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PART V
APPENDIX

APPENDIX A
POLYMER CHARACTERIZATION

1. Viscosity Measurement

Molecular weight can be simply determined by viscometric measurements. The viscosity of polymer solution is generally measured by capillary or rotational viscometers. For a highly accurate determination of the viscosity of polymer solutions, a capillary viscometer or an Ubbelohde viscometer is frequently used.

Analysis of Viscosity Data

Specific viscosity (η_{sp}) represents the increase of the viscosity due to presence of solute and is represented by a polynomial approximation in dilute solution as follows:

$$\eta_{sp}/C = [\eta] + k'[\eta]^2C \qquad (a1)$$

where C is the polymer concentration (g/cc), $[\eta]$ is intrinsic viscosity and k' is Huggins constant. A plot of η_{sp}/C versus C is called a Huggins plot.

Another formula, which represents the concentration dependence of viscosity, was proposed by Kraemer as follows:

$$\ln(\eta_r)/C = [\eta] + k''[\eta]^2C \qquad (a2)$$

where k" is independent of C and is related to the Huggins constant by

$$k'' = k' - 0.5 \qquad (a3)$$

The $[\eta]$ is obtained by extrapolation of either η_{sp}/C or $\ln(\eta_r)/C$ to zero concentration that is,

$$[\eta]_H = \lim_{c \to 0}(\eta_{sp}/C) \qquad \text{(a4)}$$

$$[\eta]_K = \lim_{c \to 0} \ln(\eta_r)/C \qquad \text{(a5)}$$

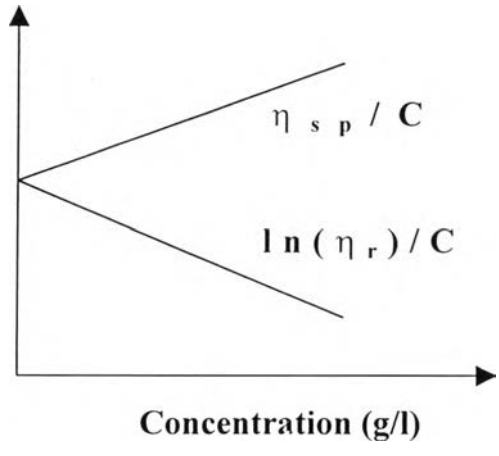


Figure a1 Plot of η_{sp} or $\ln(\eta_r)$ versus concentration.

The molecular weight was determined by using Mark-Houwink equation:

$$[\eta] = K(\overline{M}_v)^a \qquad \text{(a6)}$$

where K and a are constant values for a given polymer, solvent at a particular temperature.

Table A1 Reduced viscosity, η_{sp}/C, and inherent viscosity, $\ln(\eta_r)/C$, as a function of solution concentration at 25°C of PS680A in toluene (Figure 4.1a)

Solution Conc. (g/100cc)	Time (sec.)	η_{sp}/C	$\ln(\eta_r)/C$	Solution Conc. (g/100cc)	Time (sec.)	η_{sp}/C	$\ln(\eta_r)/C$
0.0000	300.57	-	-	0.8463	525.18	0.8788	0.6570
	301.38	-	-		525.73	0.8809	0.6582
	300.48	-	-		527.68	0.8886	0.6626
	302.33	-	-		526.33	0.8833	0.6596
0.4729	422.41	0.8512	0.7153	1.2791	665.64	0.9460	0.6199
	423.57	0.8593	0.7211		663.74	0.9411	0.6177
	421.88	0.8474	0.7126		665.37	0.9482	0.6209
	424.15	0.8634	0.7239		-	-	-
0.6700	474.66	0.8597	0.6789	1.6080	785.38	0.9998	0.5960
	475.43	0.8635	0.6814		784.39	0.9977	0.5953
	475.88	0.8657	0.6828		786.63	1.0024	0.5970
	476.18	0.8672	0.6837		-	-	-

All solution concentrations used ubbelohde viscometer number 25. K value was 0.00203 centistroke/sec (quoted from company).

Table A2 Reduced viscosity, η_{sp}/C, and inherent viscosity, $\ln(\eta_r)/C$, as a function of solution concentration at 30°C of PI in toluene (Figure 4.1b)

Solution Conc. (g/100cc)	Time (sec.)	η_{sp}/C	$\ln(\eta_r)/C$	Solution Conc. (g/100cc)	Time (sec.)	η_{sp}/C	$\ln(\eta_r)/C$
0.0000	150.00	-	-	0.0900	221.67	5.2865	4.3243
	150.11	-	-		222.11	5.3190	4.3463
	150.23	-	-		221.43	5.2687	4.3123
	150.48	-	-		221.97	5.3087	4.3393
0.0360	178.02	5.1439	4.7193	0.1800	315.52	6.1144	4.1234
	178.29	5.1938	4.7614		315.67	6.1199	4.1261
	178.29	5.1938	4.7614		314.97	6.0941	4.1137
	178.46	5.2253	4.7878		314.00	6.0582	4.0966
0.0540	193.18	5.2983	4.6596	0.2250	369.43	6.4867	3.9998
	193.11	5.2897	4.6529		367.65	6.4340	3.9783
	192.99	5.2749	4.6414		367.47	6.4287	3.9762
	193.06	5.2835	4.6481		367.43	6.4275	3.9757

All solution concentrations used ubbelohde viscometer number 50. K value was 0.00407 centistroke/sec (quoted from company).

Table A3 Reduced viscosity, η_{sp}/C, and inherent viscosity, $\ln(\eta_r)/C$, as a function of solution concentration at 25°C of PVAc500 in chloroform (Figure 4.1c)

Solution Conc. (g/100cc)	Time (sec.)	η_{sp}/C	$\ln(\eta_r)/C$	Solution Conc. (g/100cc)	Time (sec.)	η_{sp}/C	$\ln(\eta_r)/C$
0.0000	175.27	-	-	0.1818	265.74	2.9120	2.3370
	175.45	-	-		266.89	2.9474	2.3602
	174.36	-	-		263.47	2.8401	2.2899
	169.97	-	-		267.33	2.9623	2.3699
0.0645	204.63	2.7550	2.5358	0.2353	294.77	2.9599	2.2463
	205.54	2.8362	2.6046		296.27	2.9966	2.2679
	204.38	2.7327	2.5169		294.97	2.9648	2.2492
	205.49	2.8317	2.6008		295.39	2.9751	2.2552
0.1250	235.43	2.8397	2.4302	0.3333	348.76	3.0219	2.0904
	234.42	2.7932	2.3958		347.33	2.9972	2.0781
	236.66	2.8963	2.4719		346.83	2.9886	2.0738
	237.72	2.9451	2.5076		349.66	3.0374	2.0982

All solution concentrations used ubbelohde viscometer number 25. K value was 0.00203 centistroke/sec (quoted from company).

2. Rheological Properties of each polymer blend

Table A4 The pre-processing characterization of shear viscosity, N_1, η_r and N_d/N_m of HDPE5200B/PI blend at 220°C where PI acted as the minor component (Figure 4.2b)

Shear rate (s^{-1})	Shear viscosity (Poise)		N_1		η_r	N_d/N_m
	HDPE	PI	HDPE	PI		
0.10	100,850	136,966.7	-	9,245.3	1.36	-
1.00	42,100	41,333.3	70,800	119,000	0.98	1.53
3.98	19,866.7	16,850	129,000	352,333.3	0.85	2.42
10.0	11,280	8,260	228,400	465,000	0.78	2.04
25.1	5,950	3,640	327,800	715,000	0.61	2.18
100	1,643.3	627.7	513,000	840,000	0.40	1.64
158	943.3	508.3	542,666.7	-	0.72	-

Table A5 The post-processing characterization of shear viscosity, N_1, η_r and N_d/N_m of HDPE5200B/PI blend at 220°C where PI acted as the minor component (*Processing conditions*: Mixing at 10 s^{-1} and shearing at various shear rates, the strain unit was fixed at 6000) (Figure 4.22a)

Shear rate (s^{-1})	Shear viscosity (P)		N_1		η_r	N_d/N_m
	HDPE	PI	HDPE	PI		
10	6,835.5	2252	161,000	$1.03*10^5$	0.33	0.64
20	6,631.1	1172	202,004.3	$1.93*10^5$	0.18	0.95
30	3,966.5	922.39	248,043.1	$3.96*10^5$	0.23	1.59
50	2,952.5	520	368,000	$5.03*10^5$	0.18	1.37
100	2,342.4	375	404,113.9	$6.98*10^5$	0.16	1.73
200	1,360.7	280	471,200	-	0.21	-

Table A6 The pre-processing characterization of shear viscosity, N_1, η_r and N_d/N_m of PS680A/PI blend at 220°C where PI acted as the minor component (Figure 4.2a)

Shear rate (s^{-1})	Shear viscosity (P)		N_1		η_r	N_d/N_m
	PS	PI	PS	PI		
0.10	18,275.3	136,966.7	-	9,245.3	7.49	-
1.00	13,400	41,333.3	10,644.5	119,000	3.08	10.2
3.98	11,072.5	16,850	42,293	352,333.3	1.52	7.38
10.0	5,935	8,260	100,615.3	465,000	0.63	4.67
25.1	3,178.3	3,640	199,000	715,000	1.45	3.59
100	1,305.3	627.7	657,000	840,000	0.48	1.28
158	816.2	508.3	839,000	-	0.62	-

Table A7 The post-processing characterization of shear viscosity, N_1, η_r and N_d/N_m of PS680A/PI blend at 220°C where PI acted as the minor component. (*Processing conditions*: Mixing at 10 s^{-1} and shearing at various shear rates, the strain unit was fixed at 6.000) (Figure 4.22b)

Shear rate (s^{-1})	Shear viscosity (P)		N_1		η_r	N_d/N_m
	PS	PI	PS	PI		
10	-	2252	-	$1.03*10^5$	-	-
20	2065.9	1172	42,312.5	$1.93*10^5$	0.57	0.46
30	1998.5	922.39	74,808.6	$3.96*10^5$	0.46	0.53
50	1359.6	520	135,411.3	$5.03*10^5$	0.38	3.73
100	926.4	375	252,984	$6.98*10^5$	0.40	2.76
200	612.6	280	461,151.2	-	0.46	-

Table A8 The pre-processing characterization of shear viscosity, N_1, η_r and N_d/N_m of PVAc500/PI blend at 220°C and PI acted as the minor component (Figure 4.2c)

Shear rate (s^{-1})	Shear viscosity (P)		N_1		η_r	N_d/N_m
	PVAc	PI	PVAc	PI		
0.10	157,500	136,966.7	8,770	9,245.3	0.87	1.05
1.00	63,500	41,333.3	146,650	119,000	0.65	0.74
3.98	30,250	16,850	316,750	352,333.3	0.56	0.98
10.0	15,125	8,260	402,000	465,000	0.64	1.16
25.1	6,426.5	3,640	820,000	715,000	0.57	0.87
100	2,432.9	627.7	821,000	840,000	0.27	1.02
158	1,269	508.3	857,021	-	0.40	-

Table A9 The post-processing characterization of shear viscosity, N_1, η_r and N_d/N_m of PVAc500/PI blend at 220°C where PI acted as the minor component. (*Processing conditions*: Mixing at 10 s^{-1} and shearing at various shear rates, the strain unit was fixed at 6,000) (Figure 4.22c)

Shear rate (s^{-1})	Shear viscosity (P)		N_1		η_r	N_d/N_m
	PVAc	PI	PVAc	PI		
10	16453.5	2252	477,000	$1.03*10^5$	0.14	0.22
20	8539.5	1172	637,215.2	$1.93*10^5$	0.14	0.30
30	-	922.39	-	$3.96*10^5$	-	-
50	5609.2	520	809,014	$5.03*10^5$	0.11	0.62
100	2446	375	836,972.8	$6.98*10^5$	0.15	0.83
200	980.7	280	885,471.9	-	0.28	-

APPENDIX B
INTERFACIAL TENSION BETWEEN POLYMER AND THE PS SEGMENT OF BLOCK COPOLYMER

The two most common properties associated with interfaces are surface tension and interfacial tension. The surface tension is a controlling factor in processes involving wetting and coating operations whereas the interfacial tension is a primary factor in controlling rheological properties, stability and domain size in polymer-polymer dispersions. The interfacial tension (Γ_{12}) was calculated from the surface tension (γ) value of each component which can be obtained from several handbooks (Brandrup, 1989). The interfacial tension was calculated from "Harmonic-mean equation" (Jeffrey, 1988):

$$\Gamma_{12} = \gamma_1 + \gamma_2 - \frac{4\gamma_1^d \gamma_2^d}{\gamma_1^d + \gamma_2^d} - \frac{4\gamma_1^p \gamma_2^p}{\gamma_1^p + \gamma_2^p} \qquad \text{(b1)}$$

where γ_i is the surface tension of i^{th} homopolymer. In general, the surface can be separated into dispersion (nonpolar) and polar components as shown in equation b2 – b5:

$$\gamma = \gamma^d + \gamma^p \qquad \text{(b2)}$$

$$\chi^p = \frac{\gamma_p}{\gamma} \qquad \text{(b3)}$$

$$\chi^d = \frac{\gamma^d}{\gamma} \qquad \text{(b4)}$$

$$\chi^p + \chi^d = 1 \qquad \text{(b5)}$$

The superscript-d shows the dispersed contribution part arising from dispersion force interactions whereas the superscript-p exhibits the polar contribution part arising from various dipolar and specific interactions. The values of polarity (χ^p) of each homopolymer also have been published.

The surface tension of homopolymer and the interfacial tension of polymer blend at 20, 150 and 200°C are tabulated in table B1 and B2, respectively.

Table B1 Surface tension of homopolymer at 20, 150 and 200°C

polymers	γ (dyn/cm)			χ^p	χ^d	γ^d			γ^p		
	20°C	150°C	200°C			20°C	150°C	200°C	20°C	150°C	200°C
PS680A	40.7	31.4	27.8	0.168	0.832	33.86	26.12	23.13	6.84	5.27	4.67
PI	45.85	29.35	23.00	0	1	45.85	29.35	23.00	0	0	0
PE5200B	35.7	29.4	26.6	0	1	35.7	29.40	26.60	0	0	0
PVAc500	36.5	27.9	24.6	0.329	0.671	24.49	18.72	16.51	12.0	9.179	8.09

Table B2 The interfacial tension between PS segment of block copolymer and homopolymer at 20, 150 and 200°C

Polymer blend system	Interfacial tension between PS segment/major component (dyn/cm)			
	20°C *	150°C *	200°C *	220°C +
PS/ P(S-b-I-b-S)/ PI	0.000	0.000	0.000	0.000
PE/ P(S-b-I-b-S)/ PI	6.887	5.468	4.910	4.688
PVAc/ P(S-b-I-b-S)/ PI	2.925	2.277	2.020	1.926

* from calculation. + from figure C2.

The surface tension of polymer is usually a linear function of temperature. The experimental surface entropies (dγ/dT) are small for polymers, ca 0.05 mN/m (=dyn/cm). For polymer blend, the general behavior of homopolymer-homopolymer melt interfacial tension is similar in many respects for homopolymer melt surface tension. The interfacial tension decreases linearly with temperature as shown in figure B1 (Jeffrey, 1989). So the interfacial tension between PE/PS segment of block copolymer and PVAc/PS segment of block copolymer at 220°C were also received from the relation of interfacial

tension and temperature as demonstrated in figure B2. It indicated that the interfacial tension of PE/PS segment of block copolymer and PVAc/PS segment of block copolymer at 220°C is around 4.69 and 1.93 dyn/cm, respectively.

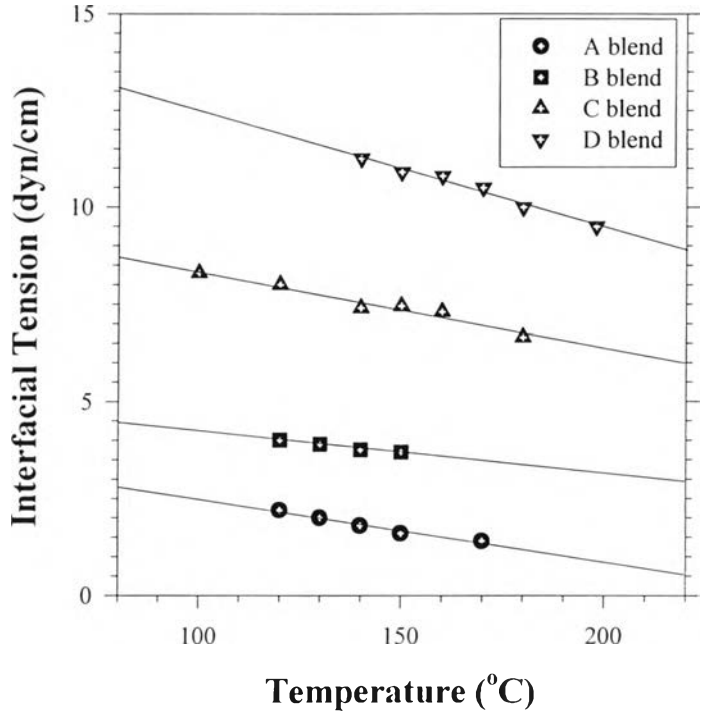


Figure B1 Interfacial tension vs temperature for immiscible binary homopolymer mixtures: *A blend*, poly(methyl methacrylate)-poly(n-butyl methacrylate); *B blend*, polychloroprene-branched polyethylene; *C blend*, poly (vinyl acetate)-polyisobutylene; *D blend*, poly(vinyl acetate)-linear polyethylene.

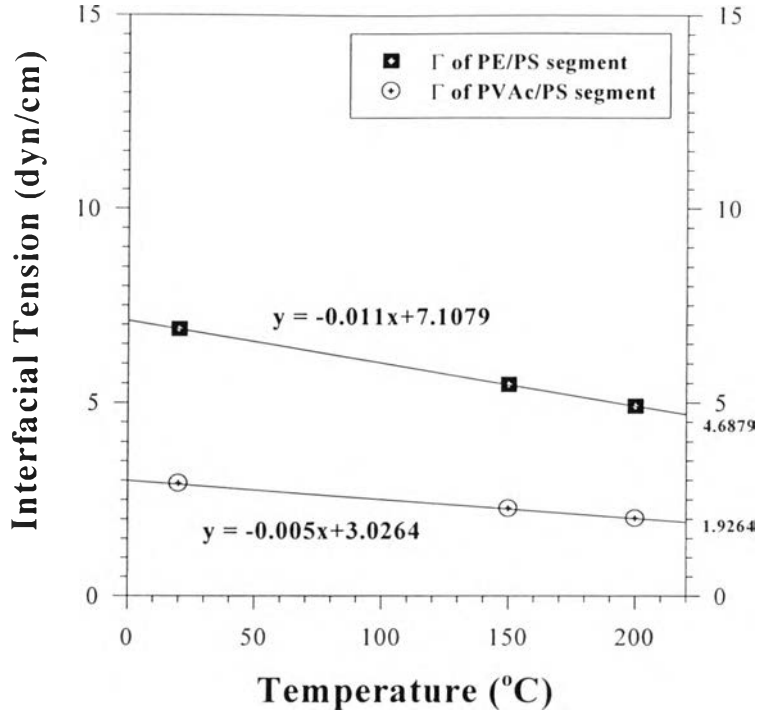
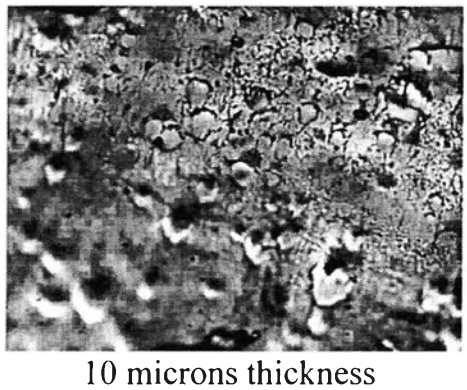


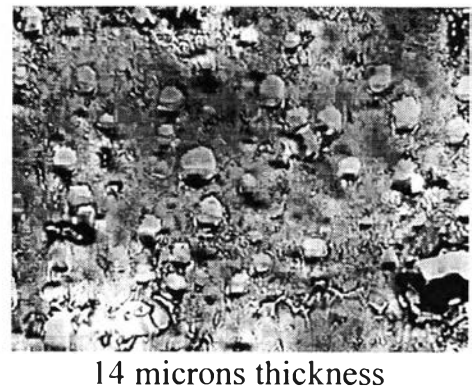
Figure B2 The interfacial tension (Γ) as a function of temperature of HDPE/PS segment and PVAc/PS segment. At 220°C, Γ of HDPE/PS and PVAc/PS are 4.69 and 1.93 dyn/cm, respectively.

APPENDIX C
MICROGRAPHS OF POLYMER BLENDS

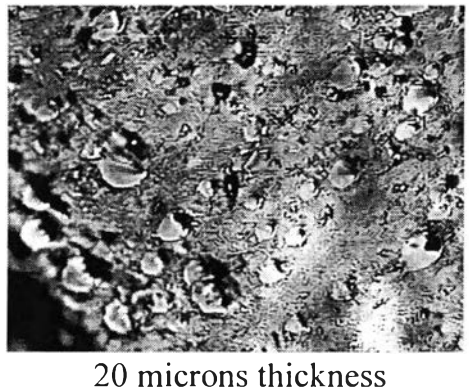
Figure C1 Suitable thickness of the thin film cut by the microtome sector by varying the thickness between 10 to 30 micrometers (magnification: 500 times).



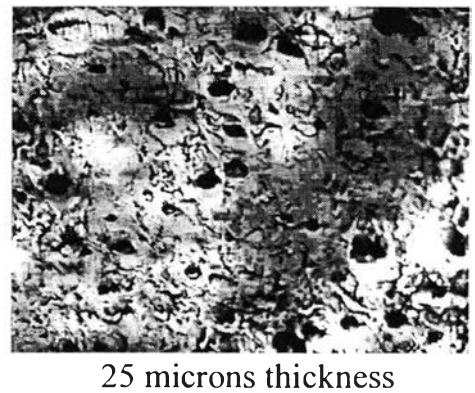
10 microns thickness



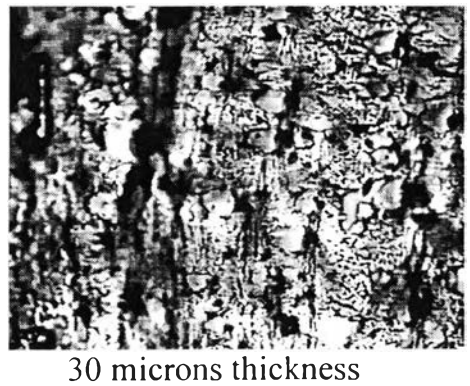
14 microns thickness



20 microns thickness

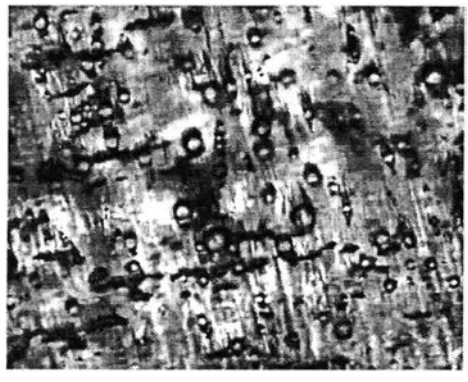


25 microns thickness

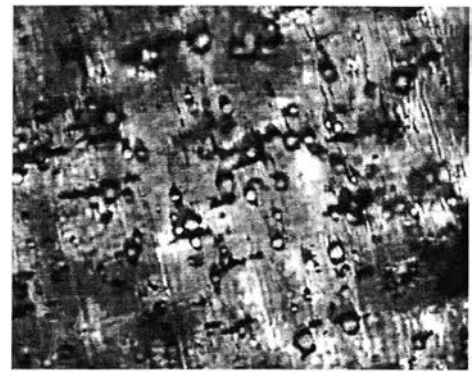


30 microns thickness

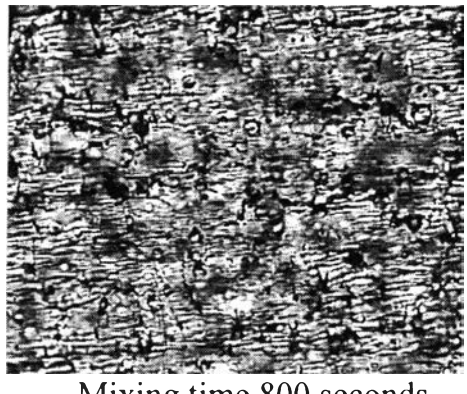
Figure C2 The micrographs of HDPE5200B/PI blend at various mixing times at the shear rate of 10 s^{-1}, 220°C (magnification: 500 times).



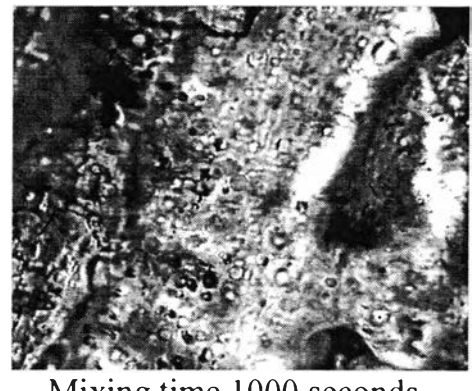
Mixing time 200 seconds



Mixing time 400 seconds

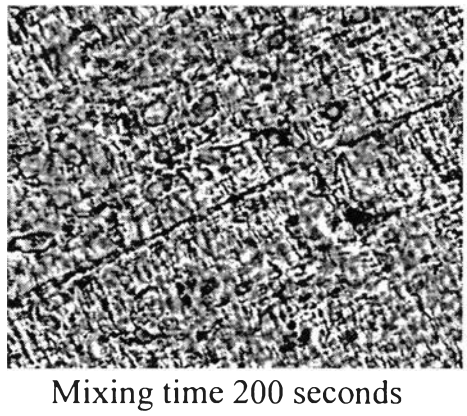


Mixing time 800 seconds

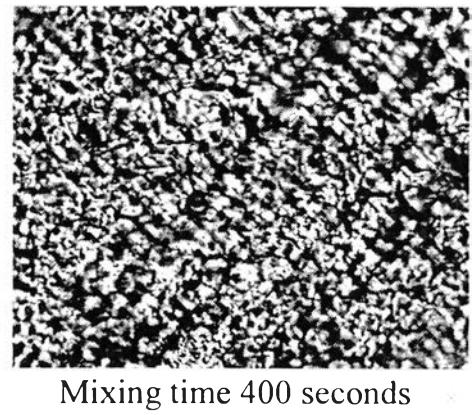


Mixing time 1000 seconds

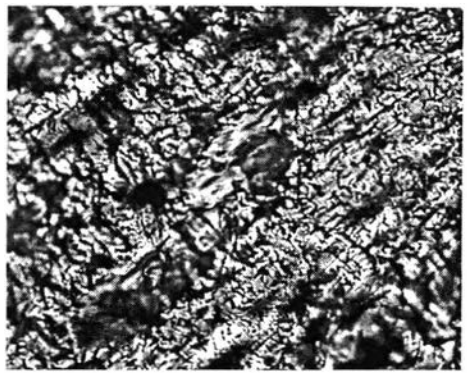
Figure C3 The micrographs of PS680A/PI blend at various mixing times at the shear rate of 10 s^{-1}, 220°C (magnification: 500 times).



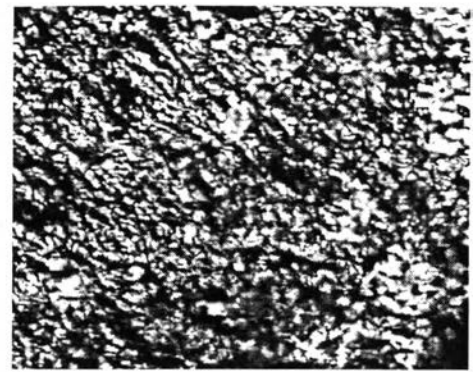
Mixing time 200 seconds



Mixing time 400 seconds

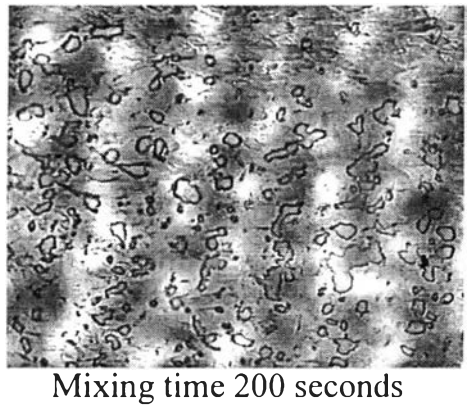


Mixing time 800 seconds

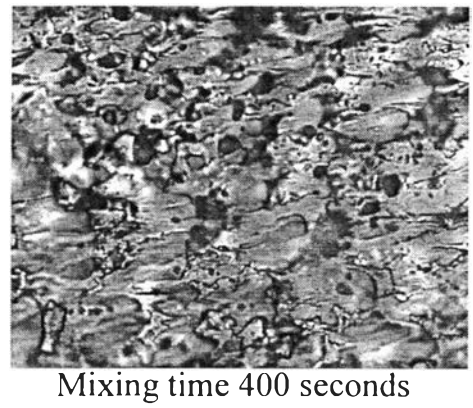


Mixing time 1000 seconds

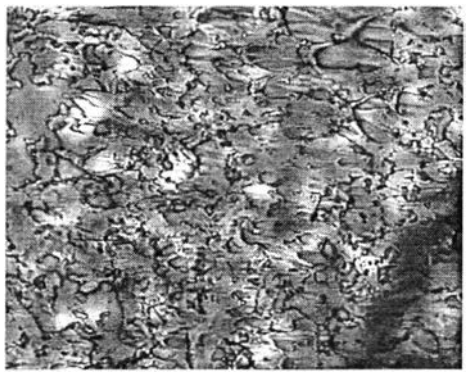
Figure C4 The micrographs of PVAc500/PI blend at various mixing times at the shear rate of 10 s^{-1}, 220°C (magnification: 500 times).



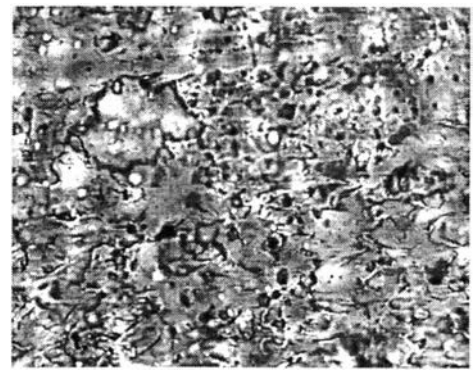
Mixing time 200 seconds



Mixing time 400 seconds

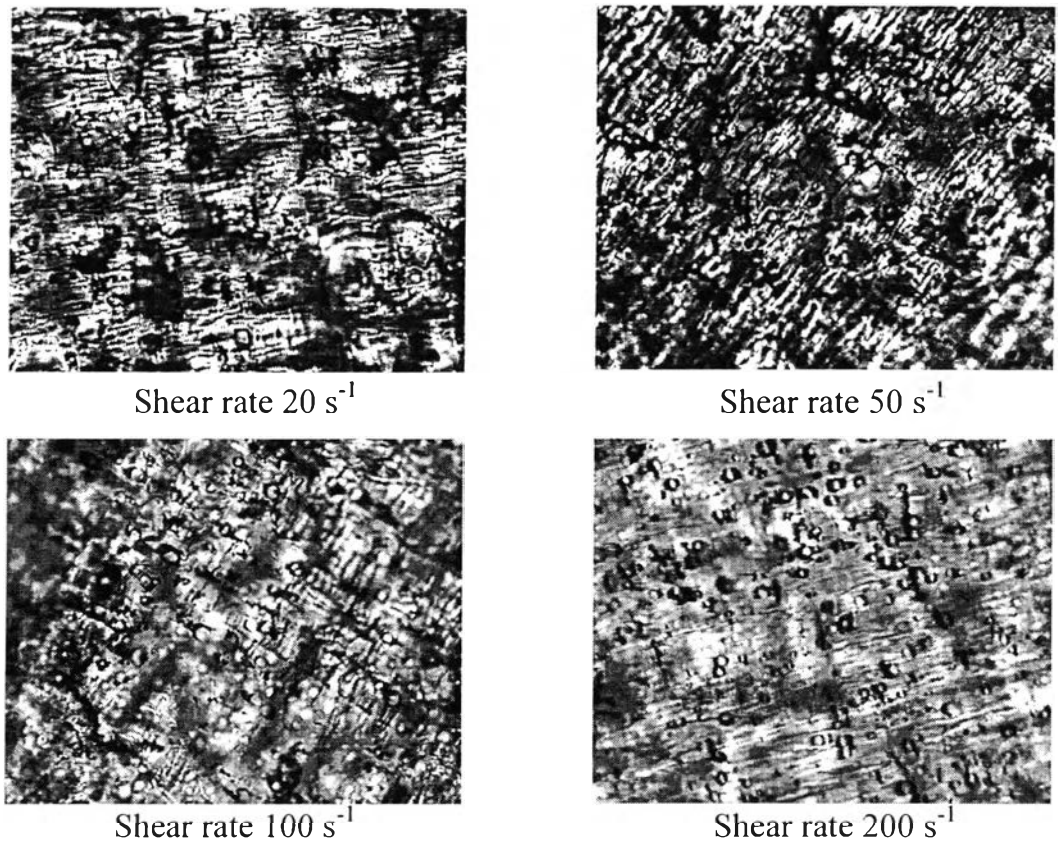


Mixing time 800 seconds



Mixing time 1200 seconds

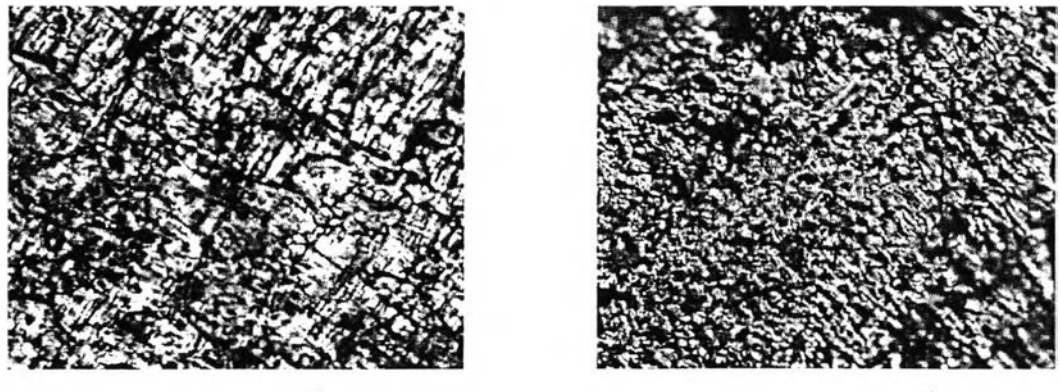
Figure C5 The micrographs of HDPE5200B/PI blend at various shear rates between 10 to 200 s^{-1}, 220°C (magnification: 500 times).



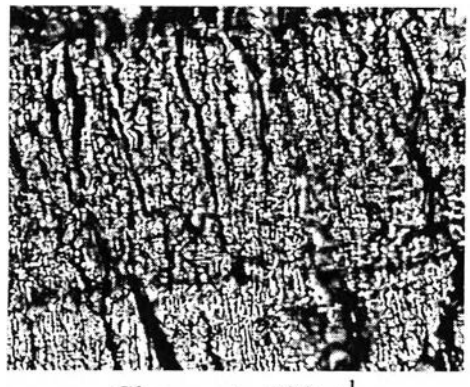
Shear rate 20 s^{-1} Shear rate 50 s^{-1}

Shear rate 100 s^{-1} Shear rate 200 s^{-1}

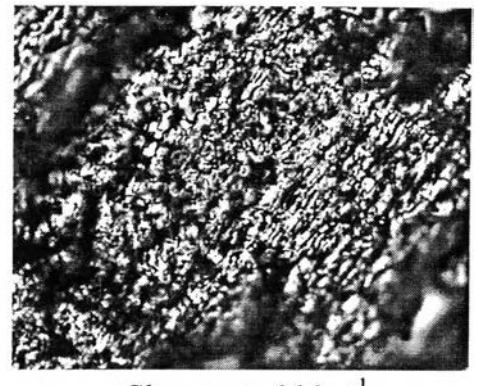
Figure C6 The micrographs of PS680A/PI blend at various shear rates between 10 to 200 s^{-1}, 220°C (magnification: 500 times).



Shear rate 20 s^{-1} Shear rate 50 s^{-1}

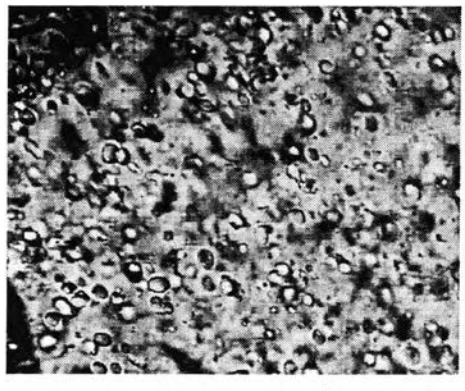


Shear rate 100 s^{-1}

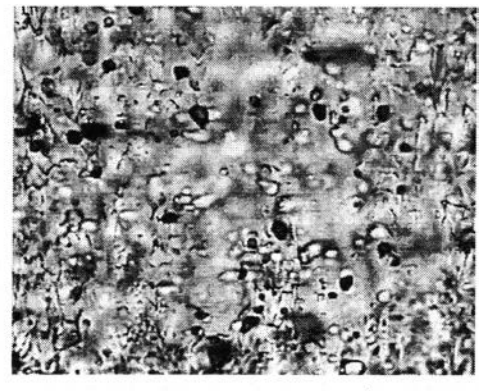


Shear rate 200 s^{-1}

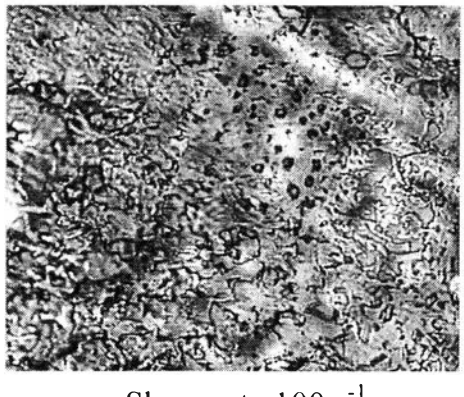
Figure C7 The micrographs of PVAc500/PI blend at various shear rates between 10 to 200 s^{-1}, 220°C (magnification: 500 times).



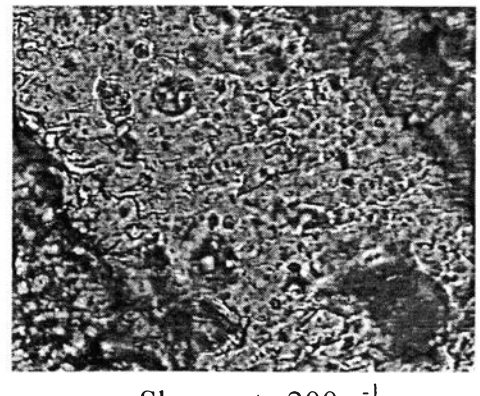
Shear rate 10 s^{-1}



Shear rate 20 s^{-1}

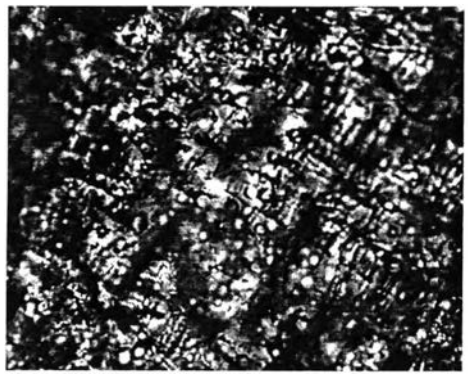


Shear rate 100 s^{-1}

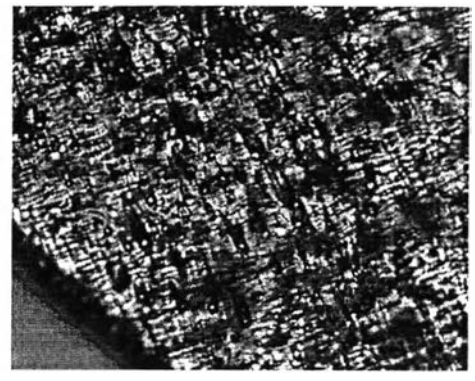


Shear rate 200 s^{-1}

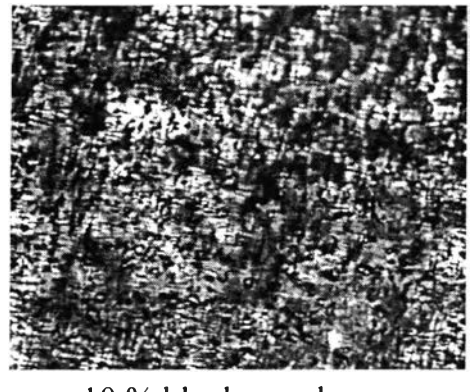
Figure C8 The micrographs of HDPE5200B/PI blend for melt mixing process at various % SIS triblock copolymer, 220°C (magnification: 500 times).



1 % block copolymer



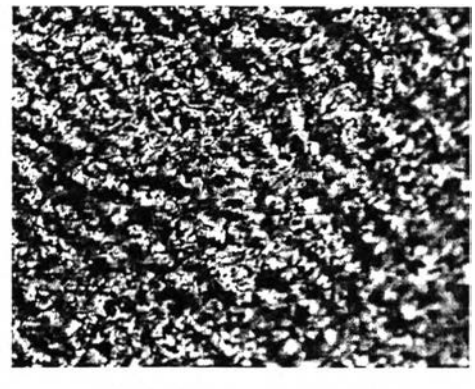
5 % block copolymer



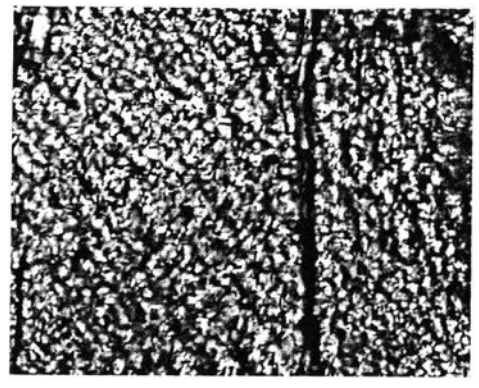
10 % block copolymer

Figure C9 The micrographs of PS680A/PI blend for melt mixing process at various % SIS triblock copolymer, 220°C (magnification: 500 times).

1 % block copolymer

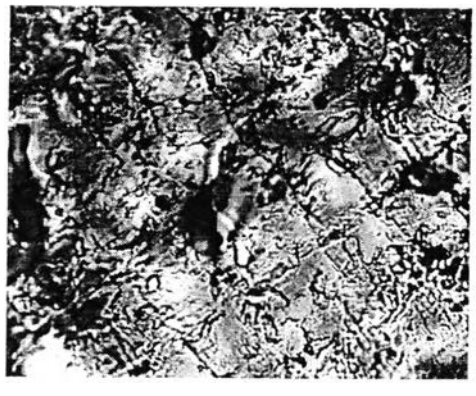


5 % block copolymer

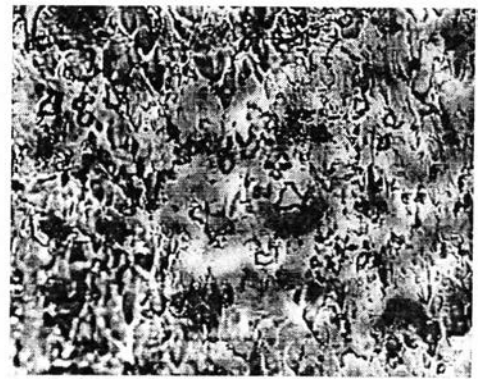


10 % block copolymer

Figure C10 The micrographs of PVAc500/PI blend for melt mixing process at various % SIS triblock copolymer, 220°C (magnification: 500 times).



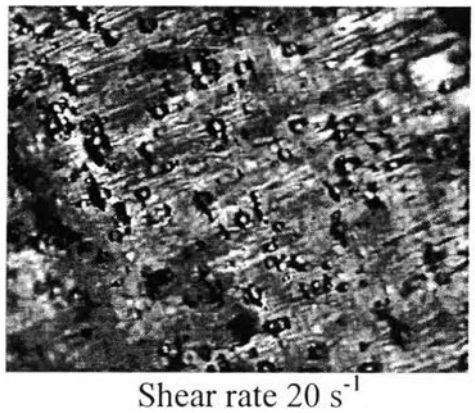
1 % block copolymer



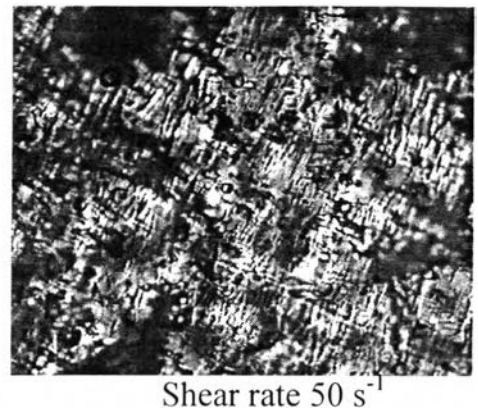
5 % block copolymer

10 % block copolymer

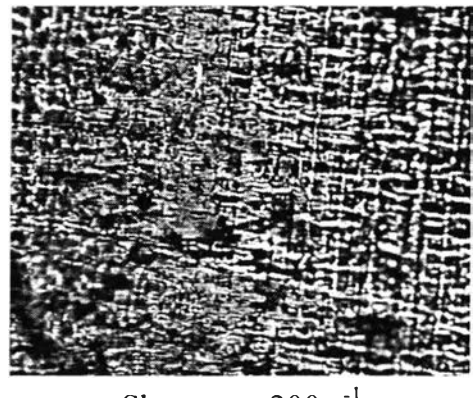
Figure C11 The micrographs of HDPE5200B/PI blend for melt mixing process at various shear rates, 5%triblock copolymer and 220°C (magnification: 500 times).



Shear rate 20 s^{-1}

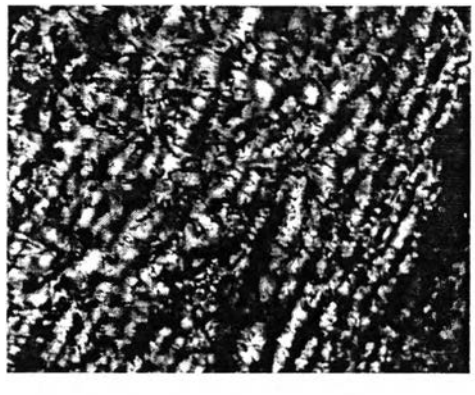


Shear rate 50 s^{-1}

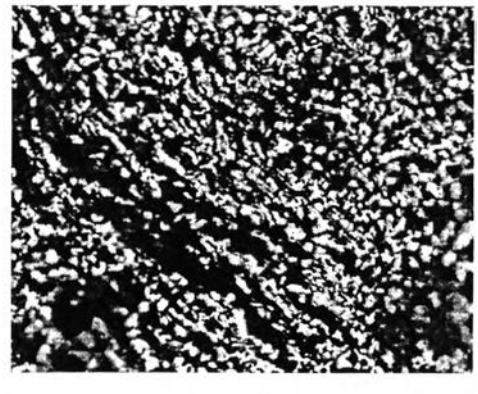


Shear rate 200 s^{-1}

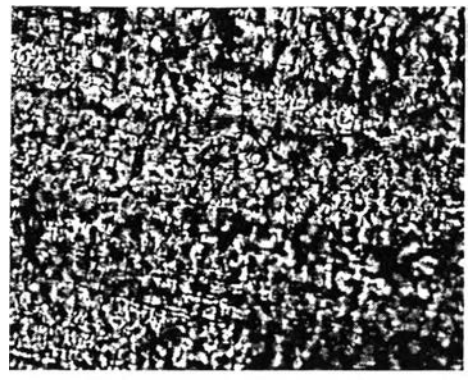
Figure C12 The micrographs of PS680A/PI blend for melt mixing process at various shear rates, 5%triblock copolymer and 220°C (magnification: 500 times).



Shear rate 20 s^{-1}



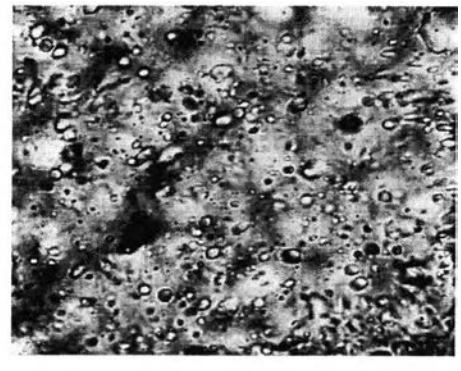
Shear rate 50 s^{-1}



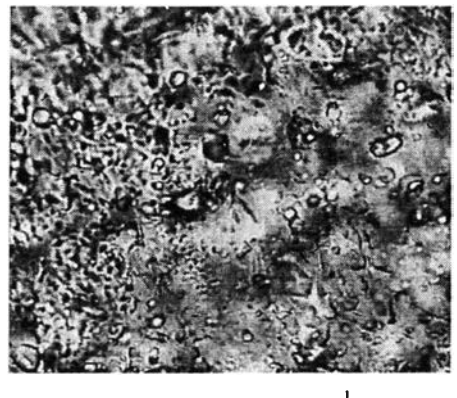
Shear rate 200 s^{-1}

Figure C13 The micrographs of PVAc500/PI blend for melt mixing process at various shear rates, 5%triblock copolymer and 220°C (magnification: 500 times).

Shear rate 20 s^{-1}



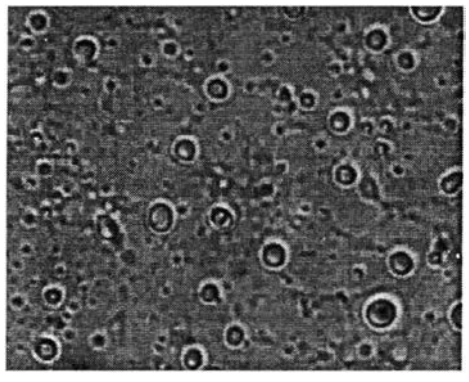
Shear rate 30 s^{-1}



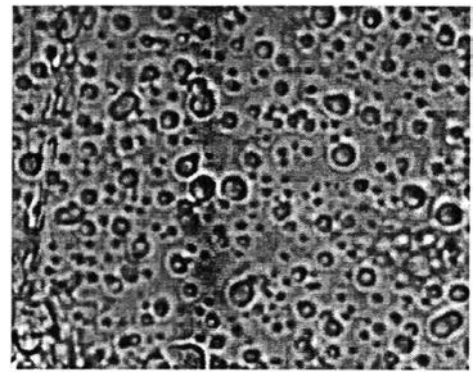
Shear rate 100 s^{-1}

Figure C14 The micrographs of PS680A/PI blend for solvent casting process at various % SIS triblock copolymer, 220°C (magnification: 500 times).

a) Casting on glass slide method

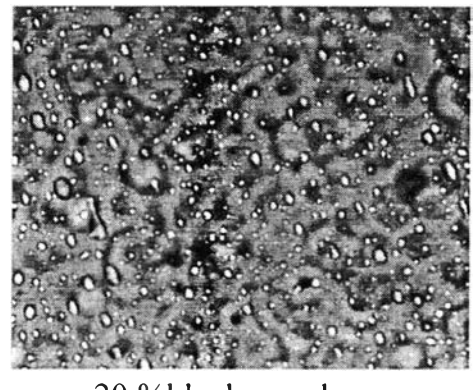


0 %block copolymer



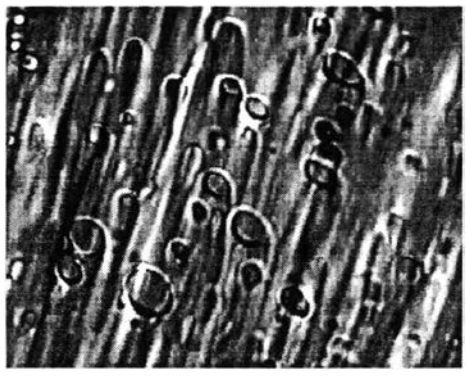
5 %block copolymer

10 %block copolymer



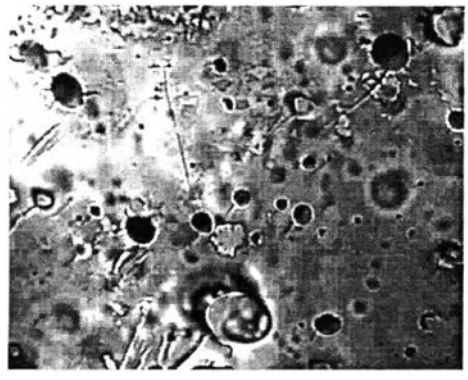
20 %block copolymer

b) Forming the thick samples and sectioned by microtome sector



0 %block copolymer

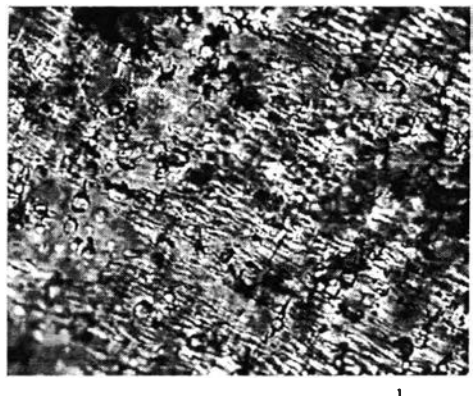
5 %block copolymer



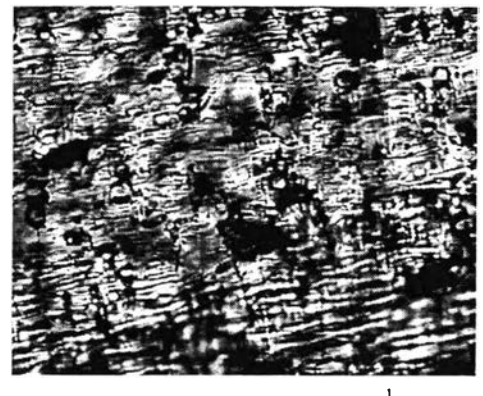
10 %block copolymer

20 %block copolymer

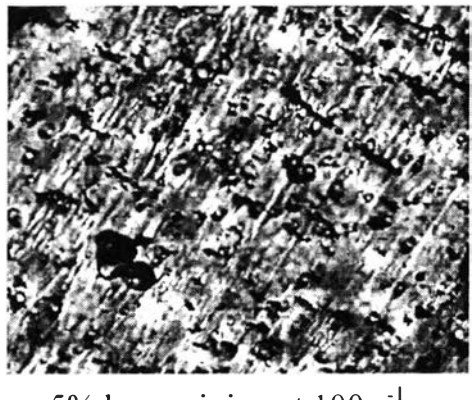
Figure C15 The micrographs of HDPE/PI blend with 0% and 5% SIS triblock copolymer by mixing at 100 s^{-1} and shearing at 10 s^{-1}, 220°C (magnification: 500 times)



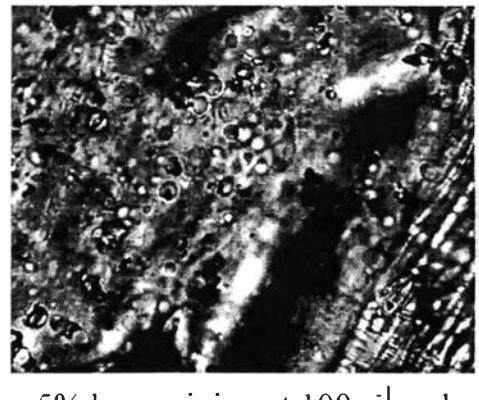
0% bcp, mixing at 100 s^{-1}



0% bcp, mixing at 100 s^{-1} and shearing at 10 s^{-1}

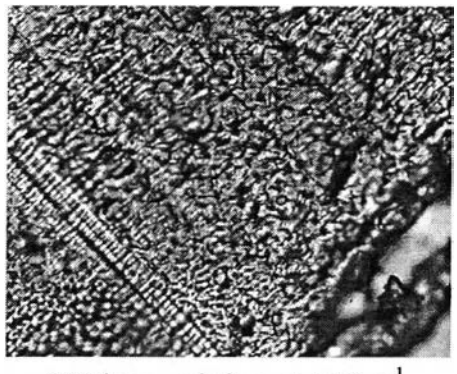


5% bcp, mixing at 100 s^{-1}

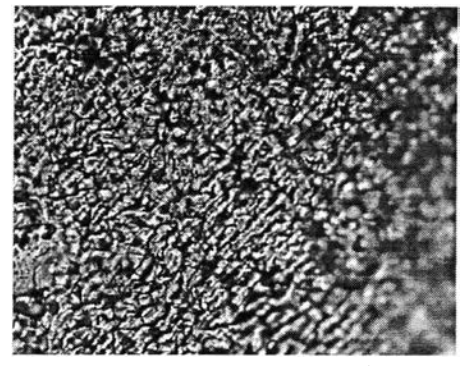


5% bcp, mixing at 100 s^{-1} and shearing at 10 s^{-1}

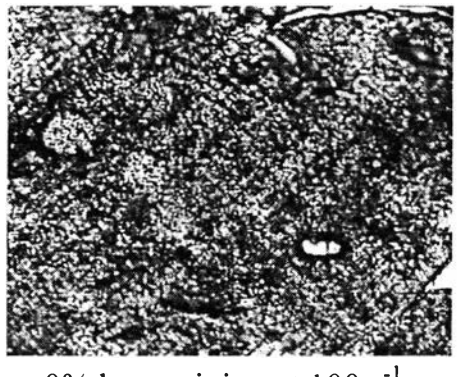
Figure C16 The micrographs of PS/PI blend with 0% and 5% SIS triblock copolymer by mixing at 100 s^{-1} and shearing at 10 s^{-1}, 220°C (magnification: 500 times)



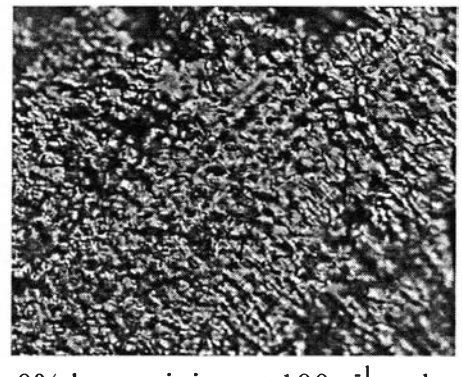
0% bcp, mixing at 100 s^{-1}



0% bcp, mixing at 100 s^{-1} and shearing at 10 s^{-1}

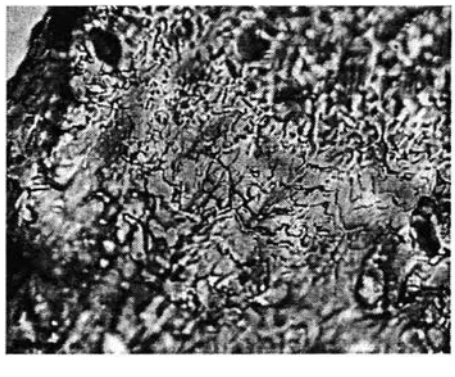


0% bcp, mixing at 100 s^{-1}



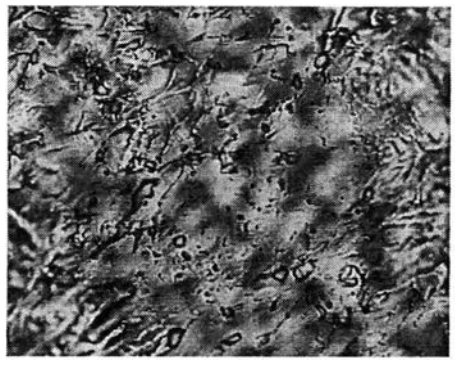
0% bcp, mixing at 100 s^{-1} and shearing at 10 s^{-1}

Figure C17 The micrographs of PVAc/PI blend with 0% and 5% SIS triblock copolymer by mixing at 100 s^{-1} and shearing at 10 s^{-1}, 220°C

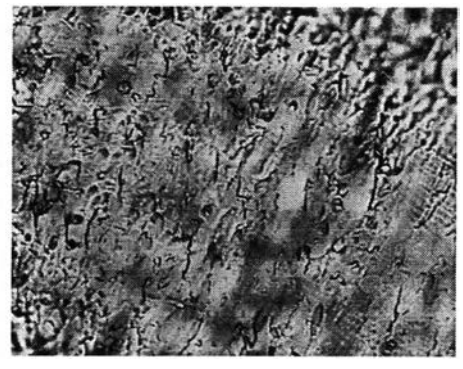


0% bcp, mixing at 100 s^{-1}

0% bcp, mixing at 100 s^{-1} and shearing at 10 s^{-1}



5% bcp, mixing at 100 s^{-1}



5% bcp, mixing at 100 s^{-1} and shearing at 10 s^{-1}

APPENDIX D

DROPLET SIZE DISTRIBUTION FUNCTIONS

Figure D1 Droplet size distribution of HDPE5200B/PI at various mixing times for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.8)

Mixing time 100 seconds		Mixing time 200 seconds		Mixing time 350 seconds		Mixing time 600 seconds	
d	f(d)	d	f(d)	d	f(d)	d	f(d)
5.032	0.035	5.032	0.083	5.032	0.000	3.804	0.000
5.706	0.053	5.706	0.041	5.706	0.286	4.431	0.044
6.267	0.105	6.267	0.041	6.267	0.476	5.032	0.088
6.933	0.193	6.933	0.167	6.933	0.048	5.706	0.309
7.574	0.175	7.574	0.292	7.574	0.143	6.267	0.309
8.197	0.228	8.197	0.167	8.197	0.027	6.933	0.162
8.863	0.070	8.863	0.042			7.574	0.059
9.428	0.035	9.428	0.125			8.197	0.000
10.14	0.017	10.14	0.042				
D = 7.58 ± 1.18 μm		D = 7.61 ± 1.31 μm		D = 6.42 ± 0.73 μm		D = 6.17 ± 0.79 μm	

Mixing time 800 seconds		Mixing time 1000 seconds		Mixing time 1200 seconds		Mixing time 1500 seconds	
d	f(d)	d	f(d)	d	f(d)	d	f(d)
3.804	0.007	3.804	0.006	3.804	0.007	4.431	0.013
4.431	0.053	4.431	0.039	4.431	0.053	5.032	0.174
5.032	0.185	5.032	0.155	5.032	0.150	5.706	0.235
5.706	0.232	5.706	0.381	5.706	0.233	6.267	0.309
6.267	0.291	6.267	0.219	6.267	0.271	6.933	0.107
6.933	0.146	6.933	0.148	6.933	0.158	7.574	0.101
7.574	0.066	7.574	0.039	7.574	0.090	8.197	0.054
8.197	0.012	8.197	0.013	8.197	0.030	8.863	0.006
8.863	0.000	8.863	0.000	8.863	0.007		
D = 6.02 ± 0.87 μm		D = 5.98 ± 0.83 μm		D = 6.18 ± 0.99 μm		D = 6.15 ± 0.95 μm	

Figure D2 Droplet size distribution of PS680A/PI at various mixing times for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.9)

Mixing time 200 seconds		Mixing time 400 seconds		Mixing time 600 seconds		Mixing time 800 seconds		Mixing time 1000 seconds		Mixing time 1200 seconds	
d	f(d)	d	f(d)	d	f(d)	d	f(d)	d	f(d)	d	f(d)
3.050	0.011	3.448	0.005	3.050	0.017	3.050	0.006	3.050	0.000	2.490	0.000
3.448	0.022	3.804	0.167	3.448	0.028	3.804	0.206	3.804	0.259	3.050	0.031
3.804	0.089	4.431	0.400	3.804	0.272	4.431	0.467	4.431	0.534	3.804	0.177
4.431	0.189	5.032	0.311	4.431	0.275	4.714	0.297	5.032	0.201	4.431	0.515
4.714	0.067	5.706	0.083	4.714	0.213	5.032	0.024	5.706	0.006	5.032	0.269
5.032	0.300	6.267	0.028	5.032	0.140	5.706	0.000	6.267	0.000	5.706	0.008
5.706	0.172	6.933	0.005	5.706	0.034						
6.267	0.111			6.267	0.000						
6.933	0.028										
D =5.09 ± 0.84		D =4.80 ± 0.59		D =4.41 ± 0.54		D =4.52 ± 0.48		D =4.39 ± 0.43		D =4.45 ± 0.48	

Figure D3 Droplet size distribution of PVAc500/PI at various mixing times for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.10)

Mixing time 200 seconds		Mixing time 400 seconds		Mixing time 600 seconds		Mixing time 800 seconds		Mixing time 1000 seconds		Mixing time 1200 seconds	
d	f(d)	d	f(d)	d	f(d)	d	f(d)	d	f(d)	d	f(d)
3.050	0.000	3.050	0.000	3.050	0.000	3.050	0.006	3.050	0.006	3.050	0.006
3.804	0.034	3.804	0.071	3.804	0.078	3.804	0.118	3.804	0.119	3.804	0.117
4.431	0.152	4.431	0.175	4.431	0.371	4.431	0.323	4.431	0.311	4.431	0.315
5.032	0.186	5.032	0.286	5.032	0.326	5.032	0.373	5.032	0.331	5.032	0.389
5.706	0.322	5.706	0.240	5.706	0.168	5.706	0.143	5.706	0.172	5.706	0.135
6.267	0.186	6.267	0.123	6.267	0.045	6.267	0.031	6.267	0.046	6.267	0.043
6.933	0.102	6.933	0.071	7.574	0.011	7.574	0.006	6.933	0.013	6.933	0.006
7.574	0.017	7.574	0.019	8.197	0.000	8.197	0.000	7.574	0.000	7.574	0.000
8.197	0.000	8.197	0.013								
		9.428	0.000								
D = 5.58±0.84		D = 5.38±0.93		D = 4.91±0.67		D = 4.83±0.66		D = 4.88±0.70		D = 4.85±0.65	

Figure D4 Droplet size distribution of HDPE5200B/PI at various shear rates for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.13a)

Initial drop size distribution		**Shear rate 10s^{-1}**		**Shear rate 20 s^{-1}**		**Shear rate 30 s^{-1}**	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
3.804	0.006	3.050	0.000	3.804	0.000	3.804	0.000
4.431	0.039	3.804	0.025	4.431	0.078	4.431	0.161
5.032	0.155	4.431	0.105	5.032	0.344	5.032	0.419
5.706	0.381	5.032	0.229	5.706	0.377	5.706	0.316
6.267	0.219	5.706	0.317	6.267	0.123	6.267	0.077
6.933	0.148	6.267	0.255	6.933	0.065	6.933	0.019
7.574	0.039	6.933	0.056	7.574	0.013	7.574	0.006
8.197	0.013	7.574	0.012	8.197	0.000	8.197	0.000
8.863	0.000	8.197	0.000				
D = 5.98 ± 0.83 μm		D = 5.60 ± 0.75 μm		D = 5.54 ± 0.66 μm		D = 5.30 ± 0.60 μm	

Shear rate 50 s^{-1}		**Shear rate 100 s^{-1}**		**Shear rate 200 s^{-1}**	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
3.804	0.000	3.050	0.000	3.050	0.031
4.431	0.167	3.804	0.132	3.804	0.215
5.032	0.629	4.431	0.456	4.431	0.508
5.706	0.148	5.032	0.368	5.032	0.215
6.267	0.056	5.706	0.044	5.706	0.031
6.933	0.000	6.267	0.000	6.267	0.000
D = 5.10 ± 0.46 μm		D = 4.62 ± 0.47 μm		D = 4.42 ± 0.52 μm	

Figure D5 Droplet size distribution of PS680A/PI at various shear rates for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.13b)

Initial drop size distribution		**Shear rate 10s^{-1}**		**Shear rate 20 s^{-1}**		**Shear rate 30 s^{-1}**	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
3.050	0.006	2.490	0.000	2.490	0.000	2.490	0.000
3.804	0.206	3.050	0.006	3.050	0.019	3.050	0.024
4.431	0.467	3.804	0.083	3.804	0.263	3.804	0.464
4.714	0.297	4.431	0.474	4.431	0.558	4.431	0.452
5.032	0.024	5.032	0.333	5.032	0.160	5.032	0.060
5.706	0.000	5.706	0.096	6.267	0.000	6.267	0.000
		6.267	0.006				
D = 4.52 ± 0.48 μm		D = 4.69 ± 0.52 μm		D = 4.33 ± 0.42 μm		D = 4.14 ± 1.41 μm	

Shear rate 50 s^{-1}		**Shear rate 100 s^{-1}**		**Shear rate 200 s^{-1}**	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
2.490	0.007	2.490	0.000	2.490	0.024
3.050	0.156	3.050	0.316	3.050	0.379
3.804	0.592	3.804	0.525	3.804	0.500
4.431	0.211	4.431	0.144	4.431	0.089
5.032	0.034	5.032	0.017	5.032	0.008
6.267	0.000	6.267	0.000	6.267	0.000
D = 3.85 ± 0.45 μm		D = 3.68 ± 0.49 μm		D = 3.36 ± 0.46 μm	

Figure D6 Droplet size distribution of PVAc500/PI at various shear rates for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.13c)

Initial drop size distribution		Shear rate 10s^{-1}		Shear rate 20 s^{-1}		Shear rate 30 s^{-1}		Shear rate 100 s^{-1}		Shear rate 200 s^{-1}	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
3.050	0.006	2.490	0.000	2.490	0.000	2.490	0.000	2.000	0.000	2.000	0.000
3.804	0.118	3.050	0.035	3.050	0.026	3.050	0.064	2.490	0.034	2.490	0.011
4.431	0.323	3.804	0.139	3.804	0.232	3.804	0.348	3.050	0.181	3.050	0.210
5.032	0.373	4.431	0.339	4.431	0.496	4.431	0.484	3.804	0.388	3.804	0.506
5.706	0.143	5.032	0.304	5.032	0.185	5.032	0.077	4.431	0.302	4.431	0.227
6.267	0.031	5.706	0.113	5.706	0.026	5.706	0.026	5.032	0.095	5.032	0.039
7.574	0.006	6.267	0.043	6.267	0.007	6.267	0.000	5.706	0.000	5.706	0.006
8.197	0.000	6.926	0.017	6.926	0.000					6.267	0.000
D =4.83±0.66		D =4.78±0.83		D =4.41±0.52		D =4.21±0.52		D =3.93±0.64		D =3.83±0.55	

Figure D7 Droplet size distribution of PS680A/PI at various %SIS triblock copolymer for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.18)

Mixing at 10 s^{-1} and shearing at 50 s^{-1}.

1% block copolymer		2% block copolymer		5% block copolymer		10% block copolymer	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
2.490	0.000	2.010	0.000	2.490	0.039	2.490	0.052
3.050	0.362	2.490	0.006	3.050	0.454	3.050	0.409
3.804	0.520	3.050	0.475	3.804	0.447	3.804	0.454
4.431	0.112	3.804	0.519	4.431	0.059	4.431	0.071
5.032	0.006	4.431	0.000	5.032	0.000	5.032	0.000
6.267	0.000						
D = 3.61 ± 0.47 μm		D = 3.44 ± 0.38 μm		D = 3.45 ± 0.47 μm		D = 3.46 ± 0.48 μm	

Figure D8 Droplet size distribution of HDPE5200B/PI at various %SIS triblock copolymer for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.18 and Figure 4.19)

a) Mixing at 10 s^{-1} and shearing at 50 s^{-1}.

1% block copolymer		2% block copolymer		5% block copolymer		10% block copolymer	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
3.050	0.000	2.490	0.000	2.490	0.000	2.490	0.000
3.804	0.056	3.050	0.016	3.050	0.019	3.050	0.065
4.431	0.422	3.804	0.197	3.804	0.169	3.804	0.130
5.032	0.433	4.431	0.557	4.431	0.623	4.431	0.695
5.706	0.089	5.032	0.229	5.032	0.189	5.032	0.109
6.267	0.000	5.706	0.000	5.706	0.000	5.706	0.000
D = 4.77 ± 0.46 μm		D = 4.42 ± 0.44 μm		D = 4.41 ± 0.41 μm		D = 4.38 ± 0.38 μm	

b) Mixing at 10 s^{-1} and shearing at 100 s^{-1}.

1% block copolymer		2% block copolymer		5% block copolymer		10% block copolymer		15% block copolymer	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
3.050	0.000	2.490	0.000	2.490	0.000	2.490	0.013	2.010	0.000
3.804	0.047	3.050	0.243	3.050	0.317	3.050	0.258	2.490	0.039
4.431	0.409	3.804	0.503	3.804	0.540	3.804	0.593	3.050	0.307
5.032	0.121	4.431	0.239	4.431	0.121	4.431	0.123	3.804	0.495
5.706	0.013	5.032	0.124	5.032	0.021	5.032	0.013	4.431	0.148
6.267	0.000	5.706	0.003	5.706	0.000	5.706	0.000	5.032	0.010
		6.267	0.000					5.706	0.000
D = 4.20 ± 0.51		D = 4.01 ± 0.47		D = 3.70 ± 0.45		D = 3.68 ± 0.47		D = 3.63 ± 0.53	

Figure D9 Droplet size distribution of PVAc500/PI at various %SIS triblock copolymer for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.18)

Mixing at 10 s^{-1} and shearing at 50 s^{-1}.

1% block copolymer		2% block copolymer		5% block copolymer		10% block copolymer	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
2.490	0.000	2.000	0.000	2.000	0.000	2.000	0.000
3.050	0.115	2.490	0.010	2.490	0.009	2.490	0.013
3.804	0.345	3.050	0.118	3.050	0.148	3.050	0.112
4.431	0.424	3.804	0.490	3.804	0.522	3.804	0.450
5.032	0.109	4.431	0.434	4.431	0.226	4.431	0.375
5.706	0.006	5.032	0.039	5.032	0.078	5.032	0.050
6.267	0.000	5.706	0.000	5.706	0.017	5.706	0.013
D = 4.13 ± 0.56 μm		D = 3.96 ± 0.50 μm		D = 3.95 ± 0.59 μm		D = 4.02 ± 0.54 μm	

Figure D10 Droplet size distribution of HDPE5200B/PI/5% SIS triblock copolymer at various shear rates for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.20)

Shear rate 20 s^{-1}		Shear rate 40 s^{-1}		Shear rate 60 s^{-1}		Shear rate 100 s^{-1}	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
3.050	0.000	3.050	0.000	3.050	0.019	2.490	0.000
3.804	0.037	3.804	0.080	3.804	0.349	3.050	0.317
4.431	0.313	4.431	0.410	4.431	0.491	3.804	0.540
5.032	0.487	5.032	0.450	5.032	0.132	4.431	0.121
5.706	0.163	5.706	0.060	5.706	0.009	5.032	0.021
6.267	0.000	6.267	0.000	6.267	0.000	5.706	0.000
D = 4.91 ± 0.48 μm		D = 4.72 ± 0.45 μm		D = 4.28 ± 0.46 μm		D = 3.70 ± 0.45 μm	

Figure D11 Droplet size distribution of PS680A/PI/5% SIS triblock copolymer at various shear rates for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.20)

Shear rate 20 s^{-1}		Shear rate 40 s^{-1}		Shear rate 60 s^{-1}		Shear rate 100 s^{-1}	
d	f(d)	d	f(d)	d	f(d)	d	f(d)
2.010	0.000	2.010	0.000	2.010	0.000	2.010	0.000
2.490	0.006	2.490	0.019	2.490	0.089	2.490	0.195
3.050	0.228	3.050	0.375	3.050	0.418	3.050	0.468
3.804	0.576	3.804	0.544	3.804	0.333	3.804	0.313
4.431	0.177	4.431	0.063	4.431	0.050	4.431	0.023
5.032	0.013	5.032	0.000	5.032	0.006	5.032	0.000
5.706	0.000			5.706	0.000		
D = 3.75 ± 0.47 μm		D = 3.54 ± 0.44 μm		D = 3.32 ± 0.50 μm		D = 3.21 ± 0.51 μm	

Figure D12 Droplet size distribution of PVAc500/PI/5% SIS triblock copolymer at various shear rates for the mixing shear rate of 10 s^{-1}, 220°C (Figure 4.20)

Shear rate 20 s^{-1}		Shear rate 30 s^{-1}		Shear rate 50 s^{-1}		Shear rate 100 s^{-1}	
d	f(d)	d	f(d)	d	f(d)	d	f(d)
2.010	0.000	2.490	0.000	2.010	0.000	2.010	0.000
2.490	0.037	3.050	0.078	2.490	0.009	2.490	0.051
3.050	0.117	3.804	0.476	3.050	0.148	3.050	0.250
3.804	0.294	4.431	0.305	3.804	0.522	3.804	0.410
4.431	0.374	5.032	0.109	4.431	0.226	4.431	0.192
5.032	0.104	5.706	0.031	5.032	0.078	5.032	0.077
5.706	0.043	6.267	0.000	5.706	0.017	5.706	0.019
6.267	0.031					6.267	0.000
6.931	0.000						
D = 4.21 ± 0.77 μm		D = 4.13 ± 0.58 μm		D = 3.95 ± 0.59 μm		D = 3.78 ± 0.71 μm	

Figure D13 Droplet size distribution of PS680A/PI at various % SIS triblock copolymer in solvent casting process

a) Casting solution on glass slide method (Figure 4.16)

0% block copolymer		2% block copolymer		5% block copolymer		15% block copolymer		20% block copolymer	
d	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**	**d**	**f(d)**
6.411	0.000	6.411	0.000	5.646	0.000	3.804	0.000	2.500	0.000
7.984	0.165	7.984	0.252	6.411	0.009	4.847	0.016	3.804	0.029
8.833	0.155	8.833	0.252	7.984	0.172	5.646	0.146	4.847	0.077
9.650	0.121	9.650	0.179	8.833	0.139	6.411	0.178	5.646	0.298
10.44	0.165	10.44	0.301	9.650	0.344	7.984	0.372	6.411	0.321
11.29	0.127	11.29	0.097	10.44	0.179	8.833	0.105	7.984	0.131
12.01	0.166	12.01	0.122	11.29	0.079	9.650	0.078	8.833	0.083
13.72	0.022	13.72	0.024	12.01	0.028	10.44	0.052	9.650	0.012
14.79	0.022	14.79	0.008	13.72	0.004	11.29	0.037	10.44	0.018
15.35	0.006	15.35	0.000	14.79	0.009	12.01	0.016	11.29	0.000
16.04	0.044			15.35	0.000	13.72	0.000		
D = 10.74 ± 2.08		D = 9.89 ± 1.60		D = 9.39 ± 1.51		D = 7.64 ± 1.65		D = 6.47 ± 1.46	

b) Forming the thick sample and microtome section method. (Figure 4.17)

0% block copolymer		2% block copolymer		5% block copolymer		15% block copolymer		20% block copolymer	
d	f(d)	d	f(d)	d	f(d)	d	f(d)	d	f(d)
6.267	0.009	5.646	0.006	4.893	0.004	3.802	0.000	3.802	0.013
7.574	0.104	6.267	0.025	5.646	0.084	4.893	0.026	4.893	0.047
8.197	0.188	7.574	0.193	6.267	0.245	5.646	0.132	5.646	0.267
9.428	0.179	8.197	0.205	7.574	0.211	6.267	0.316	6.267	0.500
10.64	0.226	9.428	0.180	8.197	0.207	7.574	0.184	7.574	0.100
11.11	0.104	10.64	0.174	9.428	0.160	8.197	0.158	8.197	0.067
12.05	0.113	11.11	0.081	10.64	0.080	9.428	0.105	9.428	0.006
13.31	0.057	12.05	0.118	11.11	0.008	10.64	0.079	10.64	0.000
14.25	0.009	13.31	0.018	12.05	0.000	11.11	0.000		
15.86	0.009	14.25	0.000						
D = 10.42 ± 2.29		D = 9.66 ± 1.66		D = 7.91 ± 1.40		D = 7.38 ± 1.45		D = 6.42 ± 1.02	

Figure D14 Drop size distribution of three immiscible blends at 0 and 5% SIS triblock copolymer for the mixing shear rate of 100 s^{-1}, 220 °C (Figure ...)

HDPE5200B/PI blend				PS680A/PI blend			
0% block copolymer		5% block copolymer		0% block copolymer		5% block copolymer	
d	f(d)	d	f(d)	d	f(d)	d	f(d)
2.490	0.000	2.490	0.000	2.010	0.000	2.010	0.000
3.050	0.048	3.050	0.028	2.490	0.006	2.490	0.008
3.804	0.211	3.804	0.326	3.050	0.105	3.050	0.060
4.431	0.433	4.431	0.369	3.804	0.408	3.804	0.552
5.032	0.167	5.032	0.248	4.431	0.329	4.431	0.353
5.706	0.104	5.706	0.028	5.032	0.072	5.032	0.026
6.267	0.037	6.267	0.000	5.706	0.006	5.706	0.000
6.931	0.000			6.267	0.000		
D = 4.53 ± 0.71 μm		D = 4.37 ± 0.56 μm		D = 4.05 ± 0.57 μm		D = 3.98 ± 0.44 μm	

PVAc500/PI blend			
0% block copolymer		5% block copolymer	
d	f(d)	d	f(d)
2.490	0.000	2.010	0.000
3.050	0.032	2.490	0.009
3.804	0.226	3.050	0.118
4.431	0.500	3.804	0.300
5.032	0.169	4.431	0.418
5.706	0.072	5.032	0.109
6.267	0.000	5.706	0.045
		6.267	0.000
D = 4.44 ± 0.57 μm		D = 4.18 ± 0.66 μm	

Figure D15 Drop size distribution of three immiscible blends at 0 and 5% SIS triblock copolymer for the mixing shear rate of 100 s^{-1} and shearing at 10 s^{-1}, 220°C (Figure 4.22)

HDPE5200B/PI blend				PS680A/PI blend			
0% block copolymer		5% block copolymer		0% block copolymer		5% block copolymer	
d	f(d)	d	f(d)	d	f(d)	d	f(d)
2.490	0.000	2.490	0.000	2.490	0.000	2.490	0.000
3.050	0.013	3.050	0.016	3.050	0.090	3.050	0.090
3.804	0.085	3.804	0.206	3.804	0.534	3.804	0.534
4.431	0.276	4.431	0.444	4.431	0.301	4.431	0.301
5.032	0.335	5.032	0.238	5.032	0.075	5.032	0.075
5.706	0.197	5.706	0.071	5.706	0.000	5.706	0.000
6.267	0.066	6.267	0.024				
6.931	0.020	7.574	0.000				
8.197	0.007						
D = 5.01 ± 0.78 μm		D = 4.56 ± 0.61 μm		D = 4.28 ± 0.56 μm		D = 4.02 ± 0.49 μm	

PVAc500/PI blend			
0% block copolymer		5% block copolymer	
d	f(d)	d	f(d)
3.050	0.000	2.490	0.000
3.804	0.060	3.050	0.051
4.431	0.300	3.804	0.271
5.032	0.380	4.431	0.381
5.706	0.180	5.032	0.229
6.267	0.060	5.706	0.042
7.574	0.000	6.267	0.017
		7.574	0.008
D = 5.03 ± 0.71 μm		D = 4.43 ± 0.68 μm	

APPENDIX E

Correlation between Ca versus N_r

As presented in the introduction part that the drop size and the drop size distribution depend on two dimensionless parameters: the capillary number ($Ca = \frac{\gamma \eta_m D}{2\Gamma}$) and the viscosity ratio ($\eta_r = \frac{\eta_d}{\eta_m}$). There are many previous works studied the relation between Ca versus η_r (Wu, 1987) but no one emphasize on the correlation between Ca versus N_r ($N_r = \frac{N_{1,d}}{N_{1,m}}$). The data of the matrix viscosity (η_m), D_n and interfacial tension (Γ) used in calculating the capillary number are tabulated in Table E1 and Table E2. The viscosity ratio and the first normal stress difference ratio at any shear rates of all the blends also shown in these tables.

Table E1 The data of η_m, D_n, Γ, Ca, η_r and N_r of all blends with 0% SIS triblock copolymer at any shear rates

Polymer Blends	Shear rate (s^{-1})	η_m (Poise)	D_n (μm)	Γ (dyn/cm)	Ca	η_r	N_r
PS/PI	20	3,500	3.91 to 4.75	5.08	2.69 to 3.27	1.45	-
	30	3,180	3.73 to 4.55		3.50 to 4.27	0.85	3.59
	50	1,800	3.40 to 4.30		3.01 to 3.81	0.83	2.05
	100	1,310	3.19 to 4.17		4.12 to 5.37	0.19	1.28
HDPE/PI	10	8,840	4.85 to 6.35	10.33	2.07 to 2.72	0.78	2.04
	20	7,000	4.88 to 6.20		3.31 to 4.20	0.62	2.15
	50	3,200	4.76 to 5.36		3.68 to 4.31	0.47	1.90
	100	1,640	4.15 to 5.09		3.29 to 4.04	0.40	1.64
	50	4,000	3.69 to 4.73		4.77 to 6.12	0.37	1.00

Polymer Blends	Shear rate (s^{-1})	η_m (Poise)	D_n (μm)	Γ (dyn/cm)	Ca	η_r	N_r
PVAc/PI	10	13,800	3.95 to 5.61	7.73	3.52 to 5.01	0.64	1.16
	20	7,000	3.89 to 4.93		3.52 to 4.46	0.62	0.81
	30	5,200	3.75 to 4.84		3.78 to 4.88	0.48	0.92
	50	4,000	3.69 to 4.73		4.77 to 6.12	0.37	1.00

Table E2 The data of η_m, D_n, Γ, Ca, η_r and N_r of all blends with 5% SIS triblock copolymer at any shear rates

Polymer Blends	Shear rate (s^{-1})	η_m (Poise)	D_n (μm)	Γ (dyn/cm)	Ca	η_r	N_r
PS/PI	40	2,500	3.10 to 3.98	5.08	3.05 to 3.92	0.85	3.59
	50	1,800	2.98 to 3.92		2.64 to 3.47	0.83	2.05
	60	1,500	2.82 to 3.82		2.50 to 3.38	0.80	1.50
	100	1,310	2.70 to 3.72		3.48 to 4.79	0.20	1.28
HDPE/PI	20	7,000	4.43 to 5.39	10.33	3.00 to 3.65	0.61	2.15
	40	4,000	4.27 to 5.17		3.31 to 4.00	0.45	2.05
	50	3,200	4.00 to 4.82		3.10 to 3.73	0.47	1.90
	60	2,500	3.82 to 4.74		2.77 to 3.44	0.43	1.72
PVAc/PI	20	7,000	3.80 to 4.70	7.73	3.44 to 4.26	0.58	0.81
	30	5,200	3.70 to 4.60		3.73 to 4.64	0.48	0.92
	50	4,000	3.51 to 4.42		4.53 to 5.69	0.37	1.00
	100	2,410	3.30 to 4.30		5.14 to 6.70	0.27	1.02

The graph shows the relation between Ca versus N_r of all the blends at 0 and 5% SIS triblock copolymer is shown in figure E1. The viscosity ratio in all systems was fixed. The viscosity ratio of HDPE/PI and PVAc/PI blends were fixed at 0.4 whereas that of PS/PI blends was 0.8.

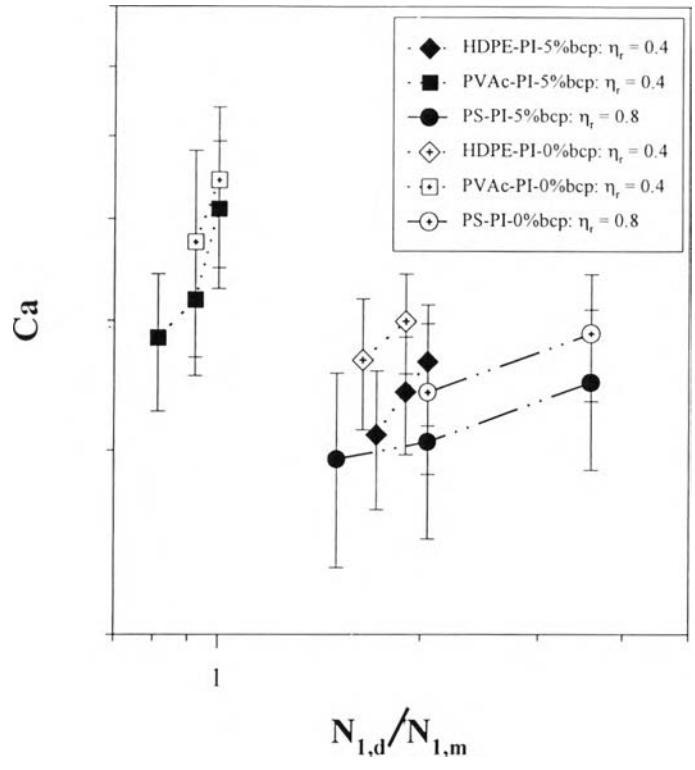


Figure E1 The plot between capillary number (Ca) versus N_r of all blends at 0 and 5% SIS triblock copolymer. The viscosity ratio of the PVAc/PI and the HDPE/PI blends were fixed at 0.4 whereas the viscosity ratio of 0.8 was chosen in the PS/PI blend.

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