Supplementary Information

Elastomers Built up through π-π Stacking Association of Polycyclic Planar Aromatic Diimides

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1. ^{1}H NMR spectra of the copolymers

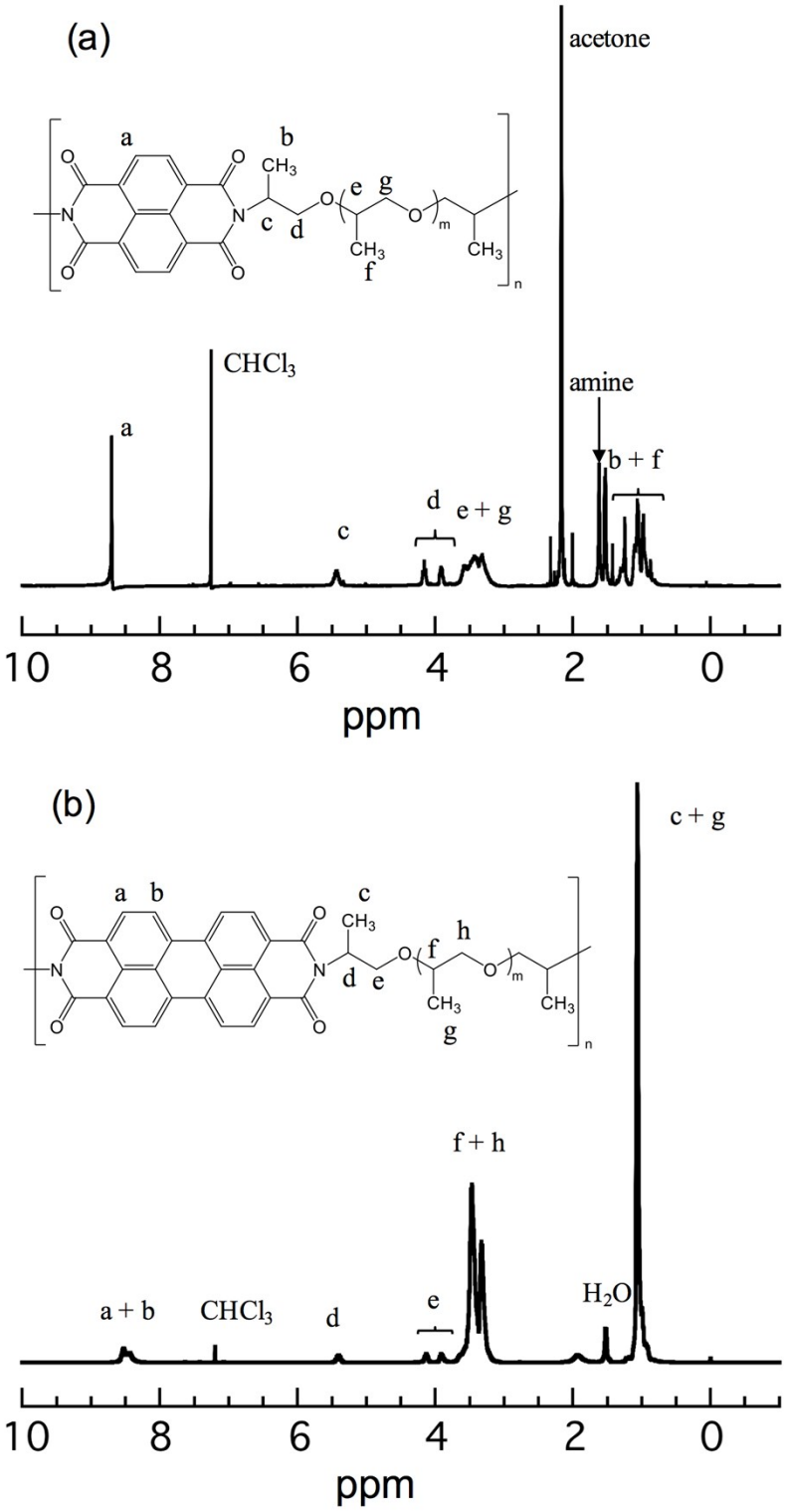

Figure S1. ^{1}H NMR spectra of the copolymers (a) PI400-N, and (b) PI2000-P.

2. Structural parameters obtained by curve fitting of the SAXS intensity profile on the basis of pseudo-two-phase model

Table S1. Structural parameters obtained by curve fitting of the SAXS intensity profile for PI2000-P film on the basis of pseudo-two-phase model

L / Å	L_1 / Å	Δ / Å	σ_{L1} / Å	σ / Å
50.8	11.0	0.87	0.02	0.05

In order to verify the thickness of each lamella phase, the SAXS intensity profile of PI2000-P film was fitted with calculated intensity profile on the basis of the pseudo-two-phase model. In the pseudo-two-phase model, the density changes sigmoidally at the interface, which is given by the one-dimensional convolution product of a step function for an ideal two-phase model and a Gaussian smoothing function [1].

L : long spacing of the lamellar structure

L_1 : lamellar thickness of high density phase

Δ : standard deviation of the long period L

σ : a parameter that is relate to the interface thickness t by the equation $t = (2\pi)^{1/2}/\sigma$

[1] R. Ishige, T. Ishii, M. Tokita, M. Koga, S. Kang, J. Watanabe. *Macromolecules* 2011, *44*, 4586-4588.

3. Arrhenius plots for relaxations in the DMA data of the copolymer films and calculated activation energies

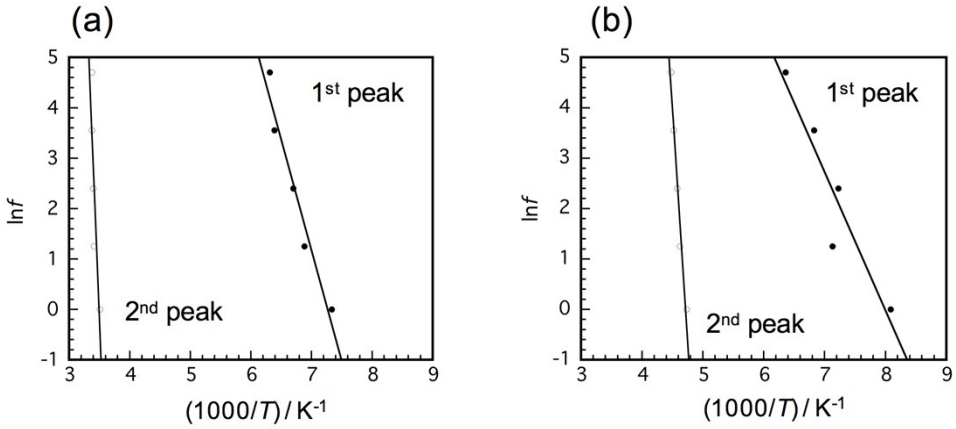

Figure S2. Arrhenius plots for relaxations in the DMA data of the copolymer films (a) PI400-N and (b) PI2000-P. The filled circles are data for the 1st peak, and the open circles are data for the 2nd peak in DMA profiles.

Table S2. Activation energies of the first and second relaxations observed in dynamic loss modulus in DMA calculated from the Arrhenius plots

PI400-N [a]		PI2000-P [b]	
ΔH_{1st} (kJ mol^{-1})	ΔH_{2nd} (kJ mol^{-1})	ΔH_{1st} (kJ mol^{-1})	ΔH_{2nd} (kJ mol^{-1})
36.4	249.4	22.8	153.2

[a]Determined from Arrhenius plots for relaxations found in dynamic loss modulus at 158 K (1st peak, 110 Hz) and 297 K (2nd peak, 110 Hz). [b]Determined from Arrhenius plots for relaxations found in dynamic loss modulus at 157 K (1st peak, 110 Hz) and 223 K (2nd peak, 110Hz).

4. Stress-strain curve for the PI2000-P films

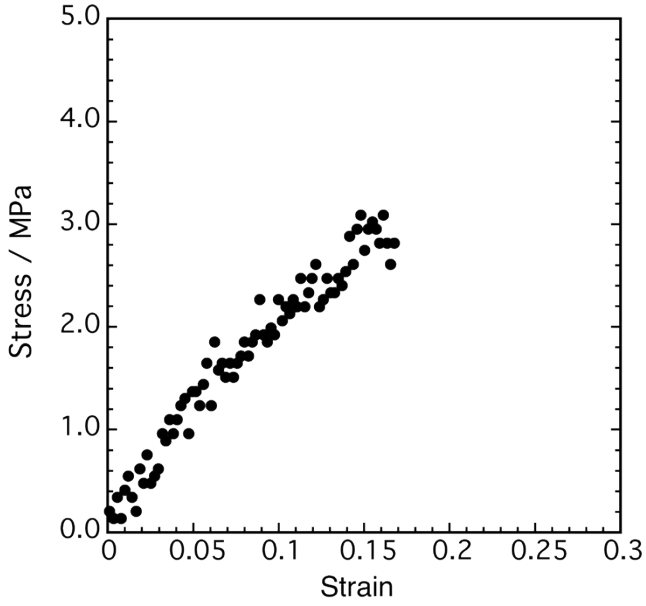

Figure S3. Stress-strain curve for the PI2000-P films. Tensile tests were carried out using an EZ-Graph tensile tester (Shimadzu Co., Ltd) with 50 N load cell. The gauge length was 10 mm. Samples were extended at a crosshead speed of 10 mm/min at 298 K. The strain was calculated based on the crosshead displacement. The elastic modulus was determined by following equation

$$\alpha\sigma = E\varepsilon^n \qquad \text{(S1)}$$

where the α is stretch ratio, E is elastic modulus. We calculated the E in the strain range where the n is equal to 1.

4. Thermogravimetric analysis data and appearance of the residues after TGA analysis

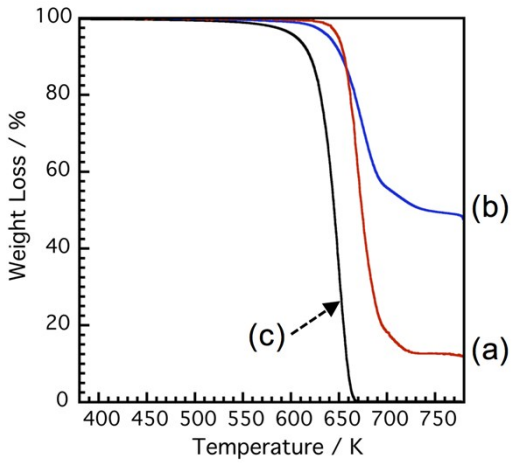

Figure S4. Thermogravimetric analysis profiles for (a) PI400-N, (b) PI2000-P, and (c) hydroxy-terminated poly(propylene glycol) (M_w: 2500). Heating rate was set at 10 K min^{-1}.

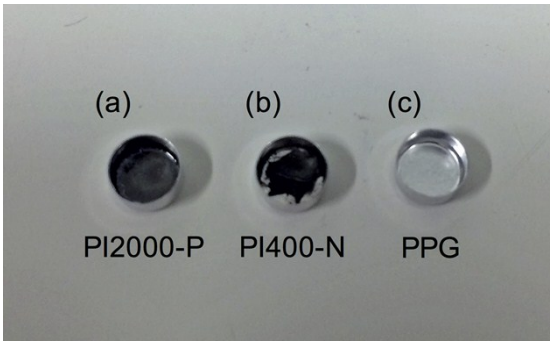

Figure S5. Photograph of residues after TGA analysis. (a) PI2000-P, (b) PI400-N, and (c) hydroxy-terminated poly(propylene glycol) (M_w: 2500). The TGA analysis was carried out in a temperature range of 300 K to 820 K.