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ศูนย์วิทยทรัพยากร
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APPENDICES

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APPENDIX A

Table A-1 Tensile strength of HDPE/MLLDPE blends at various contents of the three blends

MLLDPE of Mpact D139 (% by Weight)	Tensile Strength of HDPE / MLLDPE (MPa)						
	1	2	3	4	5	\bar{X}	σ
0	24.99	24.96	25.65	25.10	25.46	25.23	0.3039
10	24.95	24.27	26.15	25.53	25.00	25.18	0.7029
20	24.70	24.03	24.29	23.03	24.51	24.11	0.6561
30	23.58	19.44	23.08	21.56	21.50	21.84	1.605
40	19.38	19.92	18.84	19.98	19.70	19.56	0.4695
MLLDPE of Exceed D350 D60 (% by Weight)	Tensile Strength of HDPE / MLLDPE (MPa)						
	1	2	3	4	5	\bar{X}	σ
0	24.99	24.96	25.65	25.10	25.46	25.23	0.3039
10	25.55	25.53	24.60	24.40	24.80	25.02	0.4439
20	24.42	24.60	23.80	24.75	23.50	24.39	0.5384
30	21.57	21.17	21.39	22.45	22.38	21.65	0.5858
40	20.77	21.22	20.60	20.41	20.34	20.75	0.3491
MLLDPE of Elite 5100 (% by Weight)	Tensile Strength of HDPE / MLLDPE (MPa)						
	1	2	3	4	5	\bar{X}	σ
0	24.99	24.96	25.65	25.10	25.46	25.23	0.3039
10	24.40	24.95	24.38	24.56	25.20	24.70	0.3621
20	24.42	24.53	24.58	24.18	24.76	24.49	0.2143
30	22.05	22.44	21.56	20.96	21.28	21.65	0.5815
40	18.70	18.73	19.50	18.56	18.29	18.76	0.4523

Table A-2 Elongation of HDPE/MLLDPE blends at various contents of the three blends

MLLDPE of Mpaact D139 (% by Weight)	Elongation of HDPE / MLLDPE (%)						
	1	2	3	4	5	\bar{X}	σ
0	43.50	39.22	44.67	45.46	45.98	43.77	2.708
10	46.24	40.43	48.33	52.50	40.70	45.64	5.152
20	58.43	50.02	51.98	51.33	63.39	55.03	5.693
30	95.39	92.95	90.55	93.37	89.40	92.33	2.37
40	159.1	173.0	160.5	163.5	157.4	162.7	6.18
MLLDPE of Exceed D350 D60 (% by Weight)	Elongation of HDPE / MLLDPE (%)						
	1	2	3	4	5	\bar{X}	σ
0	43.50	39.22	44.67	45.46	45.98	43.77	2.708
10	54.78	52.70	55.24	59.22	62.54	56.90	3.941
20	76.35	71.30	90.87	80.96	66.85	77.27	9.267
30	92.48	93.48	90.95	82.64	92.83	90.08	4.48
40	158.3	157.8	173.0	173.0	164.3	165.3	7.49
MLLDPE of Elite 5100 (% by Weight)	Elongation of HDPE / MLLDPE (%)						
	1	2	3	4	5	\bar{X}	σ
0	43.50	39.22	44.67	45.46	45.98	43.77	2.708
10	52.70	56.54	58.96	53.41	57.59	55.84	2.694
20	60.46	59.67	60.20	58.24	58.24	59.36	1.062
30	95.45	88.87	90.92	89.56	92.07	91.37	2.59
40	157.4	166.4	158.6	158.3	162.5	160.6	3.77

Table A-3 Impact strength of HDPE/MLLDPE blends at various contents of the three blends

MLLDPE of M pact D139 (% by Weight)	Impact Strength of HDPE / MLLDPE (J/m)						
	1	2	3	4	5	\bar{X}	σ
0	154	157	153	161	156	156.2	3.11
10	168	173	169	172	173	171	2.34
20	189	200	203	207	195	198.8	7.02
30	314	311	295	314	304	307.6	8.14
40	347	326	330	322	326	330.2	9.81
MLLDPE of Exceed D350 D60 (% by Weight)	Impact Strength of HDPE / MLLDPE (J/m)						
	1	2	3	4	5	\bar{X}	σ
0	154	157	153	161	156	156.2	3.11
10	170	173	168	169	173	170.6	2.30
20	187	192	184	190	184	187.4	3.57
30	266	276	265	280	281	273.6	7.63
40	320	338	333	321	321	326.6	8.32
MLLDPE of Elite 5100 (% by Weight)	Impact Strength of HDPE / MLLDPE (J/m)						
	1	2	3	4	5	\bar{X}	σ
0	154	157	153	161	156	156.2	3.11
10	170	173	175	171	169	171	2.41
20	226	214	210	217	205	214.4	7.89
30	324	326	312	319	310	318.2	7.08
40	358	360	341	352	345	351.2	8.16

Table A-4 Flexural modulus of HDPE/MLLDPE blends at various contents of the three blends

MLLDPE of Mpack D139 (% by Weight)	Flexural Modulus of HDPE / MLLDPE (MPa)						
	1	2	3	4	5	\bar{X}	σ
0	569.3	573.5	568	570.6	572	570.68	2.17
10	467.7	469.0	465.8	456.6	453	462.42	7.16
20	413.1	418.2	419.8	411.4	415.5	415.6	3.47
30	324.7	317.2	325.5	330.6	319.3	323.5	5.32
40	245.9	254.7	251.8	241.5	252.6	249.3	5.45
MLLDPE of Exceed D350 D60 (% by Weight)	Flexural Modulus of HDPE / MLLDPE (MPa)						
	1	2	3	4	5	\bar{X}	σ
0	569.3	573.5	568	570.6	572	570.68	2.17
10	455.1	459.5	458.7	460.9	464.2	459.68	3.31
20	399.5	417.6	395.9	403.7	412.9	405.92	9.10
30	364.7	370.3	375.6	358.3	369.0	367.58	6.48
40	266.4	268.6	256.8	252.2	255.4	259.88	7.19
MLLDPE of Elite 5100 (% by Weight)	Flexural Modulus of HDPE / MLLDPE (MPa)						
	1	2	3	4	5	\bar{X}	σ
0	569.3	573.5	568	570.6	572	570.68	2.17
10	458.7	445.1	459.3	449.3	462.7	455.02	7.45
20	418.3	419.0	416.8	421.3	415.5	418.18	2.20
30	372.0	363.3	366.4	359.2	368.4	365.86	4.88
40	281.2	283.0	273.5	284.8	283.9	281.28	4.55

Table A-5 Heat distortion of HDPE/MLLDPE blends at various contents of the three blends

MLLDPE of Mpack D139 (% by Weight)	Heat distortion of HDPE / MLLDPE (° C)							
	Weight of the rod 4.5 kg/cm ²				Weight of the rod 18.5 kg/cm ²			
	10	20	30	40	10	20	30	40
0	78	78	78	78	46	46	46	46
1	61.2	57.8	55.6	57.3	41.6	40.9	41.6	40.6
2	62.3	58.3	56.3	56.1	43.8	39.2	40.2	41.4
3	60.7	57.1	57.4	57.8	42.4	41.1	39.3	41.8
\bar{X}	61.4	57.7	56.4	57.1	42.6	40.4	40.4	41.3
SD	0.82	0.60	0.91	0.87	1.11	1.04	1.16	0.61
MLLDPE of Exceed D350 D60 (% by Weight)	Heat distortion of HDPE / MLLDPE (° C)							
	Weight of the rod 4.5 kg/cm ²				Weight of the rod 18.5 kg/cm ²			
	10	20	30	40	10	20	30	40
0	78	78	78	78	46	46	46	46
1	61.8	60.7	60.6	59.9	45.8	43.7	41.9	42.8
2	62.3	58.3	61.2	60.2	43.2	44.5	42.3	41.6
3	60.7	59.6	62.6	58.6	44.3	45.3	40.7	40.9
\bar{X}	61.6	59.5	61.5	59.6	44.4	44.5	41.6	41.8
SD	0.82	1.20	1.03	0.85	1.31	0.80	0.83	0.96
MLLDPE of Elite 5100 (% by Weight)	Heat distortion of HDPE / MLLDPE (° C)							
	Weight of the rod 4.5 kg/cm ²				Weight of the rod 18.5 kg/cm ²			
	10	20	30	40	10	20	30	40
0	78	78	78	78	46	46	46	46
1	63.1	59.6	58.6	56.4	43.6	43.2	42.1	41.8
2	61.7	58.1	57.8	57.4	41.7	41.6	40.3	42.3
3	62.4	57.8	57.1	56.9	42.5	42.0	41.8	40.6
\bar{X}	62.4	58.5	57.8	56.9	42.6	42.3	41.4	41.6
SD	0.70	0.96	0.75	0.5	0.95	0.83	0.96	0.87

Table A-6 Part shrinkage of conventional HDPE.

Sample No	Pick up truck liner formed part of HDPE		
	Mold Length L_1 (mm)	Formed Part Length L_2 (mm)	Shrinkage %
1	380	378	0.53
2	380	378	0.53
3	380	378	0.53
4	380	378	0.53
5	380	378	0.53

Table A-7 Part shrinkage of HDPE/MLLDPE blends at 80/20 % by weight.

Sample No	Pick up truck liner formed part of HDPE/MLLDPE blends		
	Mold Length L_1 (mm)	Formed Part Length L_2 (mm)	Shrinkage %
1	380	375	1.32
2	380	375	1.32
3	380	375	1.32
4	380	375	1.32
5	380	375	1.32

Table A-8 Part shrinkage of HDPE/MLLDPE blends at 70/30 % by weight.

Sample No	Pick up truck liner formed part of HDPE/MLLDPE blends		
	Mold Length L_1 (mm)	Formed Part Length L_2 (mm)	Shrinkage %
1	380	375	1.58
2	380	374	1.58
3	380	374	1.58
4	380	374	1.58
5	380	374	1.58

Table A-9 Impact strength of HDPE/MLLDPE blends at 70/30 % by weight compared between three blends and reproducible.

HDPE/MLLDPE at 70/30 % by weight	Sample Number					Unit : J/M	
	1	2	3	4	5	\bar{X}	SD
Mpact D139	314	311	295	314	304	307.6	8.14
Exceed 350 D60	266	276	265	280	281	273.6	7.63
Elite 5100	324	326	312	319	310	318.2	7.08
Reproduce	315	312	320	326	316	317.8	5.40

Table A-10 Tensile strength of HDPE/MLLDPE blends at 70/30 % by weight compared between three blends and reproducible.

HDPE/MLLDPE at 70/30 % by weight	Sample Number					Unit : J/M	
	1	2	3	4	5	\bar{X}	SD
Mpact D139	23.58	19.44	23.08	21.56	21.50	21.84	1.60
Exceed 350 D60	21.57	21.17	21.39	22.45	22.38	21.79	0.58
Elite 5100	22.05	22.44	21.56	20.96	21.86	21.65	0.58
Reproduce	22.25	22.64	22.33	22.78	22.87	22.57	0.27

Table A-11 Elongation of HDPE/MLLDPE blends at 70/30 % by weight compared between three blends and reproducible.

HDPE/MLLDPE at 70/30 % by weight	Sample Number					Unit : J/M	
	1	2	3	4	5	\bar{X}	SD
Mpact D139	95.39	92.95	90.57	93.37	89.40	92.33	2.37
Exceed 350 D60	92.48	93.48	90.95	82.64	92.83	90.08	4.48
Elite 5100	95.45	88.87	90.92	89.56	92.07	91.37	2.59
Reproduce	90.49	92.35	89.97	90.50	91.50	90.96	0.95

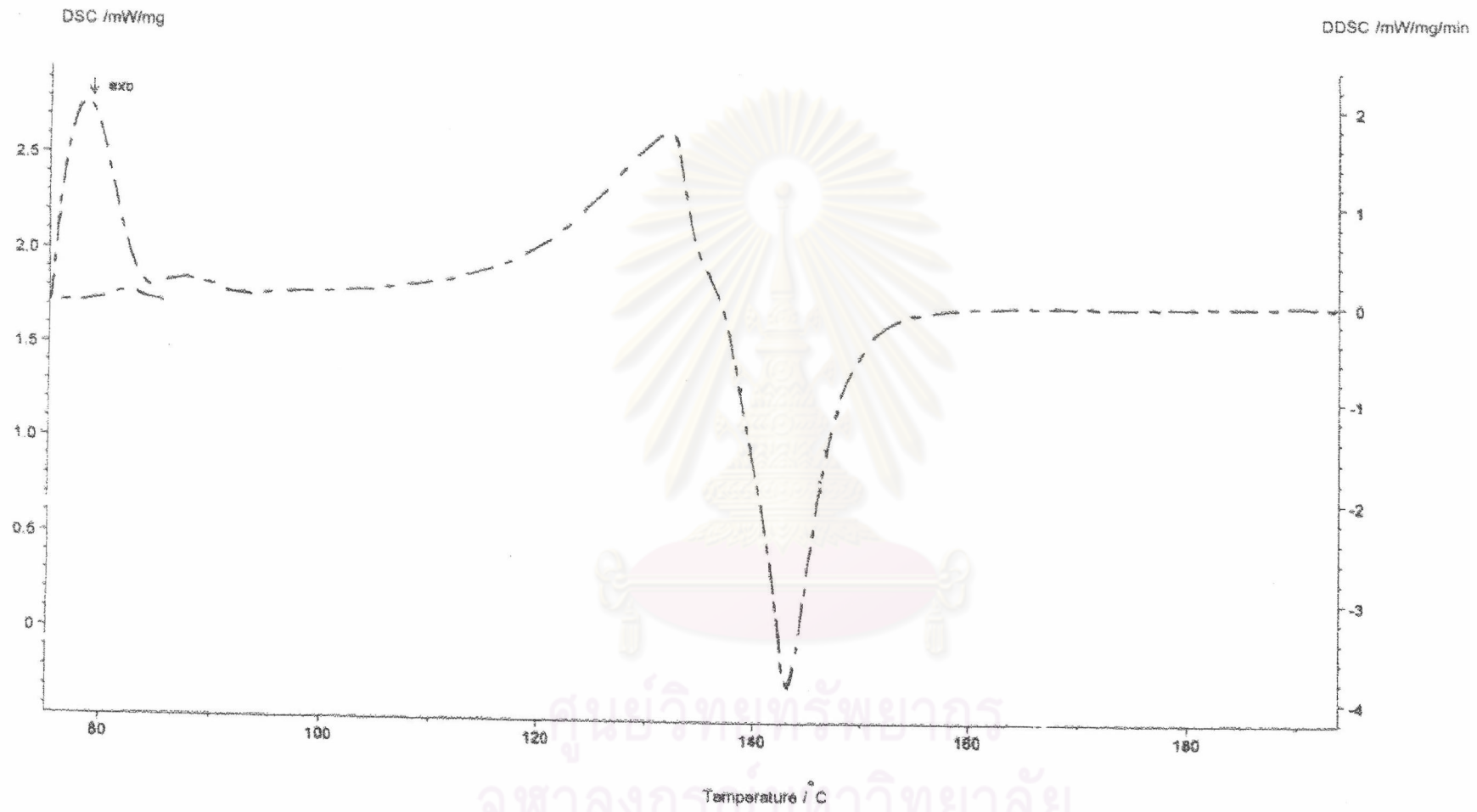


Figure B-1 DSC of HDPE/MLLDPE blend 90/10 and MLLDPE from Mpact D 139

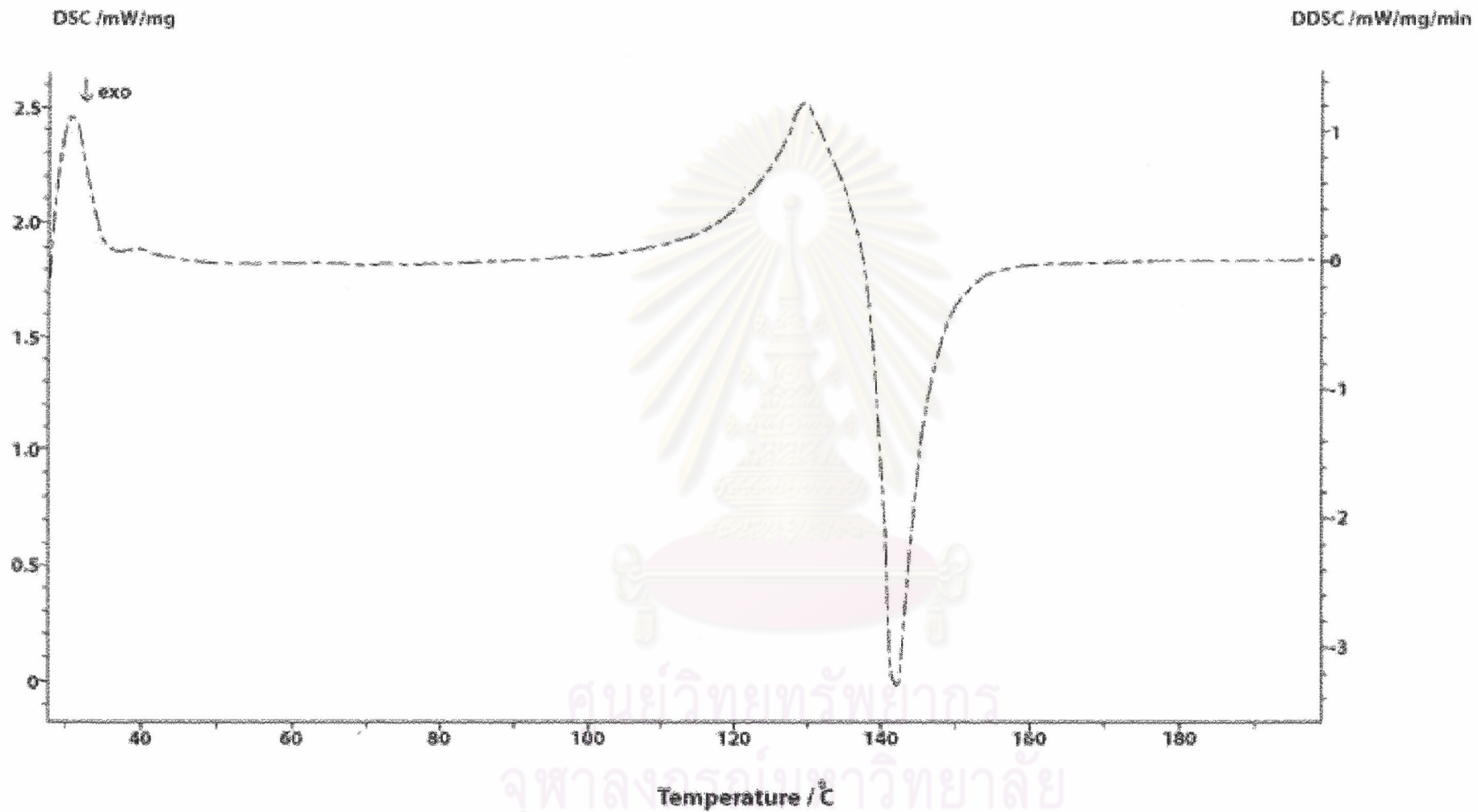


Figure B-2 DSC of HDPE/MLLDPE blend 80/20 and MLLDPE from Mpact D 139

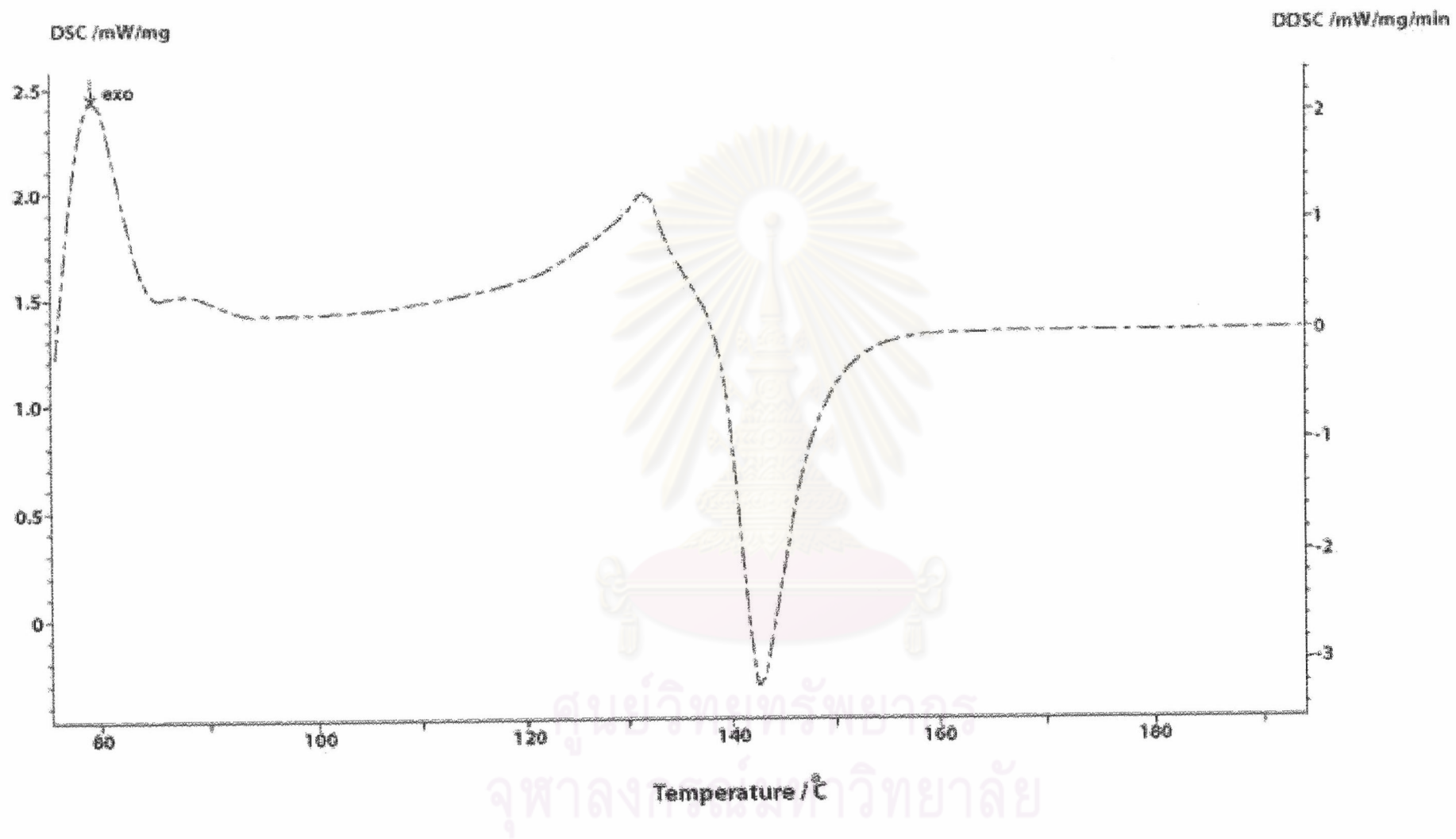


Figure B-3 DSC of HDPE/MLLDPE blend 70/30 and MLLDPE from Mpact D 139

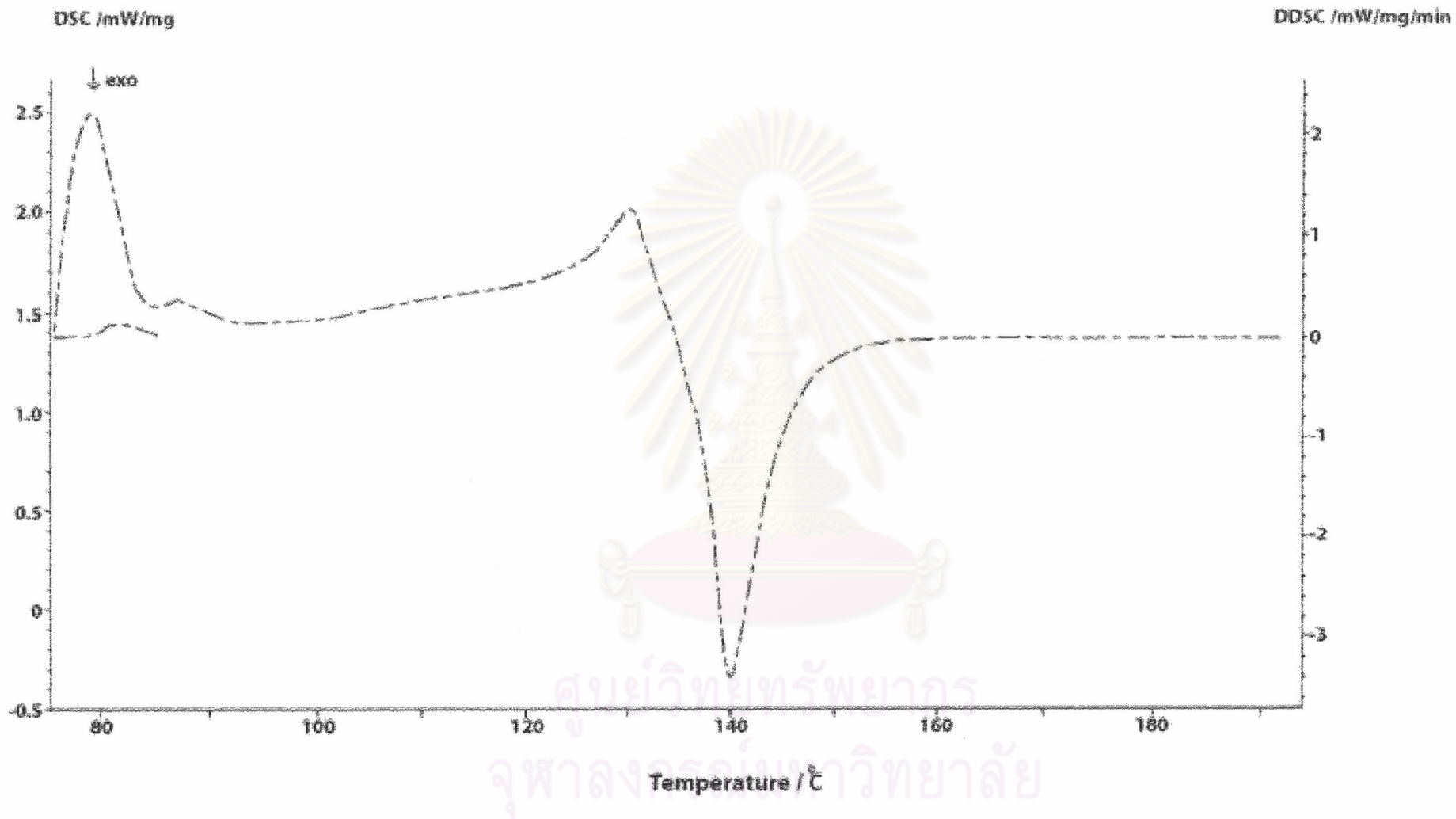


Figure B-4 DSC of HDPE/MLLDPE blend 60/40 and MLLDPE from Mpact D 139

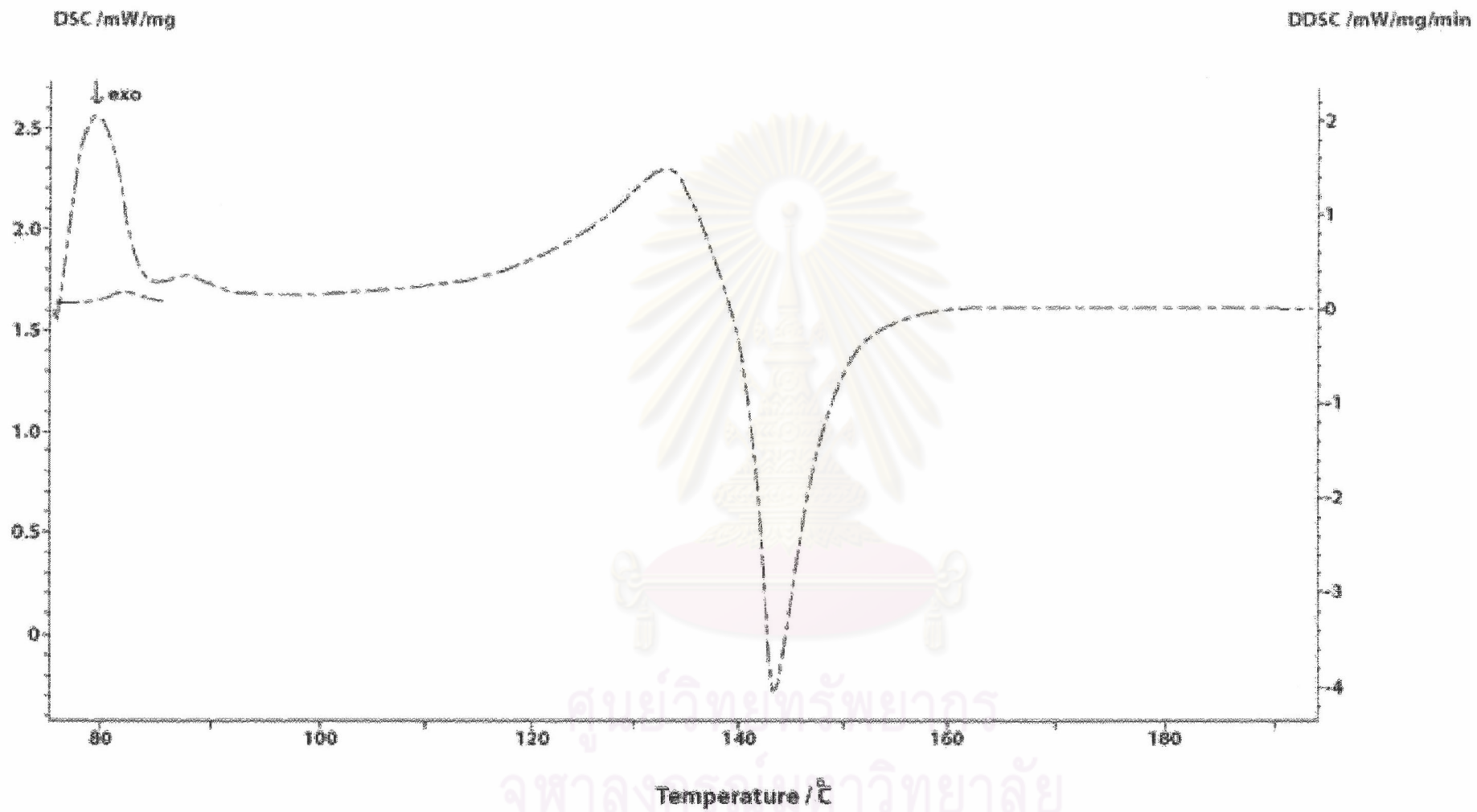


Figure B-5 DSC of HDPE/MLLDPE blend 90/10 and MLLDPE from Exceed D350 D60

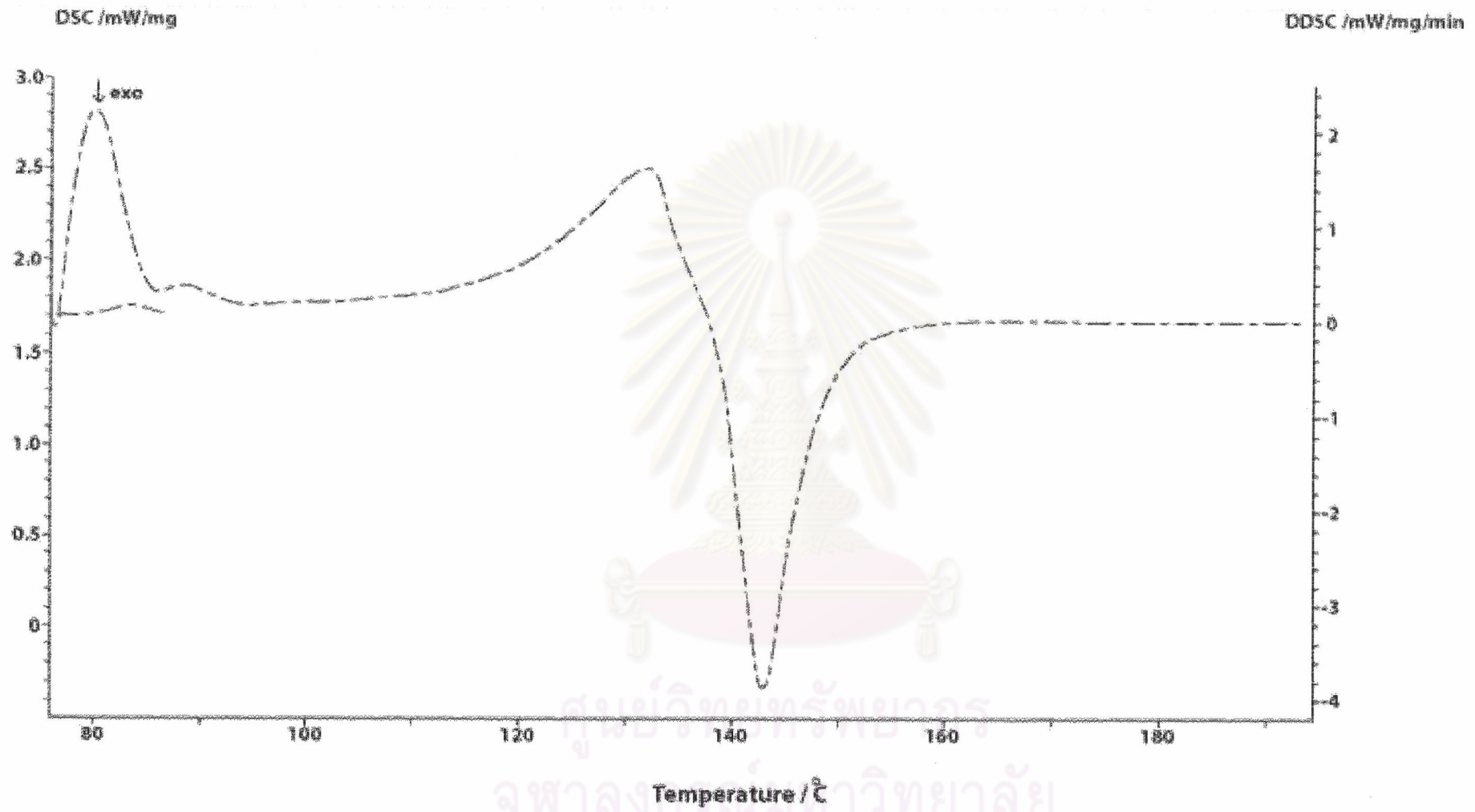


Figure B-6 DSC of HDPE/MLLDPE blend 80/20 and MLLDPE from Exceed D350 D60

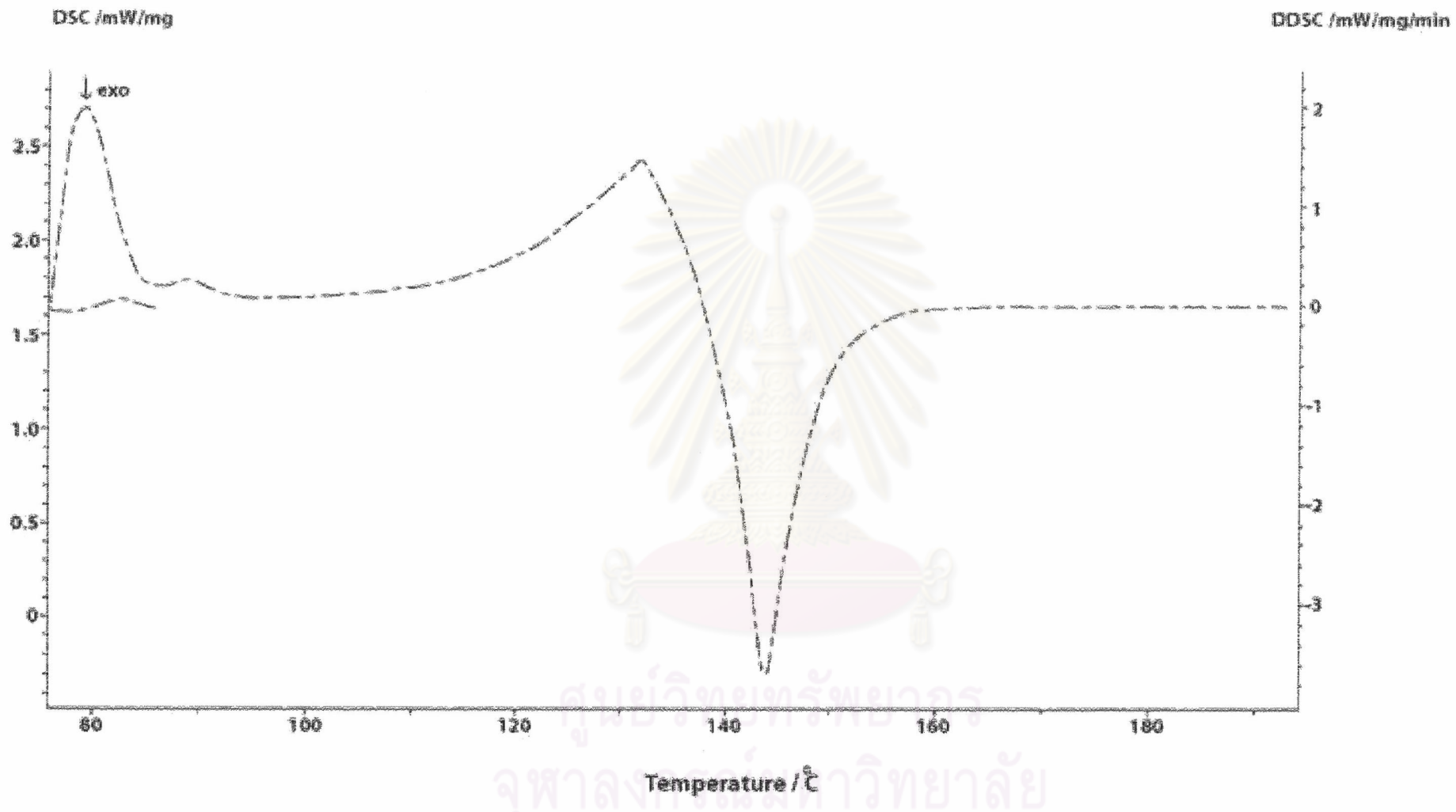


Figure B-7 DSC of HDPE/MLLDPE blend 70/30 and MLLDPE from Exceed D 350 D 60

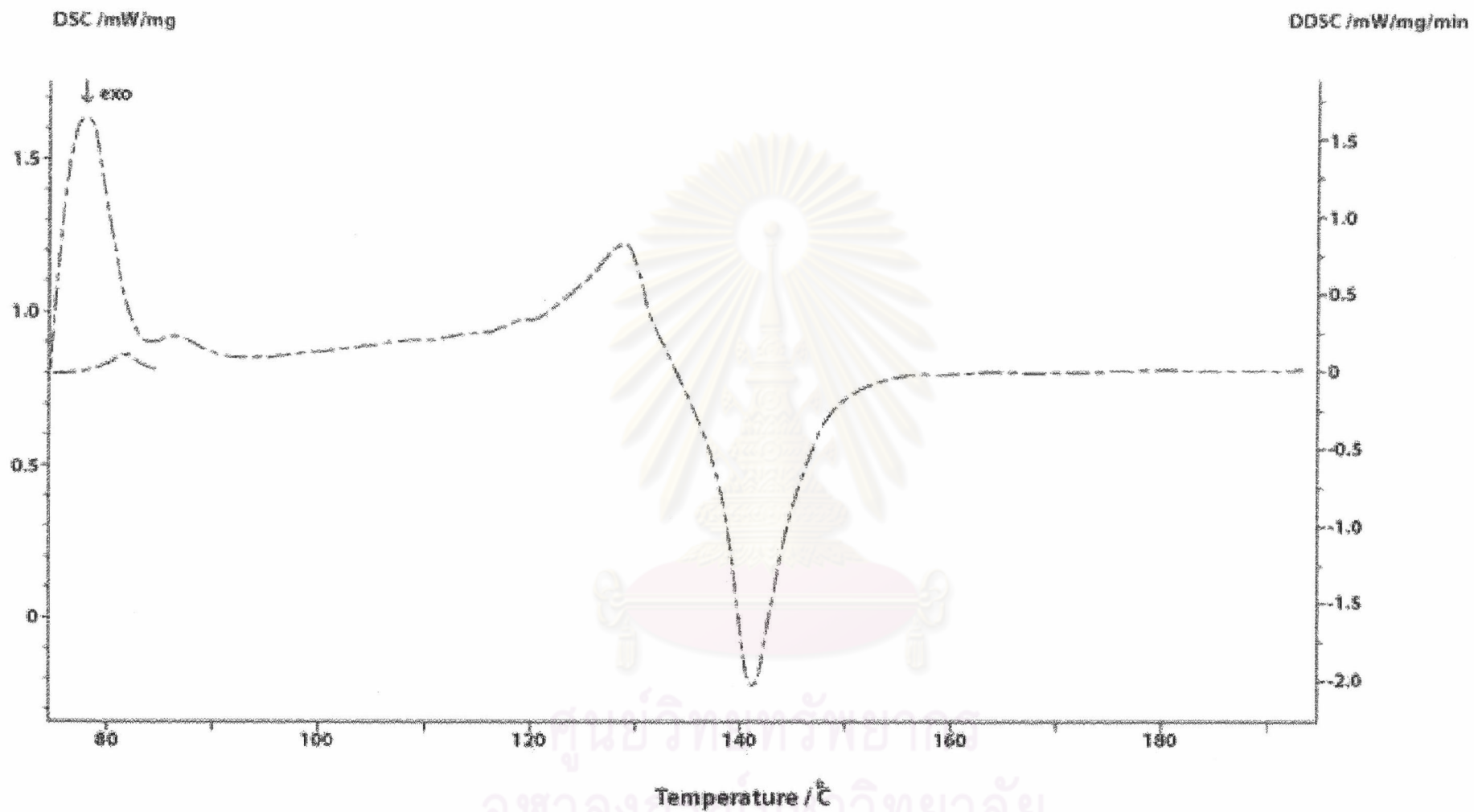


Figure B-8 DSC of HDPE/MLLDPE blend 60/40 and MLLDPE from Exceed D 350 D 60

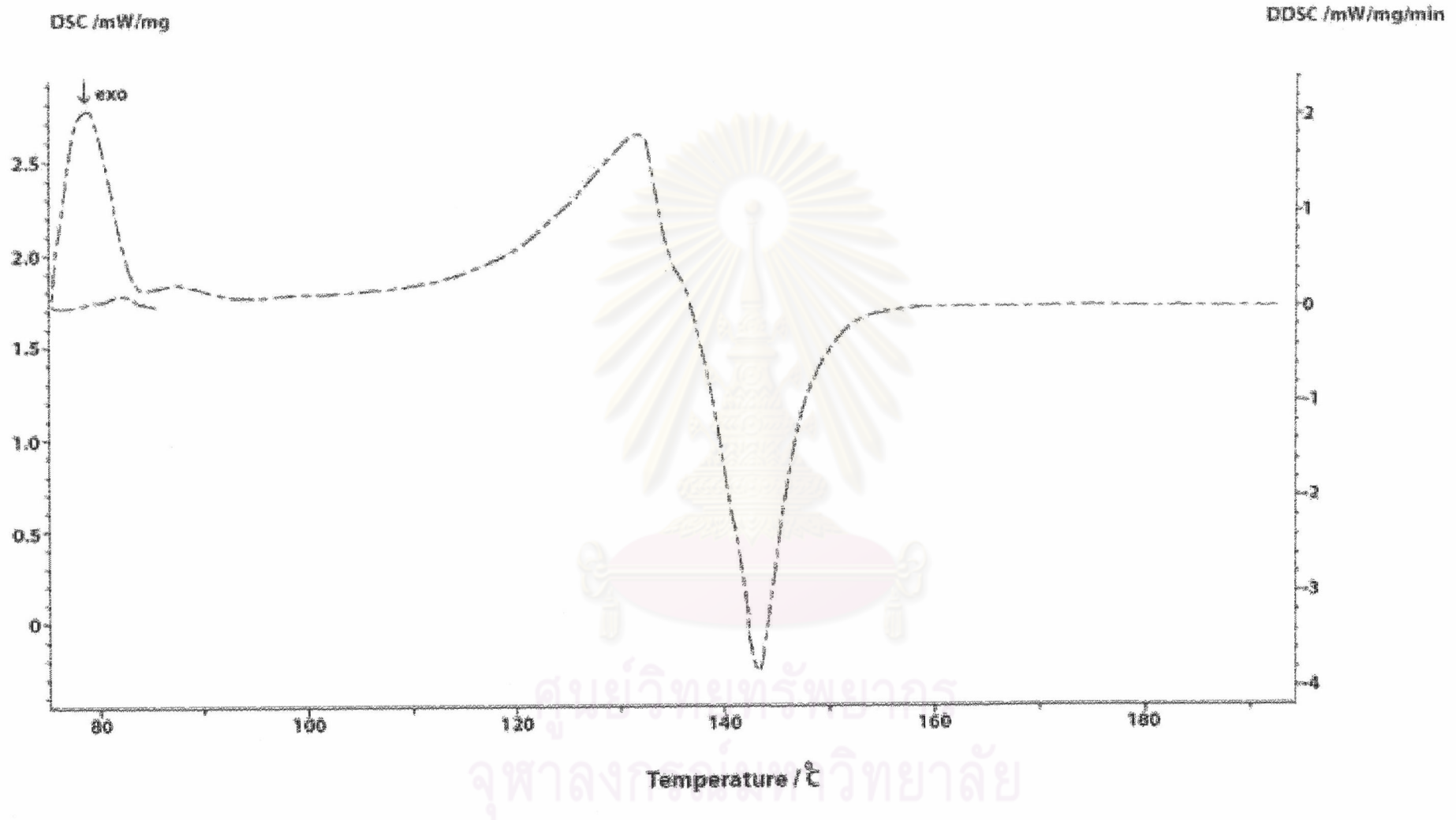


Figure B-9 DSC of HDPE/MLLDPE blend 90/10 and MLLDPE from Elite 5100

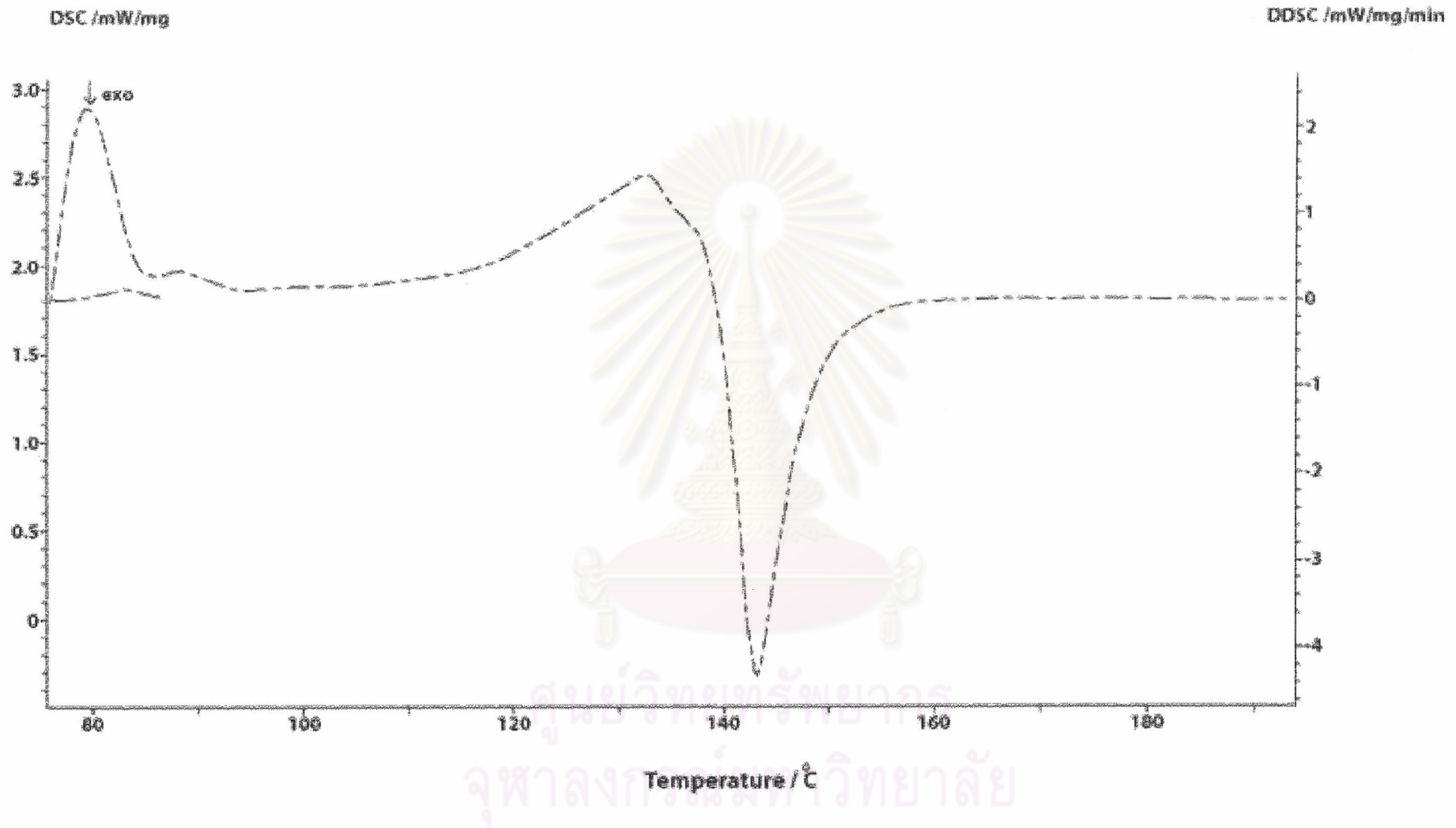


Figure B-10 DSC of HDPE/MLLDPE blend 80/20 and MLLDPE from Elite 5100

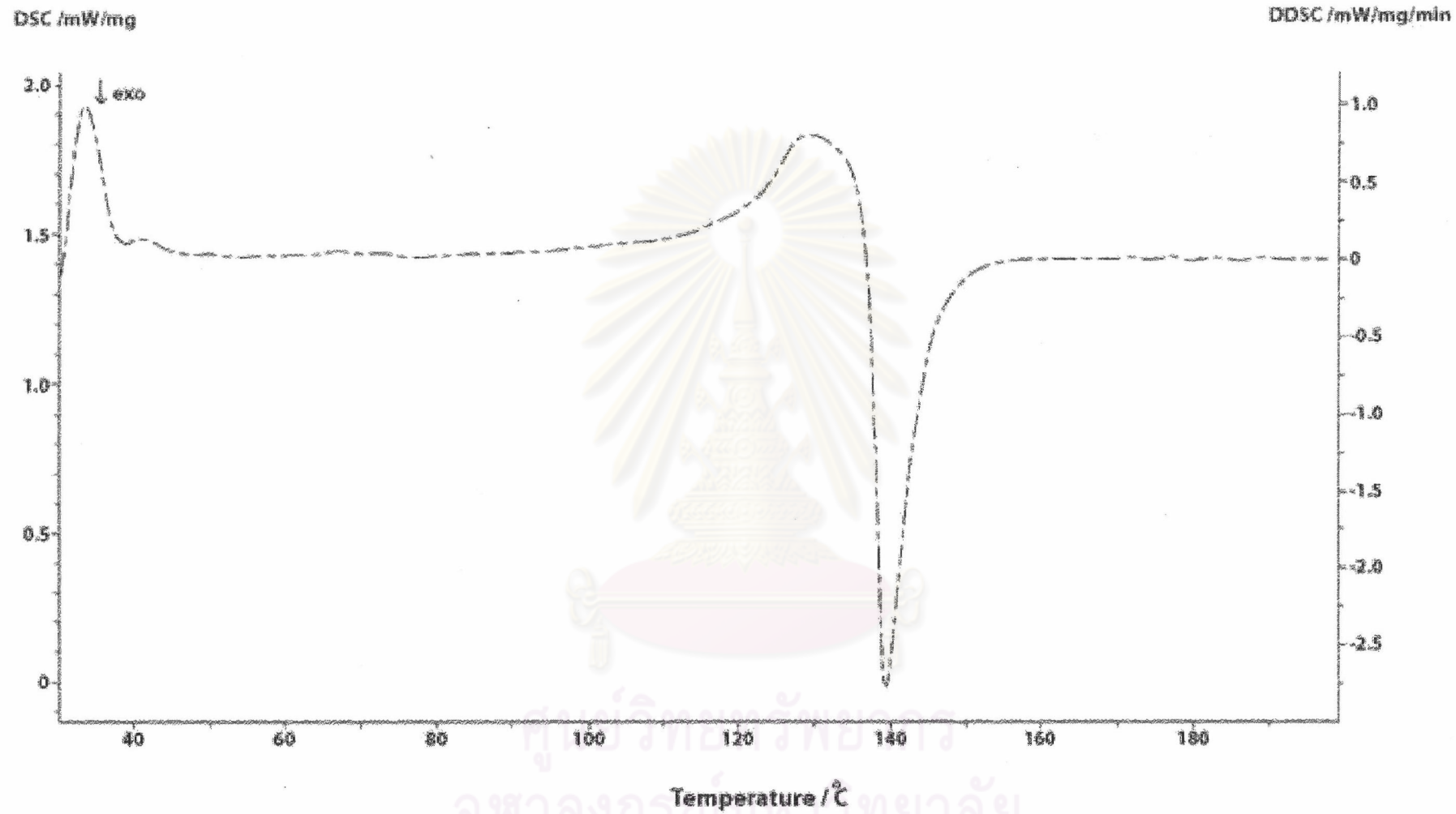


Figure B-11 DSC of HDPE/MLLDPE blend 70/30 and MLLDPE from Elite 5100

DSC /mW/mg

DDSC /mW/mg/min

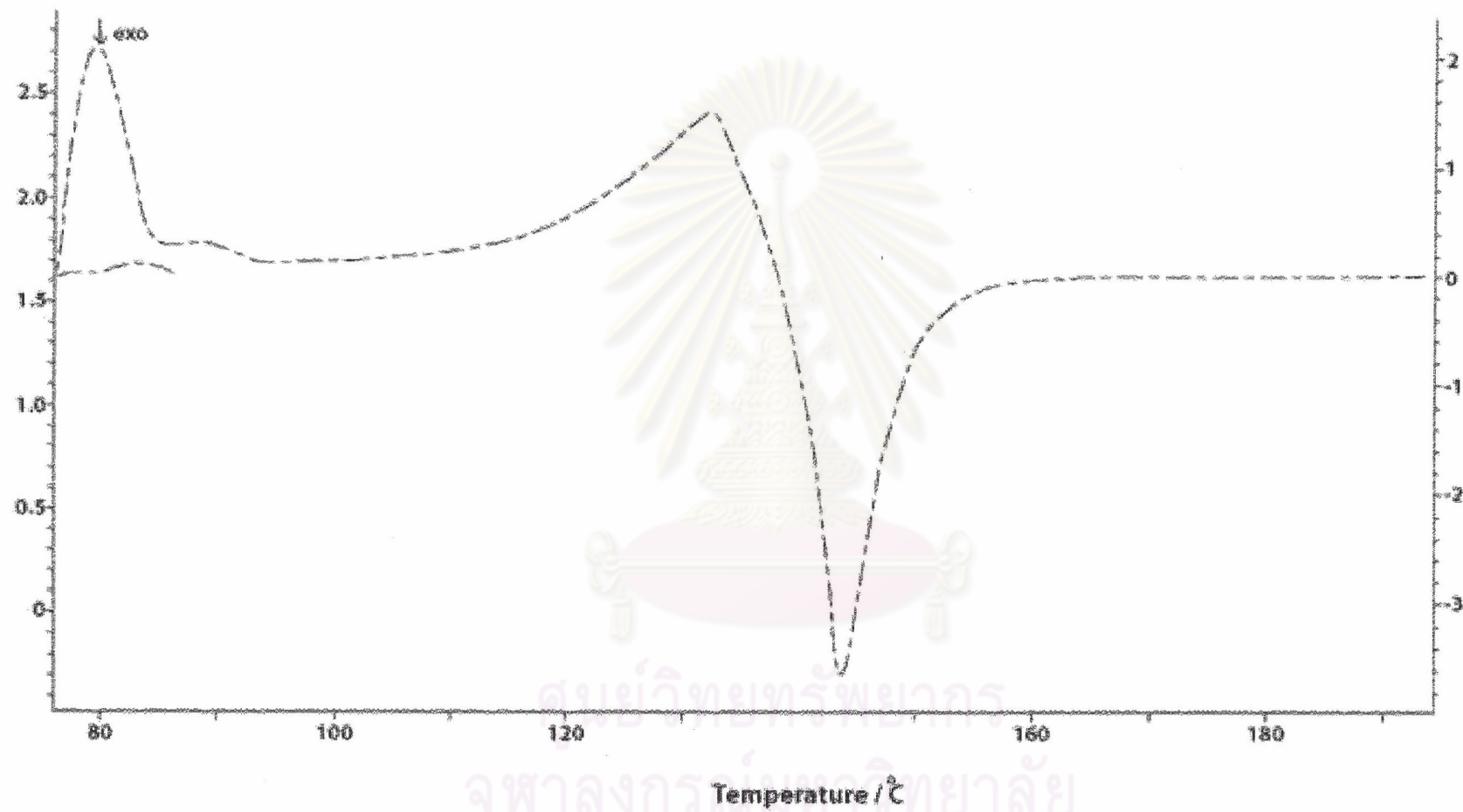


Figure B-12 DSC of HDPE/MLLDPE blend 60/40 and MLLDPE from Elite 5100

VITAE

Mr. Somporn Chantavaraluk was born on October 25, 1959 in Bangkok province. He received his Bachelor Degree of Science in Technical Education, Faculty of Mechanical Technology and Vocational Education Bangkok, Thailand in 1984. He joined Eastern Polymer Industry Company Limited in 1990. He began his Master degree study in the program of Petrochemistry and Polymer Science, Faculty of Science, Chulalongkorn University, in 1998 and completed the program in 2001.



ศูนย์วิทยทรัพยากร
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