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APPENDICES

APPENDIX A Scanning Electron Microscopy Analysis

Table A1 Number average particle size (μm) of dispersed phase of HDPE/PBT 80/20 blend

Compatibilizer content	0 phr	1 phr	2.5 phr	5 phr	10 phr
Maximum	2.96	2.47	2.9	2.4	2.11
Minimum	1.33	1.59	0.73	1.11	0.64
Mean	2.16	2.02	2	1.85	1.3

Table A2 Number average particle size (μm) of dispersed phase of HDPE/PBT 70/30 blend

Compatibilizer content	0 phr	1 phr	2.5 phr	5 phr	10 phr
Maximum	3.34	2.44	2.65	2.56	2.66
Minimum	1.67	0.55	0.7	0.76	0.67
Mean	2.41	1.6	1.77	1.67	1.44

Table A3 Number average particle size (μm) of dispersed phase of HDPE/PBT 50/50 blend

Compatibilizer content	0 phr	1 phr	2.5 phr	5 phr	10 phr
Maximum	5.53	3.85	2.49	2.62	2.74
Minimum	1.64	0.73	0.64	0.67	0.56
Mean	2.53	2.26	1.45	1.5	1.55

Table A4 Number average particle size (μm) of dispersed phase of HDPE/PBT 30/70 blend

Compatibilizer content	0 phr	1 phr	2.5 phr	5 phr	10 phr
Maximum	4.86	3.66	4.64	3.8	2.38
Minimum	2.33	0.71	0.39	0.52	0.58
Mean	3.66	1.84	2.21	1.81	1.42

Table A5 Number average particle size (μm) of dispersed phase of HDPE/PBT 20/80 blend

Compatibilizer content	0 phr	1 phr	2.5 phr	5 phr	10 phr
Maximum	5.23	4.82	2.64	3.12	3.33
Minimum	2.16	1.81	1.47	1.17	1.41
Mean	3.57	3.53	2.02	2.12	2.21

APPENDIX B Mechanical Properties of the Blends

Table B1 Impact strength (KJ/m^2) of the HDPE/PBT blend

Compatibilizer Content (phr)	HDPE/PBT									
	80/20		70/30		50/50		30/70		20/80	
	Avg	STD	Avg	STD	Avg	STD	Avg	STD	Avg	STD
0	2.32	0.08367	2.8	0.122474	5.525	0.478714	6	0.4	6.92	0.66106
1	1.9	0	3.3	0.731437	4.9	0.489898	3.94	0.59414	4.8	0.41231
2.5	2.18	0.23875	2.22	0.178885	4.16	0.114018	2.74	0.34351	4.2	0.49497
5	2.06	0.11402	2.16	0.114018	3.8	0.380789	3.4	0.24495	3.7	0.55227
10	2.24	0.20736	2.2	0.141421	3.38	0.622093	3.02	0.46583	4.02	0.67602

Table B2 Tensile properties of the HDPE/PBT blend

content (phr)	Tensile Modulus (MPa)			Tensile Strength (MPa)		
	70/30	50/50	30/70	70/30	50/50	30/70
0	698.3458608	768.7142869	885.0344449	18.40919398	31.17884158	37.85387826
1	763.8449967	761.8713795	871.9155045	29.93046769	36.29164547	42.76316477
2.5	724.8581545	755.226917	920.1579075	26.2973282	35.55663698	44.52895326
5	682.3173697	780.9281802	842.3068306	25.67593068	34.37386985	39.04218984
10	684.65963	721.8589034	821.5661181	25.09908668	29.28214245	40.84005165

APPENDIX C Rheological behavior

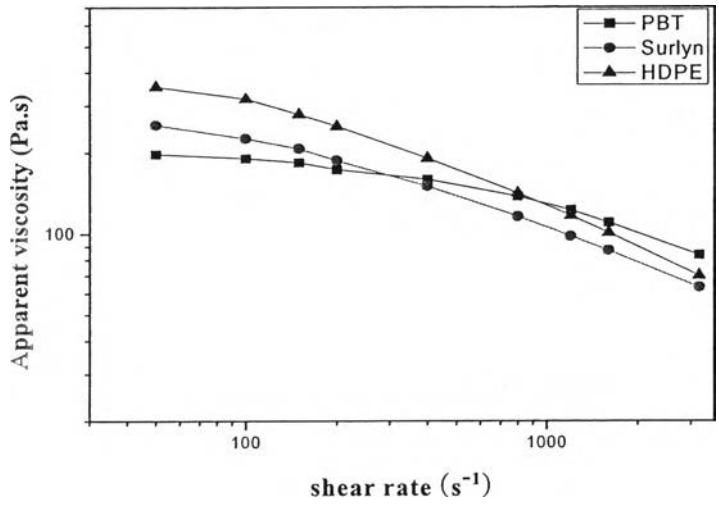


Figure C1 Flow cures of neat components

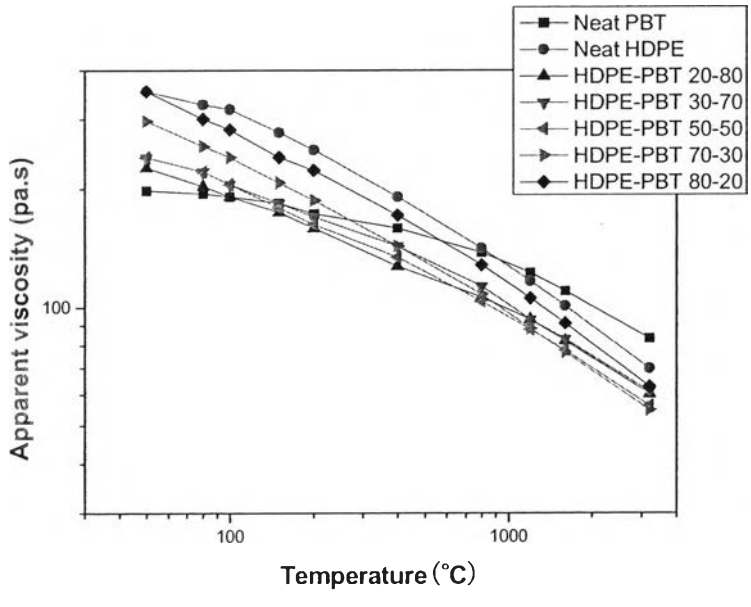


Figure C2 Flow curves of uncompatibilized binary blends and neat polymers

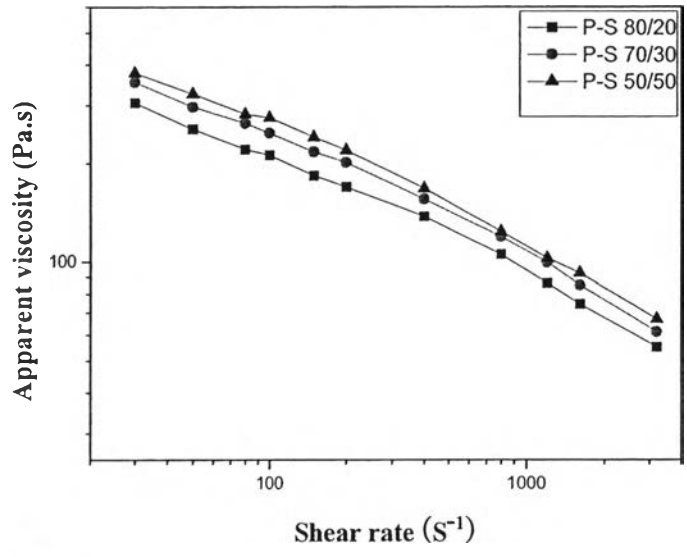


Figure C3 Flow cures of PBT/Suryln blends

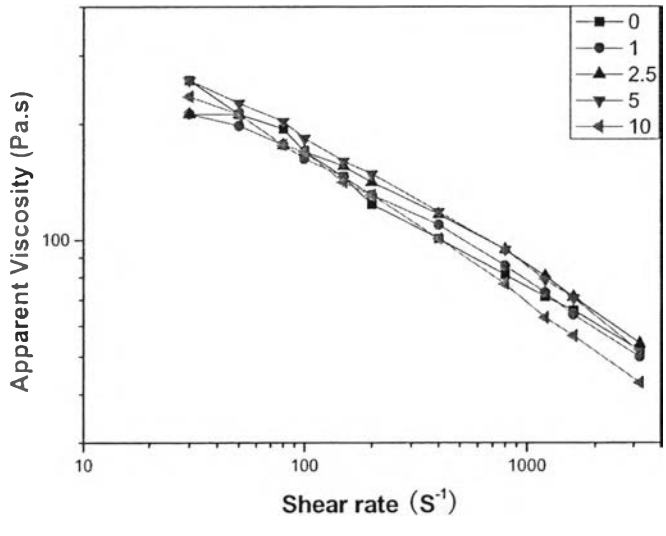


Figure C4 Flow cures of PBT/HDPE 80/20 blend containing various Surlyn contents of 0, 1, 2.5, 5, 10 phr.

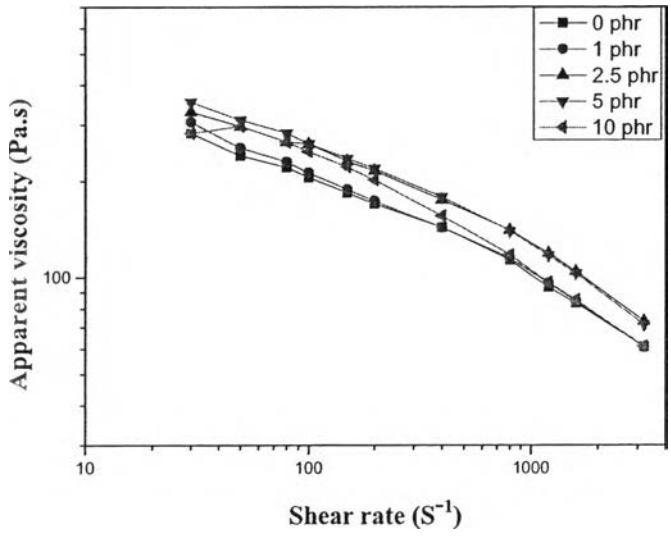


Figure C5 Flow cures of PBT/HDPE 70/30 blend containing various Surlyn contents of 0, 1, 2.5, 5, 10 phr.

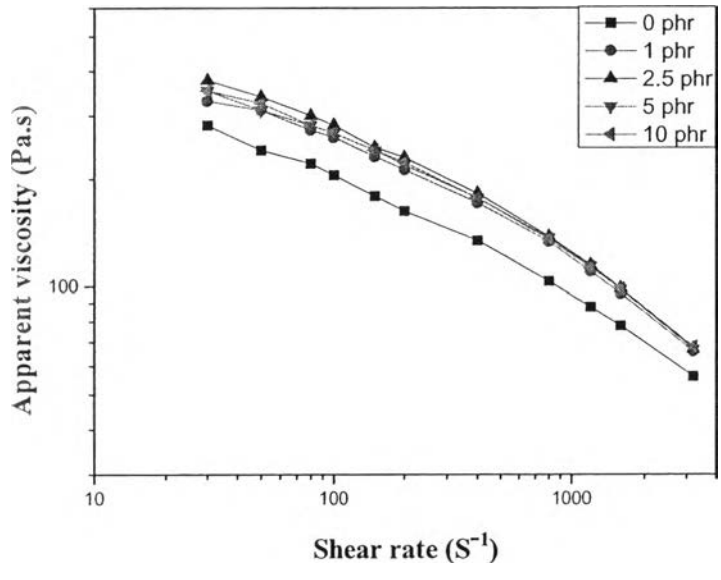


Figure C6 Flow cures of PBT/HDPE 50/50 blend containing various Surlyn contents of 0, 1, 2.5, 5, 10 phr.

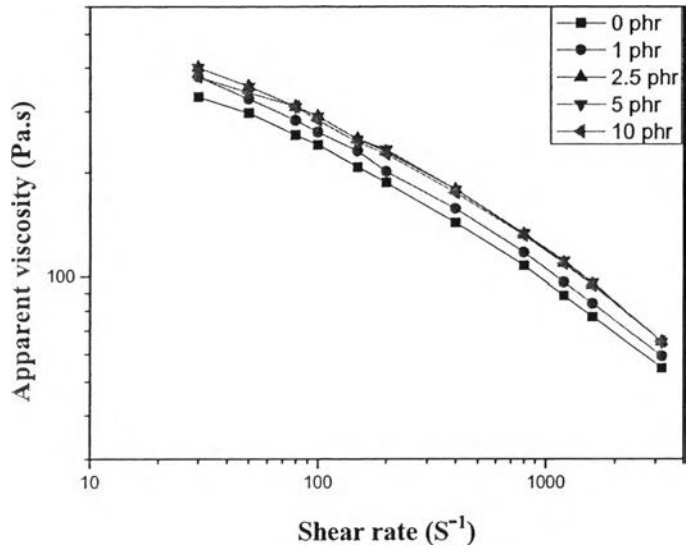


Figure C7 Flow cures of PBT/HDPE 30/70 blend containing various Surlyn contents of 0, 1, 2.5, 5, 10 phr.

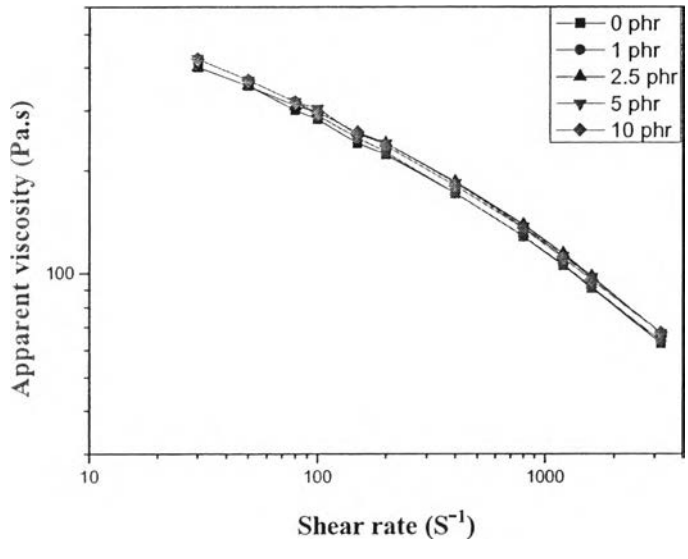
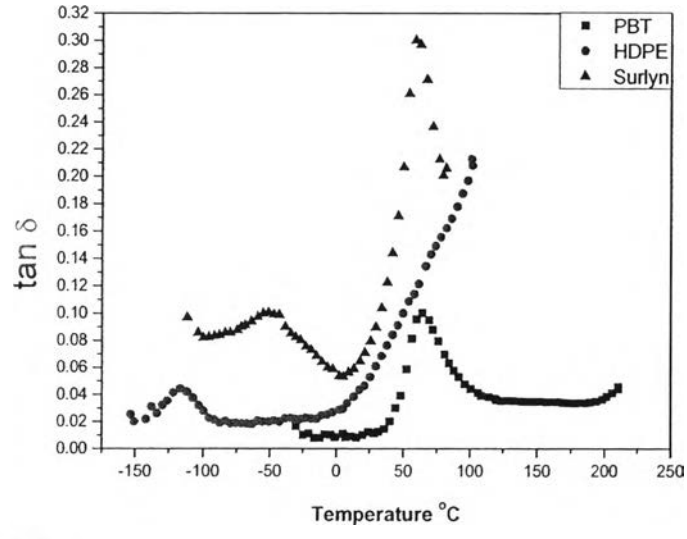
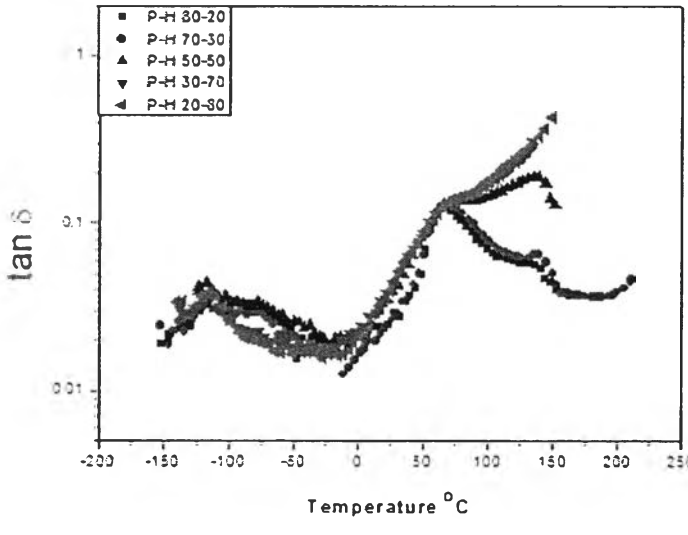


Figure C8 Flow cures of PBT/HDPE 20/80 blend containing various Surlyn contents of 0, 1, 2.5, 5, 10 phr.

APPENDIX D Dynamic properties

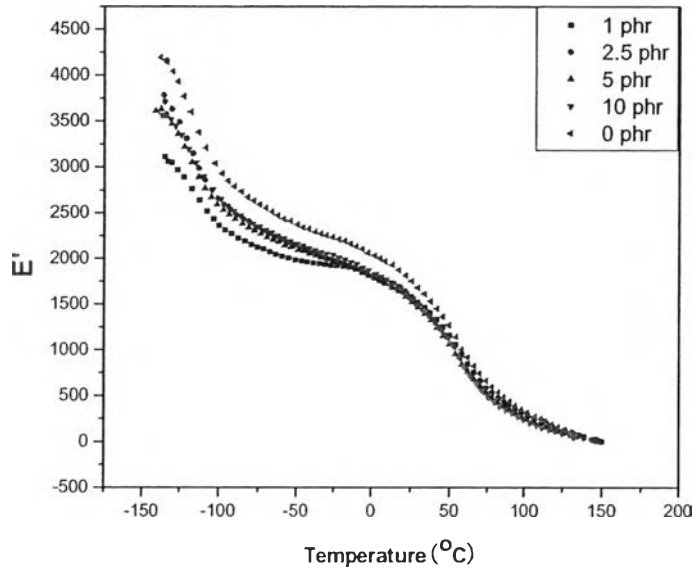


(a)

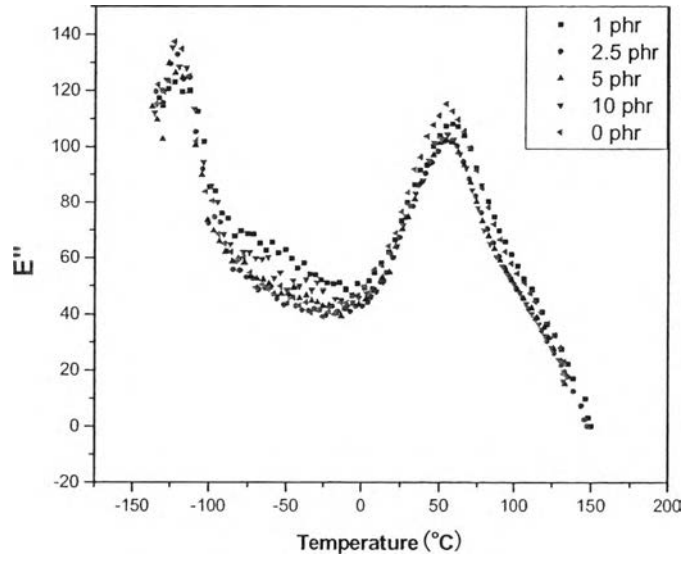


(b)

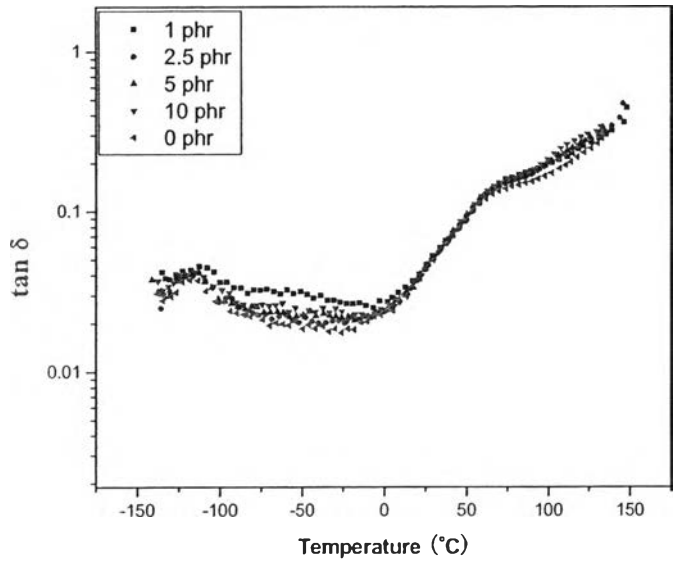
Figure D1 Tan δ as a function of temperature of neat compositions (a) and PBT/HDPE blends (b).


1 phr
2.5 phr
5 phr
10 phr
0 phr
E'
Temperature (°C)

(a)

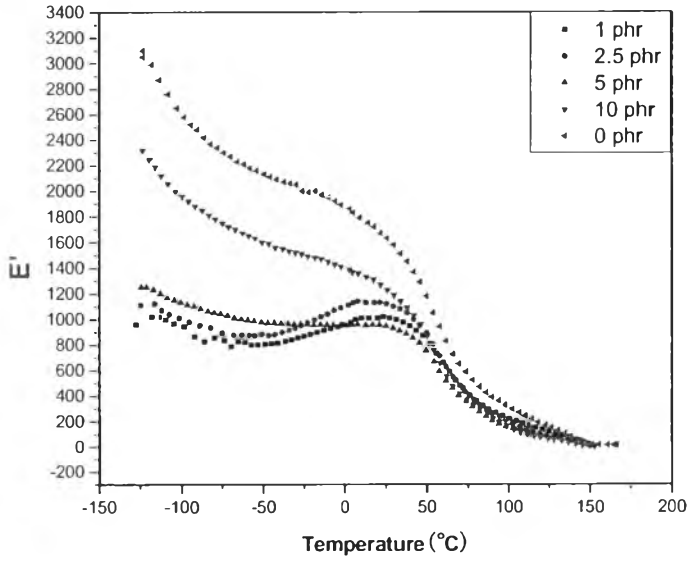

1 phr
2.5 phr
5 phr
10 phr
0 phr
E''
Temperature (°C)

(b)

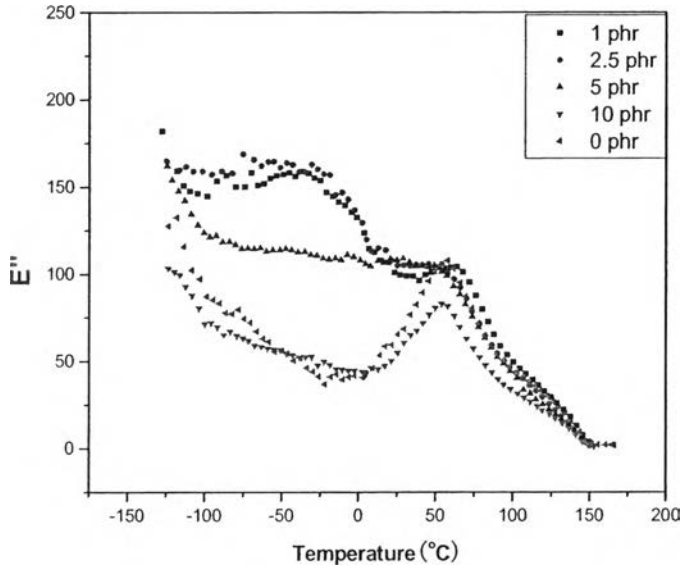


(c)

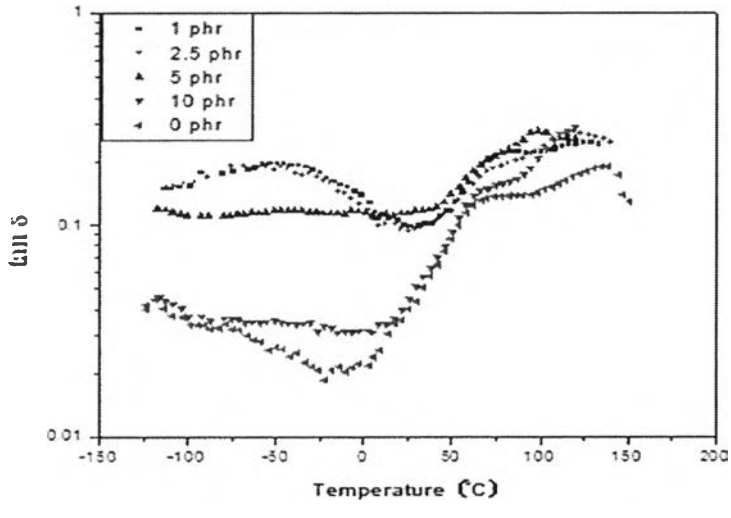
Figure D2 Storage modulus E' (a), loss modulus E''(b), tan δ (c) as a function of temperature of PBT/HDPE 30/70 with surlyn blend compositions



(a)

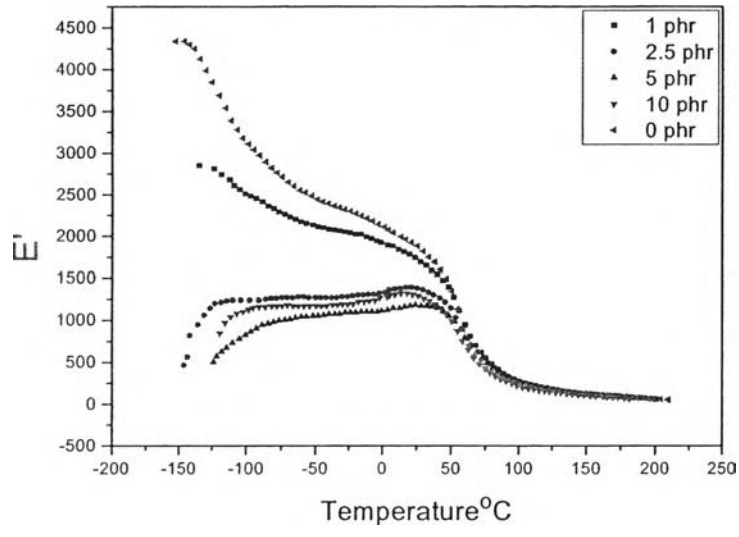


(b)

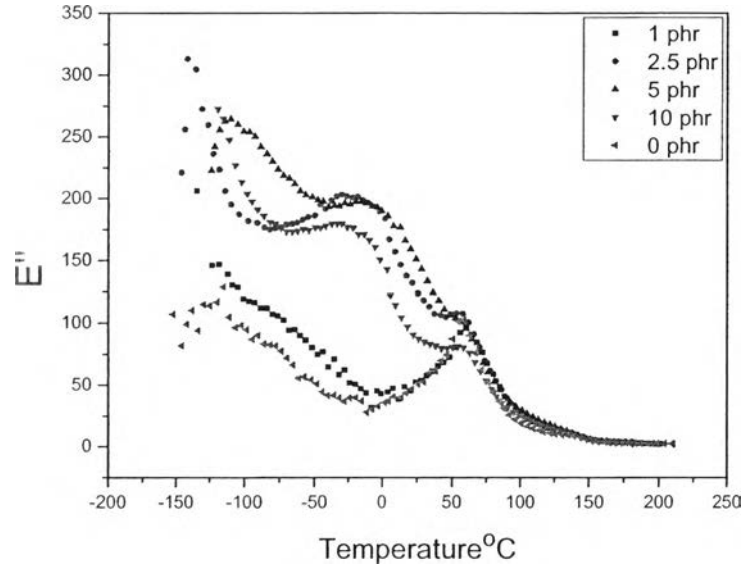


(c)

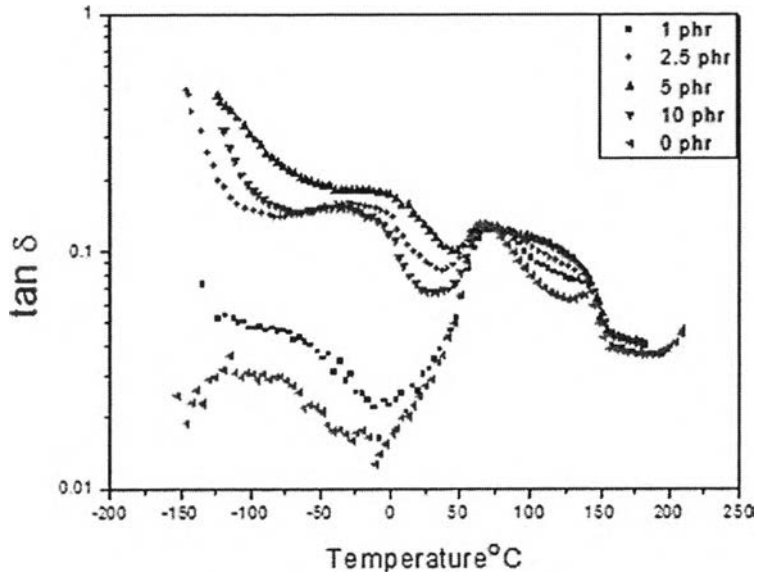
Figure D3 Storage modulus E' (a), loss modulus E''(b), tan δ (c) as a function of temperature of PBT/HDPE 50/50 with surlyn blend compositions


1 phr
2.5 phr
5 phr
10 phr
0 phr
E'
Temperature°C

(a)


1 phr
2.5 phr
5 phr
10 phr
0 phr
E''
Temperature°C

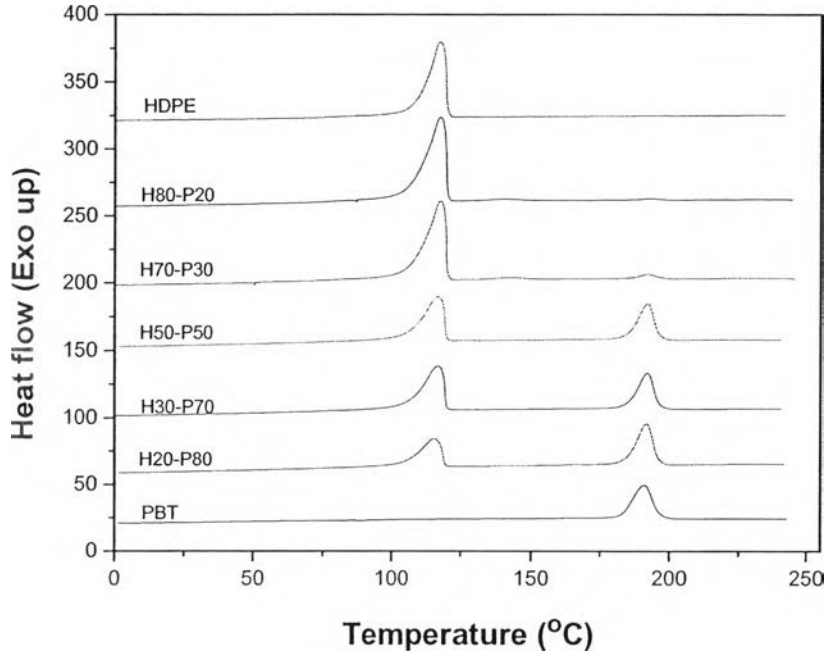
(b)



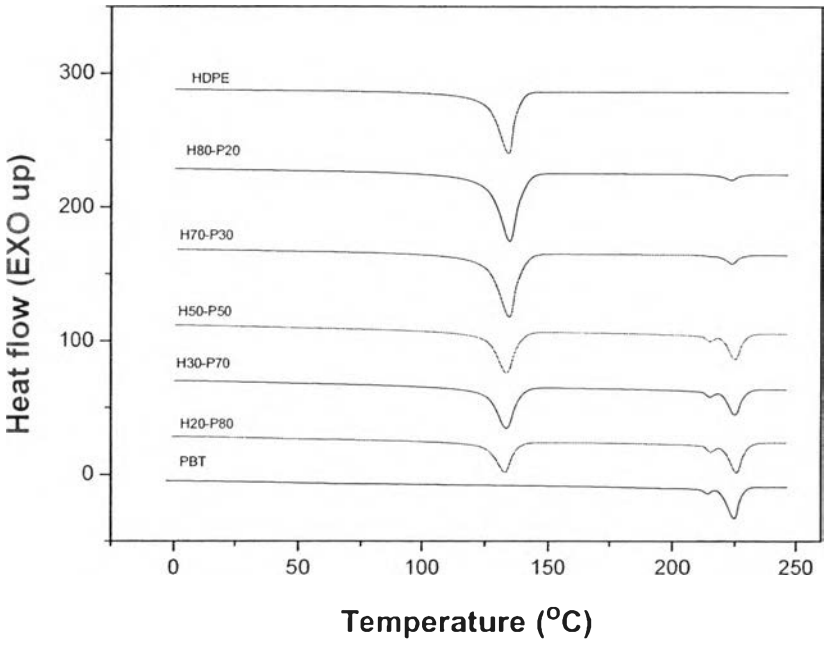
(c)

Figure D4 Storage modulus E' (a), loss modulus E''(b), tan δ (c) as a function of temperature of PBT/HDPE 70/30 with surlyn blend compositions

APPENDIX E Thermal properties

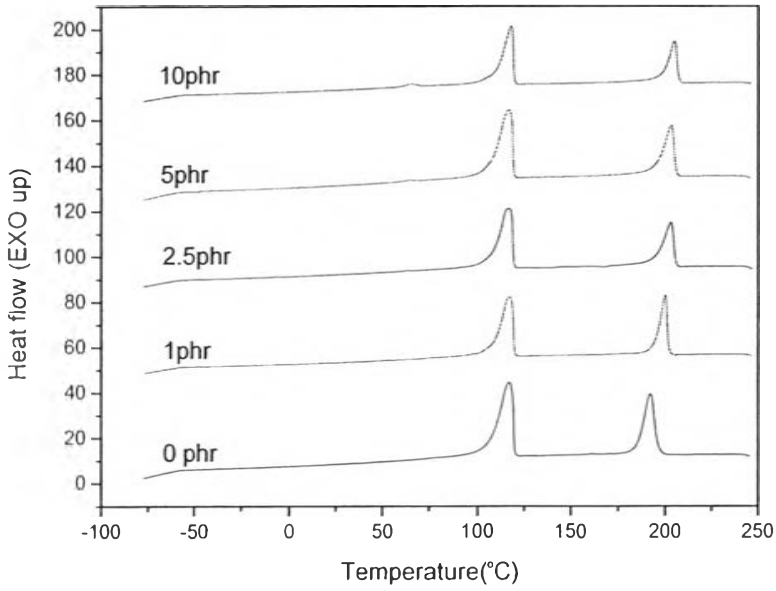


(a)

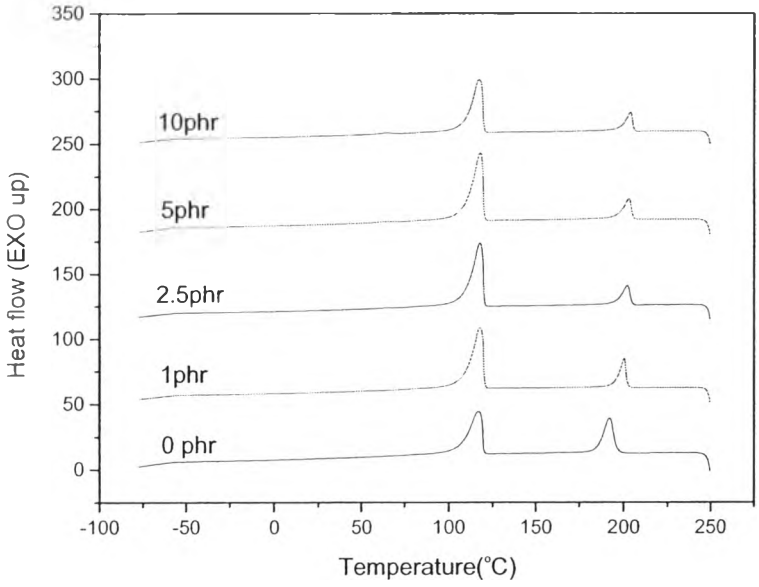


(b)

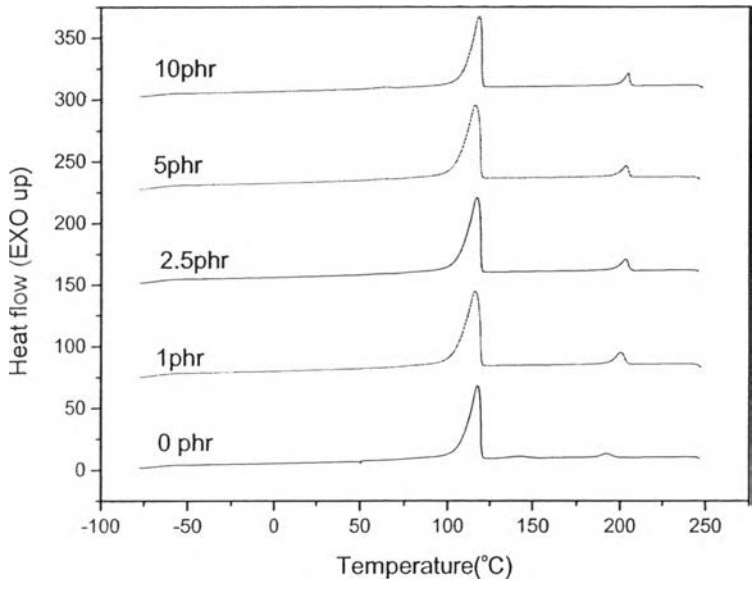
Figure E1 DSC melt crystallization exotherms (a) and melting thermograms (b) for HDPE, PBT, and HDPE/PBT blend samples recorded during cooling and heating at 10 °C/min.


Heat flow (EXO up)
Temperature(°C)
10phr
5phr
2.5phr
1phr
0 phr
200
180
160
140
120
100
80
60
40
20
0
-100
-50
0
50
100
150
200
250

(a)


Heat flow (EXO up)
Temperature(°C)
10phr
5phr
2.5phr
1phr
0 phr
350
300
250
200
150
100
50
0
-100
-50
0
50
100
150
200
250

(b)



(c)

Figure E2 DSC melt crystallization exotherms for HDPE/PBT 30/70 blend (a), HDPE/PBT 50/50 blend (b) and HDPE/PBT 70/30 blend (c) samples recorded during cooling at 10 °C/min.

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Proceeding

1. Chen, K.; and Nithitanakul, M. (2013, April 23) mechanical and rheological properties and phase morphology of polymer blends based on poly(butylene terepathalate) and high density polyethylene carboxylate ionomer compatibilizer. Proceedings of the 4th Research Symposium on Petrochemical and Materials Technology and the 19th PPC Symposium on Petroleum, Petrochemicals, and Polymers. Bangkok, Thailand.

Presentation

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