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APPENDICES

Appendix A Determination of Total Volatile Basic Nitrogen (TVB-N)

TVB-N can be calculated by following equation:

$$\text{TVB-N (mg/100g)} = \frac{(V_S - V_B)\times(N_{HCl}\times A_N)\times[W_S\times(M/100)+V_E]\times 100}{W_S}$$

Where,
V_S = Titration volume of 0.01 N HCl for sample extract (ml)
V_B = Titration volume of 0.01 N HCl for blank (ml)
N_{HCl} = Normality of HCl (= 0.01 N × factor of HCl)
A_N = Atomic weight of nitrogen (14.00)
W_S = Weight of tissue sample (g)
M = Percentage moisture of tissue sample (Assume 80%)
V_E = Volume of 4% TCA used in extraction

Table A1 Change in TVB-N values of fresh milk during storage at ambient temperature

Hours	0.01 HCl (ml)			TVB-N (mg/100g)
	1	2	Av	
3	0.12	0.12	0.12	8.064
6	0.125	0.12	0.1225	8.232
9	0.2	0.2	0.2	13.44
12	0.37	0.39	0.38	25.536
15	0.45	0.62	0.535	35.952
18	0.54	0.56	0.55	36.96
21	0.65	0.8	0.725	48.72
24	1.75	1.8	1.775	119.28
27	2	2.1	2.05	137.76

Table A2 Change in APC values of Barramundi fish during storage at ambient temperature

Hours	APC (cfu/g)	Log Count(cfu/g)
3	$1.40x10^5$	5.146128
6	$3.80x10^5$	5.579784
9	$6.20 x10^6$	6.792392
12	$2.10 x10^7$	7.322219
15	$2.50 x10^7$	7.39794
18	$3.60 x10^7$	7.556303
21	$5.80 x10^7$	7.763428
24	$2.80 x10^7$	7.447158
27	$1.60 x10^7$	7.20412
30	$3.00 x10^7$	7.477121
33	$8.20 x10^7$	7.913814
36	$5.80 x10^7$	7.763428
39	$8.40 x10^7$	7.924279
42	$8.40 x10^7$	7.924279

Appendix B Change in Hunter and TCD Values to standard ammonia using Chroma Meter

Table B1 Change in Hunter color values of PP/1000 rpm/1%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Conc.(ppm)	b	a	L	delta b	delta a	delta L	delta E
10	56.30	-15.41	54.74	36.95	-10.79	-32.15	50.15
25	10.46	-35.44	37.10	-8.89	-30.82	-49.79	59.23
50	-3.29	-34.60	33.03	-22.64	-29.98	-53.86	65.67
75	-13.56	-31.92	29.82	-32.91	-27.30	-57.07	71.31
100	-19.35	-28.15	28.07	-38.70	-23.53	-58.82	74.24
250	-30.24	-20.16	27.37	-49.59	-15.54	-59.52	79.02
500	-32.61	-16.61	26.05	-51.96	-11.99	-60.84	80.90
750	-39.73	-9.42	25.83	-59.08	-4.80	-61.06	85.10
1000	-41.03	-8.18	25.76	-60.38	-3.56	-61.13	85.99

Table B2 Change in Hunter color values of PP/2000 rpm/1%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Conc.(ppm)	b	a	L	delta b	delta a	delta L	delta E
10	46.63	-18.36	62.29	33.74	-14.82	-24.84	44.45
25	7.87	-30.92	49.56	-5.02	-27.38	-37.57	46.76
50	-17.26	-28.98	43.08	-30.15	-25.44	-44.05	59.13
75	-26.32	-24.62	40.26	-39.21	-21.08	-46.87	64.64
100	-29.82	-21.93	39.88	-42.71	-18.39	-47.25	66.29
250	-40.94	-14.46	38.30	-53.83	-10.92	-48.83	73.49
500	-45.28	-11.80	37.93	-58.17	-8.26	-49.20	76.63
750	-48.78	-8.13	35.95	-61.67	-4.59	-51.18	80.27
1000	-49.38	-7.68	34.84	-62.27	-4.14	-52.29	81.42

Table B3 Change in Hunter color values of PP/3000 rpm/1%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Conc.(ppm)	b	a	L	delta b	delta a	delta L	delta E
10	40.78	-12.72	73.23	26.86	-8.98	-14.39	31.77
25	5.48	-25.08	51.95	-8.44	-21.34	-35.67	42.41
50	-8.43	-23.89	49.32	-22.35	-20.15	-38.30	48.71
75	-17.73	-23.04	47.58	-31.65	-19.30	-40.04	54.56
100	-24.55	-22.85	46.33	-38.47	-19.11	-41.29	59.58
250	-32.45	-18.85	45.88	-46.37	-15.11	-41.74	64.19
500	-39.94	-15.93	42.49	-53.86	-12.19	-45.13	71.32
750	-41.79	-12.98	39.61	-55.71	-9.24	-48.01	74.12
1000	-49.66	-8.61	38.46	-63.58	-4.87	-49.16	80.52

Table B4 Change in Hunter color values of PP/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Conc.(ppm)	b	a	L	delta b	delta a	delta L	delta E
10	75.36	15.99	70.63	52.99	20.54	-15.93	59.02
25	10.34	-21.07	21.68	-12.03	-16.52	-64.88	68.02
50	-0.31	-18.38	9.28	-22.68	-13.83	-77.28	81.72
75	-9.74	-15.28	7.53	-32.11	-10.73	-79.03	85.98
100	-13.34	-14.54	7.41	-35.71	-9.99	-79.15	87.41
250	-18.58	-7.74	7.15	-40.95	-3.19	-79.41	89.41
500	-21.56	-4.57	6.92	-43.93	-0.02	-79.64	90.95
750	-22.96	-3.24	6.89	-45.33	1.31	-79.67	91.67
1000	-26.30	-1.95	6.65	-48.67	2.60	-79.91	93.61

Table B5 Change in Hunter color values of PP/1000 rpm/5%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Conc.(ppm)	b	a	L	delta b	delta a	delta L	delta E
10	85.37	14.68	73.80	41.34	19.62	-9.79	46.80
25	5.02	-4.55	15.81	-39.01	0.39	-67.78	78.21
50	0.44	-1.24	14.00	-43.59	3.70	-69.59	82.20
75	-2.24	-0.66	7.52	-46.27	4.28	-76.07	89.14
100	-3.30	-0.45	4.75	-47.33	4.49	-78.84	92.07
250	-5.16	-0.11	2.57	-49.19	4.83	-81.02	94.91
500	-6.80	1.63	1.81	-50.83	6.57	-81.78	96.52
750	-7.12	1.38	1.76	-51.15	6.32	-81.83	96.72
1000	-8.69	1.99	1.11	-52.72	6.93	-82.48	98.14

Appendix C Change in Hunter and TCD Values to TVB-N using Chroma Meter

Table C1 Change in Hunter color values of PP/1000 rpm/1%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	50.41	-3.32	82.56	17.47	1.00	-3.87	17.92
6	45.47	-1.97	80.36	12.53	2.35	-6.07	14.12
9	43.22	-0.21	78.50	10.28	4.11	-7.93	13.62
12	43.43	-0.59	77.30	10.49	3.73	-9.13	14.40
15	31.30	-6.73	69.90	-1.64	-2.41	-16.53	16.79
18	36.83	-13.39	62.01	3.89	-9.07	-24.42	26.34
21	43.15	-15.16	58.07	10.21	-10.84	-28.36	32.03
24	37.82	-20.55	53.39	4.88	-16.23	-33.04	37.13
27	12.01	-51.07	30.97	-20.93	-46.75	-55.46	75.50
30	10.94	-51.44	30.55	-22.01	-47.12	-55.88	76.34
33	4.90	-52.13	26.54	-28.04	-47.81	-59.90	81.61
36	6.04	-52.07	26.64	-26.90	-47.75	-59.79	81.11
39	5.65	-52.04	26.24	-27.29	-47.72	-60.20	81.52
42	5.71	-52.34	26.78	-27.24	-48.02	-59.66	81.28

Table C2 Change in Hunter color values of PP/2000 rpm/1%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	48.59	-3.52	83.26	21.08	0.88	-3.85	21.45
6	40.25	-3.46	81.92	12.74	0.93	-5.19	13.79
9	39.76	-2.17	79.93	12.25	2.23	-7.18	14.38
12	37.97	-0.25	78.90	10.46	4.15	-8.21	13.93
15	30.62	-10.27	70.40	3.11	-5.87	-16.71	17.98
18	28.17	-20.43	67.19	0.66	-16.03	-19.92	25.58
21	33.07	-21.76	58.24	5.56	-17.36	-28.87	34.15
24	18.95	-26.25	56.39	-8.56	-21.85	-30.72	38.66
27	-21.27	-26.95	45.05	-48.78	-22.55	-42.06	68.24
30	-12.90	-20.28	45.59	-40.41	-15.88	-41.52	60.07
33	-28.27	-21.66	39.62	-55.78	-17.26	-47.49	75.26
36	-28.08	-22.47	39.29	-55.59	-18.07	-47.823	75.52
39	-28.08	-22.47	39.30	-55.59	-18.07	-47.806	75.51
42	-28.08	-22.47	39.36	-55.59	-18.07	-47.746	75.47

Table C3 Change in Hunter color values of PP/3000 rpm/1%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	36.16	-4.83	85.33	6.36	-1.02	-2.21	6.81
6	41.50	-3.99	83.59	11.70	-0.18	-3.95	12.35
9	40.79	-2.71	80.58	10.99	1.10	-6.96	13.06
12	37.76	-7.37	77.81	7.96	-3.56	-9.73	13.07
15	35.15	-11.31	73.18	5.35	-7.50	-14.36	17.06
18	29.66	-16.29	66.63	-0.14	-12.48	-20.91	24.36
21	20.08	-22.38	62.40	-9.72	-18.57	-25.14	32.74
24	22.56	-19.46	62.04	-7.24	-15.65	-25.50	30.78
27	-29.46	-23.01	48.36	-59.26	-19.20	-39.18	73.59
30	-29.46	-20.67	48.36	-59.26	-16.86	-39.18	73.02
33	-30.22	-20.61	48.00	-60.03	-16.80	-39.54	73.82
36	-30.18	-20.44	48.67	-59.98	-16.63	-38.88	73.39
39	-30.22	-20.61	47.87	-60.03	-16.80	-39.67	73.89
42	-30.28	-20.43	48.00	-60.08	-16.62	-39.54	73.82

Table C4 Change in Hunter color values of PP/1000 rpm/1%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	40.80	-3.73	81.33	7.86	0.90	-5.16	9.44
6	50.80	-1.97	80.36	17.86	2.65	-6.13	19.07
9	68.21	-0.21	78.50	35.27	4.41	-7.99	36.43
12	66.10	-0.59	77.30	33.16	4.03	-9.19	34.64
15	62.30	-6.73	69.90	29.36	-2.11	-16.59	33.79
18	59.03	-13.39	64.01	26.09	-8.77	-22.48	35.54
21	43.15	-15.16	58.07	10.21	-10.54	-28.42	31.99
24	37.82	-20.55	53.39	4.88	-15.93	-33.10	37.06
27	12.01	-51.08	30.97	-20.93	-46.45	-55.52	75.35
30	10.94	-51.44	30.55	-22.01	-46.82	-55.94	76.19
33	4.90	-52.13	28.54	-28.04	-47.51	-57.96	80.02
36	6.04	-52.07	28.97	-26.90	-47.45	-57.52	79.27
39	5.65	-52.05	29.24	-27.29	-47.42	-57.26	79.20
42	5.71	-52.35	29.78	-27.24	-47.72	-56.72	78.97

Table C5 Change in Hunter color values of PP/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	77.14	1.31	79.68	27.74	4.63	-3.79	28.38
6	76.69	3.66	74.34	27.29	6.98	-9.13	29.61
9	82.16	5.41	73.77	32.76	8.73	-9.70	35.26
12	87.82	8.51	72.51	38.42	11.83	-10.96	41.67
15	89.56	14.52	67.19	40.16	17.84	-16.28	46.86
18	86.64	12.08	58.55	37.24	15.40	-24.92	47.38
21	49.80	-14.52	41.64	0.40	-11.20	-41.83	43.30
24	27.36	-15.77	32.51	-22.04	-12.45	-50.96	56.90
27	2.14	-21.54	21.68	-47.26	-18.22	-61.79	79.89
30	-15.44	-11.19	21.04	-64.84	-7.87	-62.43	90.35
33	-3.34	-22.87	20.63	-52.74	-19.55	-62.84	84.33
36	-2.85	-23.51	20.78	-52.25	-20.19	-62.69	84.07
39	-2.46	-23.03	20.6	-51.86	-19.71	-62.87	83.85
42	-1.51	-24.75	21.11	-50.91	-21.43	-62.36	83.30

Table C6 Change in Hunter color values of PP/1000 rpm/5%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	88.96	3.94	78.71	34.34	7.13	-5.08	35.44
6	88.46	6.10	73.83	33.84	9.29	-9.96	36.48
9	97.32	17.51	71.37	42.70	20.70	-12.42	49.06
12	97.35	16.89	70.59	42.73	20.08	-13.20	49.03
15	89.32	24.46	66.59	34.70	27.65	-17.20	47.59
18	87.89	23.44	51.64	33.27	26.63	-32.15	53.39
21	33.80	-4.85	25.08	-20.82	-1.66	-58.71	62.32
24	25.11	-8.80	20.29	-29.51	-5.61	-63.50	70.25
27	10.91	-12.04	11.49	-43.71	-8.85	-72.30	84.95
30	0.51	-4.16	11.72	-54.11	-0.97	-72.07	90.13
33	0.89	-4.68	10.40	-53.73	-1.49	-73.39	90.97
36	0.37	-4.39	11.22	-54.25	-1.20	-72.57	90.62
39	0.47	-4.69	10.59	-54.15	-1.50	-73.20	91.06
42	0.90	-3.86	10.72	-53.72	-0.67	-73.07	90.69

Table C7 Change in Hunter color values of PP/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	78.93	-0.64	79.45	29.80	4.68	-4.49	30.50
6	98.87	7.88	75.54	49.74	13.20	-8.40	52.15
9	106.33	13.57	73.68	57.20	18.89	-10.26	61.11
12	94.73	19.37	69.03	45.60	24.69	-14.91	53.96
15	45.69	-17.84	31.74	-3.44	-12.52	-52.20	53.79
18	47.45	-11.26	31.21	-1.68	-5.94	-52.73	53.09
21	40.70	-15.75	27.87	-8.43	-10.43	-56.07	57.66
24	11.40	-22.88	9.69	-37.73	-17.56	-74.25	85.12
27	7.22	-21.74	8.32	-41.91	-16.42	-75.62	88.01
30	5.89	-21.45	8.28	-43.24	-16.13	-75.66	88.63
33	3.26	-28.23	11.42	-45.87	-22.91	-72.52	88.82
36	-6.65	-22.11	9.75	-55.78	-16.79	-74.19	94.33
39	-3.00	-11.36	15.56	-52.13	-6.04	-68.38	86.20
42	-15.99	-10.83	8.38	-65.12	-5.51	-75.56	99.90

Table C8 Change in Hunter color values of PP/Surlyn/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	84.68	2.13	78.07	36.35	7.19	-5.69	37.49
6	88.64	4.27	77.15	40.31	9.33	-6.61	41.90
9	95.14	3.24	76.07	46.81	8.30	-7.69	48.16
12	100.59	8.82	75.10	52.26	13.88	-8.66	54.76
15	71.40	-0.63	47.48	23.07	4.43	-36.28	43.23
18	70.39	-2.13	46.35	22.06	2.93	-37.41	43.53
21	13.71	-7.99	15.21	-34.62	-2.93	-68.55	76.85
24	-1.10	-20.63	16.78	-49.43	-15.57	-66.98	84.69
27	23.09	-25.65	24.23	-25.24	-20.59	-59.53	67.86
30	18.23	-24.75	24.85	-30.10	-19.69	-58.91	69.02
33	14.50	-30.74	15.53	-33.83	-25.68	-68.23	80.37
36	1.87	-28.54	16.15	-46.46	-23.48	-67.61	85.33
39	0.13	-14.14	24.80	-48.20	-9.08	-58.96	76.70
42	1.92	-25.07	17.55	-46.41	-20.01	-66.21	83.30

Table C9 Change in Hunter color values of 1%wt Clay/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	82.12	1.19	79.24	32.38	6.33	-4.38	33.28
6	94.09	5.34	77.12	44.35	10.48	-6.50	46.03
9	97.87	6.47	77.47	48.13	11.61	-6.15	49.89
12	100.73	10.91	74.93	50.99	16.05	-8.69	54.15
15	90.50	23.10	55.80	40.76	28.24	-27.82	56.85
18	55.86	-13.51	39.31	6.12	-8.37	-44.31	45.51
21	33.92	-18.48	35.39	-15.82	-13.34	-48.23	52.48
24	35.42	-16.61	38.34	-14.32	-11.47	-45.28	48.86
27	32.64	-19.57	23.73	-17.10	-14.43	-59.89	63.93
30	15.90	-20.22	24.57	-33.84	-15.08	-59.05	69.71
33	9.05	-32.91	17.63	-40.69	-27.77	-65.99	82.35
36	8.93	-22.44	20.80	-40.81	-17.30	-62.82	76.89
39	4.96	-21.04	20.90	-44.78	-15.90	-62.72	78.69
42	-0.58	-24.48	12.22	-50.32	-19.34	-71.40	89.47

Table C10 Change in Hunter color values of 3%wt Clay/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	83.55	2.21	78.54	31.59	7.26	-4.51	32.72
6	92.04	4.92	76.83	40.08	9.97	-6.22	41.77
9	94.44	6.91	75.99	42.48	11.96	-7.06	44.69
12	102.64	11.70	75.18	50.68	16.75	-7.87	53.95
15	81.49	2.82	52.94	29.53	7.87	-30.11	42.90
18	63.04	-7.50	46.02	11.08	-2.45	-37.03	38.73
21	38.84	-14.94	40.04	-13.12	-9.89	-43.01	46.04
24	23.25	-22.18	31.54	-28.71	-17.13	-51.51	61.41
27	24.40	-24.05	29.07	-27.56	-19.00	-53.98	63.52
30	16.17	-24.52	25.33	-35.79	-19.47	-57.72	70.65
33	6.36	-32.97	15.39	-45.60	-27.92	-67.66	86.24
36	-1.66	-17.38	18.92	-53.62	-12.33	-64.13	84.50
39	-12.39	-10.10	17.86	-64.35	-5.05	-65.19	91.74
42	-11.41	-19.97	10.74	-63.37	-14.92	-72.31	97.30

Table C11 Change in Hunter color values of 5%wt Clay/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	96.37	6.97	77.58	41.54	11.37	-5.59	43.43
6	95.72	5.62	78.30	40.89	10.02	-4.87	42.38
9	101.21	11.43	75.41	46.38	15.83	-7.76	49.62
12	102.95	9.72	76.19	48.12	14.12	-6.98	50.63
15	83.71	9.12	57.04	28.88	13.52	-26.13	41.23
18	53.87	-13.31	48.61	-0.96	-8.91	-34.56	35.71
21	47.77	-11.71	42.85	-7.06	-7.31	-40.32	41.59
24	34.21	-20.33	35.38	-20.62	-15.93	-47.79	54.44
27	28.56	-21.97	22.10	-26.27	-17.57	-61.07	68.77
30	25.95	-20.97	20.6	-28.88	-16.57	-62.57	70.89
33	13.26	-16.74	16.57	-41.57	-12.34	-66.60	79.48
36	4.49	-19.34	17.15	-50.34	-14.94	-66.02	84.36
39	-6.98	-11.05	18.04	-61.81	-6.65	-65.13	90.04
42	1.48	-24.37	10.03	-53.35	-19.97	-73.14	92.71

Table C12 Change in Hunter color values of 5%wt Clay/1000 rpm/3%wt BCG film during storage at ambient temperature using 20g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	96.37	6.97	77.58	47.24	12.29	-6.36	49.23
9	103.21	11.43	75.41	54.08	16.75	-8.53	57.26
15	83.71	9.12	57.04	34.58	14.44	-26.90	46.13
21	47.77	-11.71	42.85	-1.36	-6.39	-41.09	41.61
27	28.56	-21.97	22.10	-20.57	-16.65	-61.84	67.27
33	13.26	-16.74	16.57	-35.87	-11.42	-67.37	77.18
39	-6.98	-11.05	18.04	-56.11	-5.73	-65.90	86.74

Table C13 Change in Hunter color values of 5%wt Clay/1000 rpm/3%wt BCG film during storage at ambient temperature using 40g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	105.47	12.22	74.03	58.20	17.42	-10.17	61.60
9	99.76	23.03	69.25	52.49	28.23	-14.95	61.45
15	17.95	-17.97	22.49	-29.32	-12.77	-61.71	69.50
21	33.57	-23.08	27.51	-13.70	-17.88	-56.69	61.00
27	14.08	-24.90	11.54	-33.19	-19.70	-72.66	82.27
33	7.97	-23.74	18.98	-39.30	-18.54	-65.22	78.37
39	-0.34	-12.76	7.78	-47.61	-7.56	-76.42	90.35

Table C14 Change in Hunter color values of 5%wt Clay/1000 rpm/3%wt BCG film during storage at ambient temperature using 60g of fish tissue.

Time(hours)	b	a	L	delta b	delta a	delta L	delta E
3	112.3	7.37	75.70	60.33	12.29	-7.86	62.07
9	94.93	27.57	53.58	42.96	32.49	-29.98	61.64
15	18.41	-11.03	21.57	-33.56	-6.11	-61.99	70.75
21	16.56	-26.26	12.21	-35.41	-21.34	-71.35	82.46
27	9.33	-18.33	15.85	-42.64	-13.41	-67.71	81.13
33	8.63	-19.78	11.32	-43.34	-14.86	-72.24	85.54
39	0.13	-27.07	11.83	-51.84	-22.15	-71.73	91.23

Appendix D Mechanical Measurement of PP/organoclay nanocomposites

Table D1 Mechanical properties of PP/organoclay nanocomposites

Sample	Young's Modulus (MPa)	Tensile Strength (MPa)	Elongation At break (%)
PP	513.23 ± 29.82	30.55 ± 1.70	15.96 ± 3.38
PP/6%Surlyn	576.25 ± 49.19	25.80 ± 1.11	10.46 ± 1.46
PP/6%Surlyn/1%Clay	596.29 ± 10.94	25.84 ± 0.81	12.53 ± 1.54
PP/6%Surlyn/3%Clay	549.18 ± 29.82	23.00 ± 1.74	11.72 ± 3.42
PP/6%Surlyn/5%Clay	532.95 ± 27.89	23.06 ± 2.53	11.28 ± 2.61

Table D2 Oxygen transmission rate, OTR (cc/m^2/day) of PP/organoclay nanocomposites

Sample	**Oxygen Gas Permeability (cc/m^2.day)**
PP	3580 ± 84
PP/6%Surlyn	1649 ± 139
PP/6%Surlyn/1%Clay	634 ± 19
PP/6%Surlyn/3%Clay	627 ± 16
PP/6%Surlyn/5%Clay	615 ± 40

Appendix E Bentonite Clay, Max-Gel® GRADE SAC

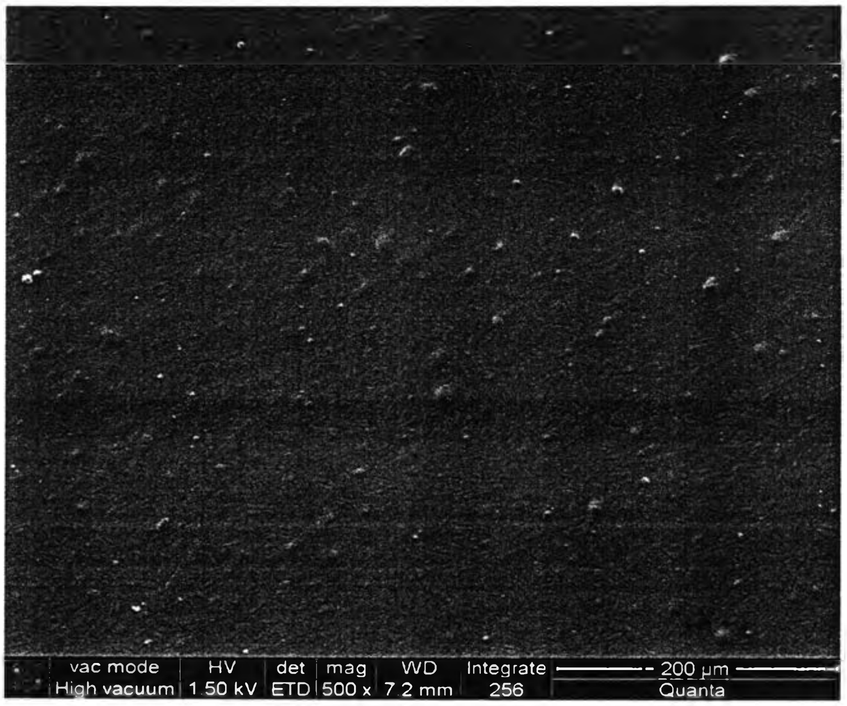
Table E1 Typical chemical analysis of bentonite on dry basis at 105°C

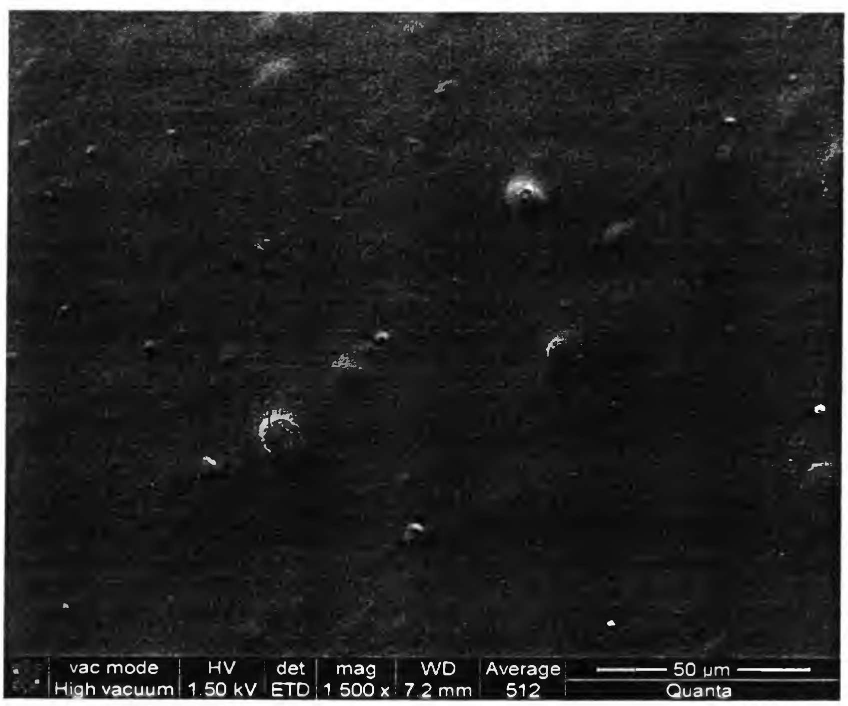
Element	Percentage
SiO_2	65-70
Al_2O_3	13-17
Fe_2O_3	1.0-2.0
Na_2O	1.5-2.5
LOI	10-12
MgO	2.0-3.0
CaO	1.5-2.5
K_2O	0.4-0.8
TiO_2	0.2-0.3

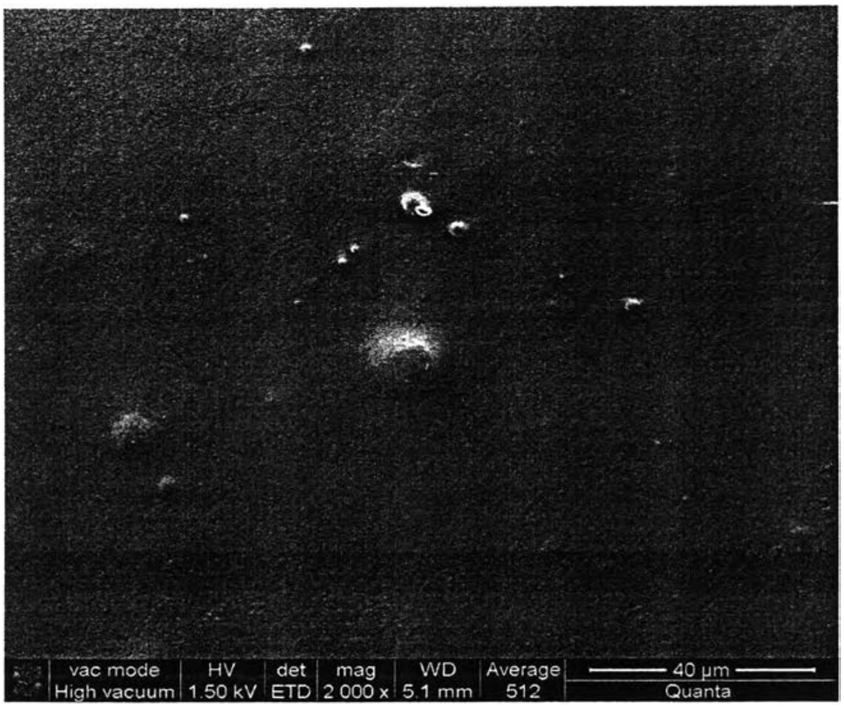
Table E2 Physical properties of bentonite

Physical properties	
Moisture content, %	8-12
5% suspension, pH	9.5-11.0
Swelling index, ml per 2 g of clay	15
Viscosity dial reading at 600 rpm	12-20
Dry particle size (pass 200 meshes), %	80 min
Wet particle size (pass 325 meshes),	98 min
Specific gravity	2.3-2.4
CEC, meq/100g of clay	50

Appendix F SEM Images of PP/Organomodified-BTN Nanocomposite Films



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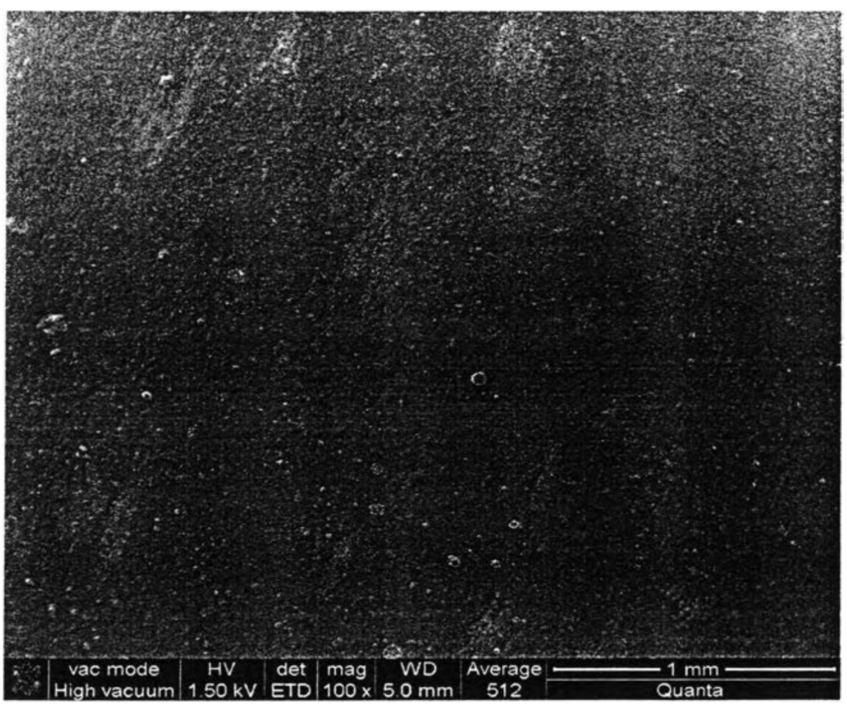
High vacuum | 1.50 kV | ETD | 2 000 x | 5.1 mm | 512 | Quanta

(A)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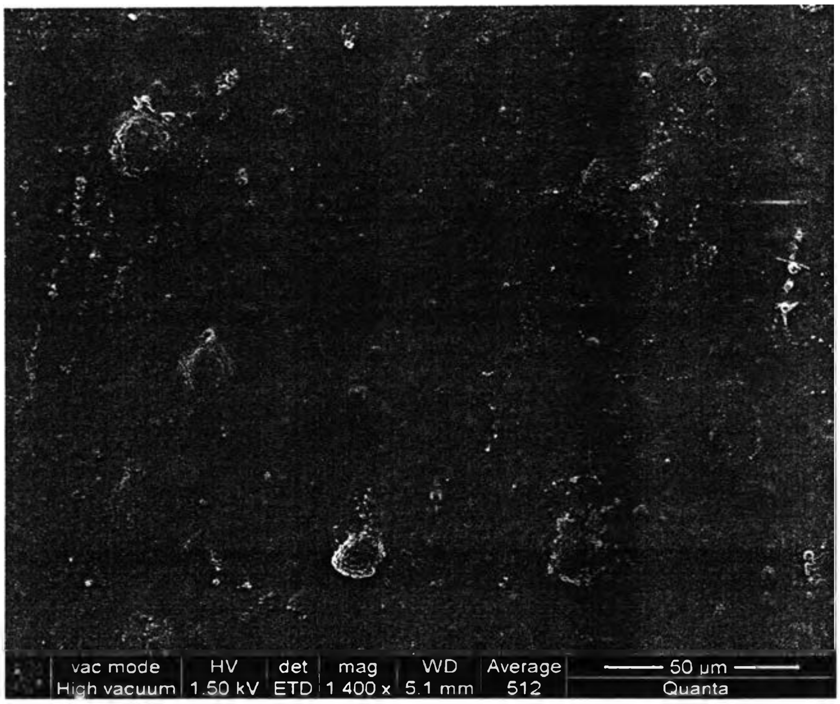
High vacuum | 1.50 kV | ETD | 100 x | 5.0 mm | 512 | Quanta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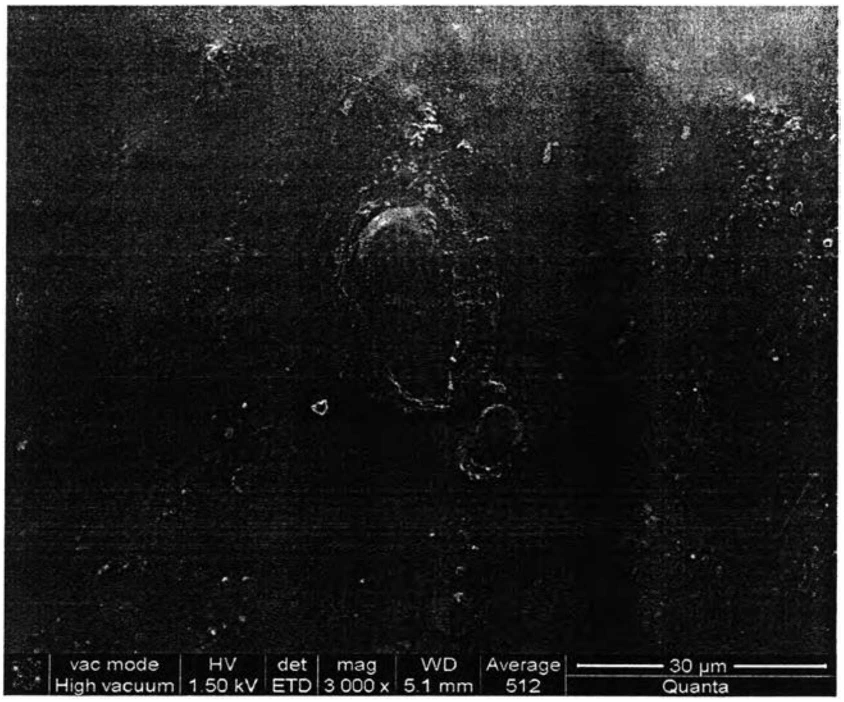
High vacuum 1.50 kV ETD 1 400 x 5.1 mm 512
50 µm
Quanta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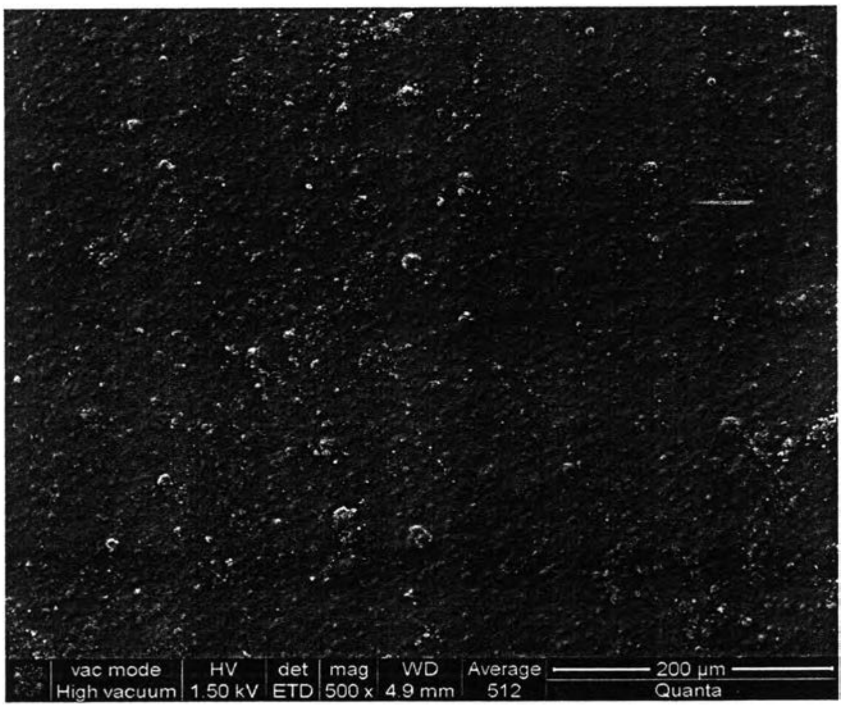
30 µm
Quanta

(B)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ETD
mag
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WD
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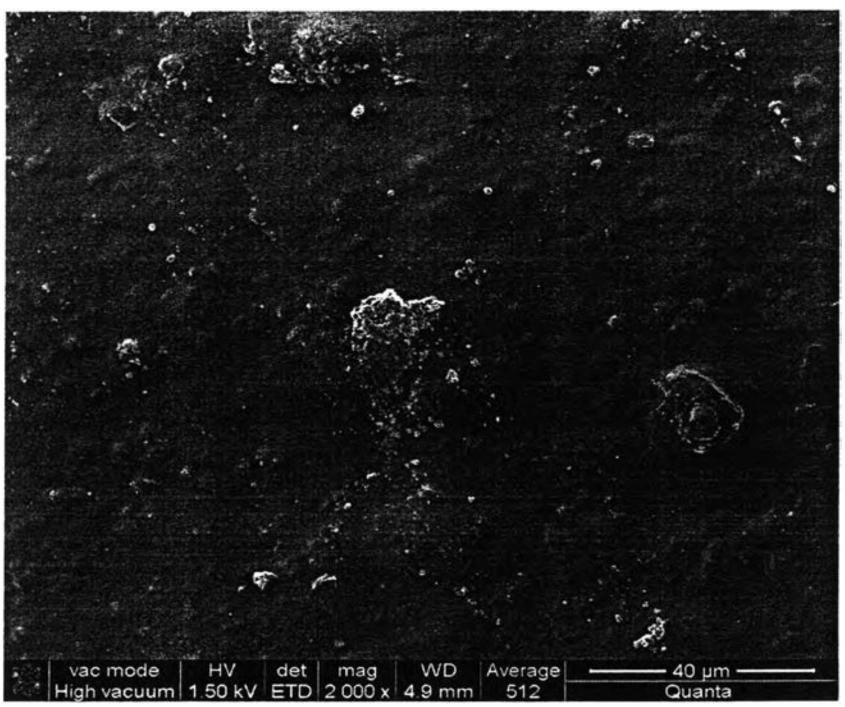
Quanta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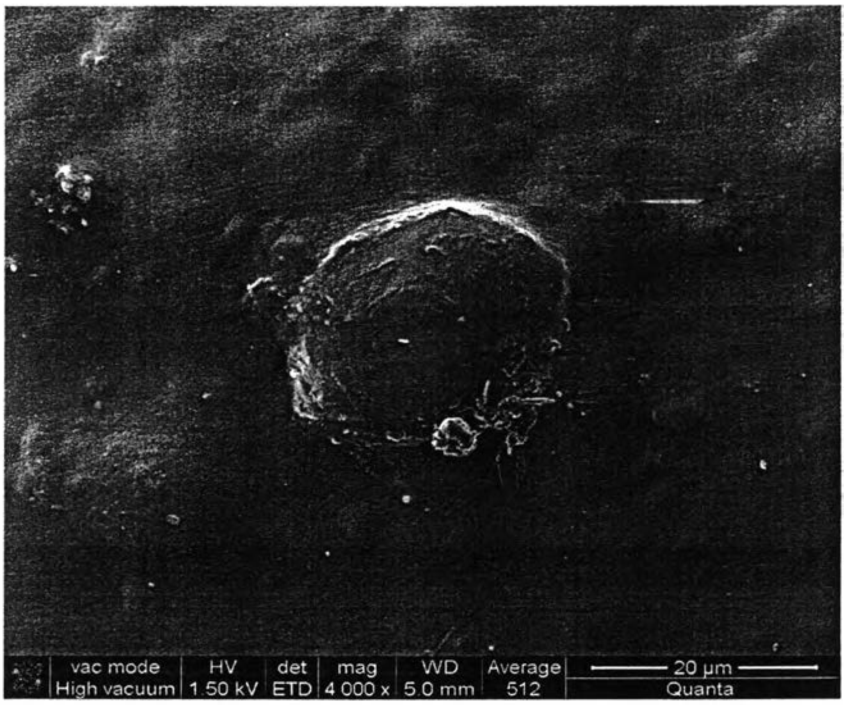
WD
4.9 mm
Average
512
40 µm
Quanta



(C)

Figure F1 SEM images of nanocomposite films at 500, 2000, and 4000 magnification; (A) 1%wt organoclay, (B) 3%wt organoclay, (C) 5%wt organoclay

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Proceedings:

1. Seephueng, A., Magaraphan, R., Nithitanakul, M., and Manuspiya, H. (2008, April 6-10) Smart Packaging for Fish Spoilage Indicator. Proceedings of the 235th American Chemical Society Conference, New Orleans, Louisiana, USA.
2. Seephueng, A., Magaraphan, R., Nithitanakul, M., and Manuspiya, H. (2008, April 23) Smart Packaging for Fish Spoilage Indicator. Proceedings of the 14th PPC Symposium on Petroleum, Petrochems, and Polymers, Bangkok, Thailand.

Presentation:

1. Seephueng, A., Magaraphan, R., Nithitanakul, M., and Manuspiya, H. (2008, April 6-10) Smart Packaging for Fish Spoilage Indicator. Poster presented at the 235th American Chemical Society Conference, New Orleans, Louisiana, USA.
2. Seephueng, A., Magaraphan, R., Nithitanakul, M., and Manuspiya, H. (2008, April 23) Smart Packaging for Fish Spoilage Indicator. Poster presented at the 14th PPC Symposium on Petroleum, Petrochems, and Polymers, Chulalongkorn University, Bangkok, Thailand.