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APPENDICES

APPENDIX A

A. Mechanical properties of PP/EPR blends filled with different nucleant types at 0.1% wt.

A.1 Tensile strength of PP/EPR blends filled with different nucleant types at 0.1%wt.

Table A.1 Tensile strength of PP/EPR blends filled with different nucleant types at 0.1%wt.

PP/EPR blends filled with	Tensile Strength (Mpa)						Data	x	SD	% Variation
	1st	2nd	3rd	4th	5th	6th				
None	25.55	25.60	25.60	25.50	25.50	25.50	6	25.54	0.05	0.19
0.1%wt.Ca-Pim	26.50	26.15	26.45	26.60	26.30	26.20	6	26.37	0.18	0.67
0.1%wt.DMDBS	24.80	24.65	24.50	24.50	24.65	24.70	6	24.63	0.12	0.47
0.1%wt.NaBz	31.20	31.30	30.95	31.30	31.00	31.15	6	31.15	0.15	0.48
0.1%wt.Talc.	25.35	25.50	25.45	25.35	25.20	25.20	6	25.34	0.12	0.49

A.2 Percentage elongation at yield of PP/EPR blends filled with different nucleant types at 0.1%wt.

Table A.2 Percentage elongation at yield of PP/EPR blends filled with different nucleant types at 0.1%wt.

PP/EPR blends filled with	Elongation at yield (%)						Data	x	SD	% Variation
	1st	2nd	3rd	4th	5th	6th				
None	9.10	9.10	9.00	9.00	9.10	9.10	6	9.07	0.05	0.57
0.1%wt.Ca-Pim	8.30	8.30	8.35	8.45	8.45	8.30	6	8.36	0.07	0.88
0.1%wt.DMDBS	8.30	8.30	8.30	8.40	8.30	8.20	6	8.30	0.06	0.76
0.1%wt.NaBz	7.30	7.30	7.45	7.45	7.45	7.45	6	7.40	0.08	1.05
0.1%wt.Talc.	6.75	6.90	6.90	6.90	6.85	6.80	6	6.85	0.06	0.92

A.3 Flexural Modulus of PP/EPR blends filled with different nucleant types at 0.1%wt.

Table A.3 Flexural Modulus of PP/EPR blends filled with different nucleant types at 0.1%wt.

PP/EPR blends filled with	Flexural Modulus (Mpa)						Data	x	SD	% Variation
	1st	2nd	3rd	4th	5th	6th				
None	1,080	1,075	1,090	1,070	1,085	1,080	6	1,080	7.07	0.65
0.1%wt.Ca-Pim	1,210	1,215	1,220	1,225	1,210	1,215	6	1,216	5.85	0.48
0.1%wt.DMDBS	1,180	1,165	1,160	1,160	1,170	1,165	6	1,167	7.53	0.65
0.1%wt.NaBz	1,485	1,495	1,500	1,510	1,500	1,510	6	1,500	9.49	0.63
0.1%wt.Talc.	1,615	1,620	1,610	1,600	1,625	1,620	6	1,615	8.94	0.55

A.4 Izod impact strength of PP/EPR blends filled with different nucleant types at 0.1%wt.

Table A.4 Izod impact strength of PP/EPR blends filled with different nucleant types at 0.1%wt.

PP/EPR blends filled with	Izod Impact Strength (J/m)						Data	x	SD	% Variation
	1st	2nd	3rd	4th	5th	6th				
None	175.50	174.70	177.00	170.20	180.00	175.00	6.00	175.40	3.21	1.83
0.1%wt.Ca-Pim	195.80	190.30	199.60	200.30	190.60	200.00	6.00	196.10	4.67	2.38
0.1%wt.DMDBS	175.00	181.50	180.00	176.98	180.00	176.34	6.00	178.30	2.55	1.43
0.1%wt.NaBz	97.74	91.49	95.88	96.52	95.10	95.65	6.00	95.40	2.12	2.22
0.1%wt.Talc.	110.00	108.46	108.00	105.23	110.50	108.80	6.00	108.50	1.86	1.71

APPENDIX B

B. Mechanical properties of talc-fiilled and Ca-Pim-filled PP/EPR blend.

B.1 Tensile strength of talc-filled and Ca-Pim-filled PP/EPR blend.

Table B.1 Tensile strength of talc-filled and Ca-Pim-filled PP/EPR blend.

Sample code	Nucleator contents (%wt.)		Tensile Strength (Mpa)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HC0	0	0	25.10	25.50	25.46	26.10	25.50	25.35	6	25.50	0.33	1.29
HC1	30	0.1	25.10	25.15	25.20	25.15	25.15	25.18	6	25.16	0.03	0.13
HC2	40	0.1	24.56	24.80	24.90	24.85	24.69	25.18	6	24.83	0.21	0.85
HC3	30	0.1	25.03	25.10	24.90	24.86	24.95	25.05	6	24.98	0.09	0.37
HC4	40	0.1	25.13	24.54	25.11	24.80	24.41	24.96	6	24.83	0.30	1.20

B.2 Percentage of elongation at yield of talc-filled and Ca-Pim-filled PP/EPR blend.

Table B.2 Percentage of elongation at yield of talc-filled and Ca-Pim-filed PP/EPR blend.

Sample code	Nucleator contents (%wt.)		Elongation at yield (%)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HC0	0	0	9.10	9.08	9.05	9.06	9.10	9.00	6	9.07	0.04	0.42
HC1	30	0.1	4.35	4.32	4.20	4.12	4.15	4.08	6	4.20	0.11	2.61
HC2	40	0.1	3.60	3.63	3.56	3.55	3.69	3.58	6	3.60	0.05	1.44
HC3	30	0.1	4.32	4.30	4.25	4.28	4.31	4.31	6	4.30	0.03	0.60
HC4	40	0.1	3.36	3.41	3.20	3.28	3.33	3.23	6	3.30	0.08	2.42

B.3 Flexural modulus of talc-filled and Ca-Pim-filled PP/EPR blend.

Table B.3 Flexural modulus results of talc-filled and Ca-Pim-filled PP/EPR blend.

Sample code	Nucleator contents (%wt.)		Flexural Modulus (MPa)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HC0	0	0	1,085	1,087	1,070	1,080	1,075	1,080	6	1,080	6.28	0.58
HC1	30	0.1	2,260	2,255	2,250	2,257	2,261	2,263	6	2,258	4.72	0.21
HC2	40	0.1	2,610	2,614	2,608	2,600	2,618	2,618	6	2,611	6.89	0.26
HC3	30	0.1	2,160	2,156	2,142	2,162	2,157	2,155	6	2,155	7.03	0.33
HC4	40	0.1	2,500	2,501	2,510	2,508	2,500	2,511	6	2,505	5.22	0.21

B.4 Izod impact strength of talc-filled and Ca-Pim-filled PP/EPR blend.

Table B.4 Izod impact strength of talc-filled and Ca-Pim-filled PP/EPR blend.

Sample code	Nucleator contents (%wt.)		Izod Impact Strength (J/M)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HC0	0	0	176.10	175.50	176.00	172.86	175.53	176.41	6	175.40	1.29	0.74
HC1	30	0.1	64.12	64.89	64.97	64.80	64.81	65.20	6	64.80	0.36	0.56
HC2	40	0.1	58.00	58.10	57.85	57.85	57.56	58.05	6	57.90	0.20	0.34
HC3	30	0.1	57.70	57.66	57.62	56.88	58.19	58.12	6	57.70	0.47	0.81
HC4	40	0.1	53.88	53.60	55.01	54.90	54.25	53.54	6	54.20	0.64	1.18

APPENDIX C

C. Mechanical properties results of talc-filled and Ca-Pim-filled homopolymer PP.

C.1 Tensile strength results of talc-filled and Ca-Pim-filled homopolymer PP.

Table C.1 Tensile strength results of talc-filled and Ca-Pim-filled homopolymer PP.

Sample Code	Nucleator contents (%wt.)		Tensile Strength (Mpa)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HM0	0	0	32.00	32.10	32.05	32.15	32.02	32.14	6	32.08	0.06	0.20
HM1	30	0.1	32.40	32.5	32.42	32.45	32.39	32.40	6	32.43	0.04	0.13
HM2	40	0.1	33.76	33.90	33.80	33.23	33.55	33.67	6	33.65	0.24	0.71

C.2 Percentage elongation at yield results of talc-filled and Ca-Pim-filled homopolymer PP.

Table C.2 Percentage elongation at yield results of talc-filled and Ca-Pim-filled to homopolymer PP.

Sample code	Nucleator contents (%wt.)		Elongation at yield (%)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HM0	0	0	11.85	11.90	11.75	11.82	11.86	11.88	6	11.84	0.05	0.45
HM1	30	0.1	5.70	5.76	5.65	5.68	5.70	5.68	6	5.70	0.04	0.65
HM2	40	0.1	5.50	5.50	5.45	5.40	5.55	5.57	6	5.50	0.06	1.14

C.3 Flexural modulus results of talc-filled and Ca-Pim-filled homopolymer PP.

Table C.3 Flexural modulus results of talc-filled and Ca-Pim-filled homopolymer PP.

Sample code	Nucleator contents (%wt.)		Flexural Modulus (MPa)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HM0	0	0	1,275	1,270	1,278	1,285	1,280	1,264	6	1,275	7.47	0.59
HM1	30	0.1	2,685	2,690	2,691	2,692	2,695	2,680	6	2,689	5.42	0.20
HM2	40	0.1	2,990	2,998	2,995	2,985	2,990	2,998	6	2,993	5.20	0.17

C.4 Izod impact strength results of talc-filled and Ca-Pim-filled homopolymer PP.

Table C.4 Izod impact strength results of talc-filled and Ca-Pim-filled homopolymer PP.

Sample code	Nucleator contents (%wt.)		Izod Impact Strength (J/M)						Data	x	SD	% Variation
	Talc	Ca-Pim	1st	2nd	3rd	4th	5th	6th				
HM0	0	0	33.30	33.40	33.40	33.51	33.45	33.31	6	33.40	0.08	0.24
HM1	30	0.1	30.71	30.70	30.68	30.65	30.65	30.79	6	30.70	0.05	0.17
HM2	40	0.1	29.05	29.16	29.11	29.25	29.20	29.13	6	29.15	0.07	0.24

APPENDIX D

D. Mechanical properties of PP/EPR blend added Ca-Pim.

D.1 Tensile strength of PP/EPR blend added Ca-Pim

Table D.1 Tensile strength of PP/EPR blend added Ca-Pim.

Sample code	Ca-Pim added (%wt.)	Tensile Strength @ Yield (Mpa)						Data	x	SD	% Variation
		1st	2nd	3rd	4th	5th	6th				
PP/EPR_0	0.000	25.50	25.47	25.50	25.46	25.51	25.53	6	25.50	0.03	0.10
PP/EPR_1	0.001	21.26	21.25	21.22	21.27	21.25	21.23	6	21.25	0.02	0.09
PP/EPR_2	0.010	21.10	21.05	21.12	21.07	21.09	21.14	6	21.10	0.03	0.16
PP/EPR_3	0.025	21.36	21.37	21.41	21.41	21.35	21.45	6	21.39	0.04	0.18
PP/EPR_4	0.050	22.95	22.96	22.95	22.91	22.93	22.98	6	22.95	0.02	0.11
PP/EPR_5	0.100	26.41	26.43	26.45	26.46	26.34	26.40	6	26.42	0.04	0.16

D.2 Flexural modulus of PP/EPR blend added Ca-Pim

Table D.2 Flexural modulus of PP/EPR blend added Ca-Pim.

Sample code	Ca-Pim added (%wt.)	Flexural Modulus (MPa)						Data	x	SD	% Variation
		1st	2nd	3rd	4th	5th	6th				
PP/EPR0	0.000	1,079.65	1,080.05	1,078.02	1,080.65	1,081.55	1,080.07	6	1,080.00	1.17	0.11
PP/EPR1	0.001	894.80	894.48	890.70	899.77	896.71	900.06	6	896.75	3.56	0.40
PP/EPR2	0.010	970.04	976.01	972.08	973.10	974.56	971.60	6	972.90	2.15	0.22
PP/EPR3	0.025	997.11	992.52	995.31	993.30	992.56	995.31	6	994.35	1.85	0.19
PP/EPR4	0.050	1,120.04	1,116.85	1,116.41	1,115.06	1,115.05	1,115.08	6	1,116.42	1.94	0.17
PP/EPR5	0.100	1,220.07	1,221.23	1,225.07	1,215.56	1,218.20	1,219.44	6	1,220.00	3.14	0.26

D.3 Notch-Izod impact strength of PP/EPR blend added Ca-Pim

Table D.3 Notch-Izod impact strength of PP/EPR blend added Ca-Pim.

Sample code	Ca-Pim added (%wt.)	Notch-Izod Impact Strength (J/M)						Data	x	SD	% Variation
		1st	2nd	3rd	4th	5th	6th				
PP/EPR0	0.000	175.40	175.41	175.42	175.40	175.37	175.42	6	175.40	0.02	0.01
PP/EPR1	0.001	627.15	627.2	627.22	627.35	627.25	627.31	6	627.25	0.07	0.01
PP/EPR2	0.010	582.70	582.72	582.65	582.61	583.1	582.45	6	582.70	0.20	0.03
PP/EPR3	0.025	557.90	557.95	557.8	557.87	558.00	557.86	6	557.89	0.08	0.01
PP/EPR4	0.050	320.45	320.49	320.51	320.50	320.41	320.45	6	320.47	0.04	0.01
PP/EPR5	0.100	196.10	196.11	196.00	196.29	196.08	196.00	6	196.10	0.11	0.05

APPENDIX E

E. Calculation of Percentage Crystallinity of PP

The percentage crystallinity of PP can be calculated with the heat of fusion (H_f) of 100 pbw PP in composite blend divide by H_f of fully crystallinity of PP and multiplies by 100 according to equation E.1. The fully crystallinity of PP had 190 J/g

$$\% \text{ Crystallinity} = \frac{H_f \text{ of PP in composite blend} \times 100}{H_f \text{ of fully crystallinity of PP}} \qquad \text{(E.1)}$$

Vita

Miss Kessaraporn Trongtorsak was born on June 10, 1972 in Bangkok. She graduated with a Bachelor Degree of Science (Industrial Chemistry) from King Mongkut Institute of Technology North Bangkok in 1995. She has joined the technical service, HMC Polymer Co., Ltd since 1996. In 2001, she was accepted as a graduate student in the Program of Petrochemistry and Polymer Science, Faculty of Science, Chulalongkorn University. She received a Master's degree of Science in polymer Science, in October 2001.