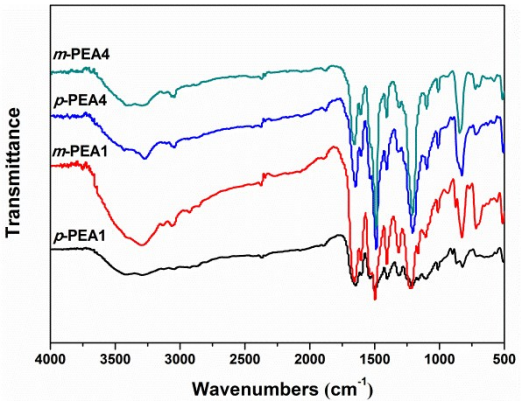


Figure S1. FTIR spectra of PEA1 and PEA4.

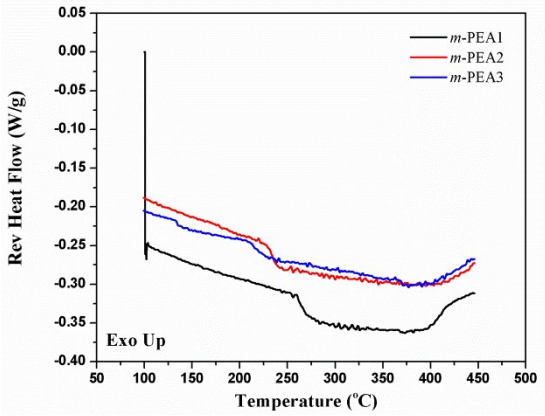


Figure S2. MDSC Rev. Heating curve of *m*-PEA1, *m*-PEA2 and *m*-PEA3.

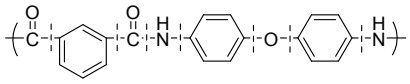
Solubility parameter δ determined by Van Krevelen method [1]

In this study, the solubility parameter of *m*-PEAs was calculated based on Van Krevelen method. Here, we choose *m*-PEA1 (M_r=330 g/mol, ρ≈1.0 g/cm^3) as an example, and calculate the solubility parameter δ_d, δ_p, δ_h and δ according to the formulas 1-2. In this method, the solubility *para*meters δ are divided into three parts: δ_d, δ_p, δ_h, where δ_d is correlated with dispersion forces, δ_p is correlated with polar forces and δ_h is correlated with hydrogen bonding. Similarly, F_{di} is the molar attraction constant correlated with dispersion forces, F_{pi} is the molar attraction constant correlated with polar forces and E_{hi} is the cohesive energy correlated with hydrogen bonding.

$$\delta d = \frac{\sum Fdi}{V};\ \delta p = \frac{\sqrt{\sum Fpi^2}}{V};\ \delta h = \sqrt{\frac{\sum Ehi}{V}},\ V=M_r/\rho \qquad (1)$$

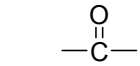
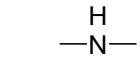
$$\delta = \sqrt{\delta d^2 + \delta p^2 + \delta h^2} \qquad (2)$$

Firstly, we calculate the $\sum F_{di}$, $\sum F_{pi}^2$ and $\sum E_{hi}$ based on the data of component group contribution shown in Table S1. And the repeat units of *m*-PEA1 are shown in Scheme S1. Next, the δ_d, δ_p, δ_h are calculated according to the formula 1, and the δ is calculated according to the formula 2.



Scheme S1. Repeat units of *m*-PEA1.

Table S1. Data of group contribution to solubility parameter of *m*-PEA1.

Structural group	$\mathbf{F}_{di}$ / (MJ·m^3)$^{1/2}$·mol^{-1}	$\mathbf{F}_{pi}$ / (MJ·m^3)$^{1/2}$·mol^{-1}	$\mathbf{E}_{hi}$ / J·mol^{-1}
 (o, m, p)	1270	110	0
—O—	100	400	3000
	290	770	2000
	160	210	3100

1. D. W. Van Krevelen, *Properties of Polymers*, Elsevier, Fourth edition, 2009, 240-246.