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APPENDIX

## Tensile properties of compressed films ( P0.0001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
20.10	270.7	11.66	208.4
22.19	311.4	12.10	298.5
23.50	306.6	13.73	403.3
23.60	314.9	18.26	375.0
20.57	289.5	10.24	315.2
$\bar{X}=21.99,$ SD=1.620	$\bar{X}=289.6,$ SD=18.40	$\bar{X}=13.19,$ SD=3.091	$\bar{X}=320.0,$ SD=75.66

## Tensile properties of compressed films ( P0.001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
20.93	291.9	16.94	337.5
23.29	324.9	11.59	310.5
20.69	256.0	18.94	337.0
23.72	336.0	12.34	297.7
27.81	306.9	15.14	468.6
$\bar{X}=23.09,$ SD=2.870	$\bar{X}=303.1,$ SD=31.28	$\bar{X}=14.99,$ SD=3.080	$\bar{X}=350.12,$ SD=69.23

## Tensile properties of compressed films ( P0.01)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
22.90	351.8	6.283	200.9
26.08	389.3	9.489	281.3
25.80	359.6	9.430	368.3
23.40	328.8	8.722	220.2
25.72	396.1	7.961	202.8
X=24.78, SD=1.50	X=365.1, SD=27.80	X=8.377, SD=1.32	X=254.7, SD=71.39

## Tensile properties of compressed films ( M0.0001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
25.21	347.2	16.11	493.1
20.17	248.7	15.11	360.6
21.12	273.7	13.92	347.8
23.98	327.3	13.11	447.8
18.47	249.3	15.59	345.9
X=21.79, SD=2.76	X=289.2, SD=45.50	X=15.16, SD=0.80	X=358.9, SD=67.29

## Tensile properties of compressed films ( M0.001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
22.84	314.2	9.090	242.9
19.59	254.5	10.53	253.6
23.64	333.2	9.856	254.3
22.35	306.7	11.30	296.3
26.31	342.3	10.78	333.3
X=22.94, SD=2.42	X=310.2, SD=34.20	X=10.31, SD=0.87	X=276.1, SD=34.53

## Tensile properties of compressed films ( M0.01)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
23.58	436.2	7.199	298.7
28.42	490.7	5.299	248.6
26.98	414.5	6.175	204.9
25.63	352.0	8.808	285.1
25.76	399.0	6.483	256.4
X=26.08, SD=1.79	X=418.0, SD=40.86	X=7.714, SD=1.600	X=258.7, SD=36.39

## Tensile properties of compressed films ( PP)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
25.90	382.7	7.775	210.8
23.70	333.4	7.741	174.0
25.27	366.2	8.074	225.4
27.50	380.8	9.783	184.0
23.67	333.0	9.690	243.3
X=25.21, SD=1.60	X=359.2, SD=24.95	X=8.492, SD=1.25	X=207.5, SD=28.66

## Tensile properties of extruded films machine direction( P0.0001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
19.08	659.7	616.1	3009
17.11	723.0	549.5	3015
19.15	710.9	600.5	3011
23.35	781.5	671.4	3370
23.02	718.0	737.1	3017
X=20.34, SD=2.72	X=718.6, SD=43.31	X=634.9, SD=71.80	X=3084, SD=159.6



## Tensile properties of extruded films machine direction( P0.001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
16.57	607.0	483.7	2280
25.99	616.3	697.1	2140
13.51	652.9	484.9	2240
20.32	606.9	644.1	2450
16.222	602.7	567.3	2403
X=18.52, SD=4.83	X=629.2, SD=26.64	X=584.2, SD=104.6	X=2306, SD=125.1

## Tensile properties of extruded films machine direction( P0.01)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
27.06	678.8	691.5	3210
20.05	609.2	678.2	3034
24.27	601.8	734.2	3168
17.85	601.4	595.3	3154
15.03	684.5	541.7	3123
X=20.85, SD=4.84	X=655.1, SD=46.4	X=653.9, SD=80.0	X=3138, SD=65.91

## Tensile properties of extruded films machine direction( M0.0001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
9.160	643.2	420.5	1721
8.490	734.7	567.6	1842
10.71	721.4	450.7	1731
14.96	696.5	547.2	1872
17.97	735.7	539.3	1962
X=14.26, SD=4.21	X=706.3, SD=56.09	X=505.1, SD=65.12	X=1825, SD=101.1

## Tensile properties of extruded films machine direction( M0.001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
19.04	665.2	594.4	2787
28.31	674.4	702.7	2692
20.61	670.8	597.4	2620
27.11	598.5	666.1	2830
20.72	619.5	614.0	2540
X=23.16, SD=4.23	X=652.1, SD=42.39	X=634.9, SD=47.60	X=2693, SD=106.2

## Tensile properties of extruded films machine direction( M0.01)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
13.95	708.9	584.0	2614
12.31	724.0	581.2	2594
26.18	755.2	693.9	2420
20.01	726.0	586.5	2322
19.15	744.8	586.6	2613
X=18.32, SD=5.49	X=706.1, SD=64.4	X=606.4, SD=64.55	X=2513, SD=134.0

## Tensile properties of extruded films machine direction( PP)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
23.37	715.0	636.6	2741
18.17	701.6	580.9	2746
18.60	698.9	586.9	2550
17.89	721.0	580.1	2744
29.97	714.1	581.2	2841
X=21.60, SD=5.19	X=710.1, SD=9.45	X=593.1, SD=24.44	X=2724, SD=106.2

## Tensile properties of extruded films transverse direction( P0.0001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
12.18	564.0	3.792	9.420
9.426	597.7	3.909	9.196
8.640	547.7	3.417	7.353
9.758	569.3	4.176	9.320
9.696	559.1	3.669	9.303
X=9.940, SD=1.329	X=601.1, SD=5.40	X=3.792, SD=0.282	X=8.910, SD=0.970

## Tensile properties of extruded films transverse direction( P0.001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
9.552	551.8	2.676	5.776
9.611	548.6	2.343	5.324
9.281	586.6	2.302	3.994
8.285	552.0	2.159	4.059
9.223	553.0	2.635	4.807
X=9.190, SD=0.533	X=543.7, SD=39.6	X=2.423, SD=0.224	X=4.792, SD=0.779

## Tensile properties of extruded films transverse direction( P0.01)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
11.70	740.4	2.269	6.185
12.81	793.8	2.143	5.933
10.58	696.4	1.951	4.867
10.69	718.4	1.885	4.867
9.264	714.0	1.869	4.326
$\bar{X}=11.01, SD=1.33$	$\bar{X}=714.8, SD=61.8$	$\bar{X}=2.023,$ $SD=0.175$	$\bar{X}=5.235,$ $SD=0.788$

## Tensile properties of extruded films transverse direction( M0.0001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
6.767	620.0	2.950	4.475
10.51	624.6	2.551	5.521
11.06	623.8	2.574	6.288
10.88	623.4	2.500	5.856
6.567	622.0	2.618	3.639
$\bar{X}=9.137,$ $SD=2.283$	$\bar{X}=623.0,$ $SD=52.47$	$\bar{X}=2.639,$ $SD=0.179$	$\bar{X}=5.196,$ $SD=1.088$

## Tensile properties of extruded films transverse direction ( M0.001)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
10.68	748.0	2.167	5.441
11.08	719.9	3.408	7.899
16.67	751.0	4.441	5.140
11.67	761.0	2.341	5.104
12.13	791.0	1.985	4.219
$\bar{X}=12.44, SD=2.43$	$\bar{X}=754.3,$ $SD=25.64$	$\bar{X}=2.868,$ $SD=1.038$	$\bar{X}=5.560, SD=1.38$

## Tensile properties of extruded films transverse direction( M0.01)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
23.40	730.7	2.408	6.619
9.832	732.0	2.267	5.525
12.07	730.9	2.390	5.831
11.83	729.0	2.435	5.609
14.10	791.2	2.567	6.795
$\bar{X}=12.03, SD=1.52$	$\bar{X}=742.76,$ $SD=27.09$	$\bar{X}=2.413,$ $SD=0.107$	$\bar{X}=6.076,$ $SD=0.590$

## Tensile properties of extruded films transverse direction( PP)

Tensile strength (MPa)	Modulus of elasticity (MPa)	Elongation at break (%)	Toughness (N-mm)
10.32	612.0	1.935	4.265
9.359	516.1	2.518	3.611
13.79	585.0	2.287	6.286
7.967	577.7	2.576	4.482
8.410	623.2	2.309	4.314
$\bar{X}=9.568,$ SD=2.607	$\bar{X}=582.8,$ SD=41.72	$\bar{X}=2.385,$ SD=0.281	$\bar{X}=4.591,$ SD=1.004

## CURRICULUM VITAE



Mr. Tikhamporn Meesane was born in February, 24,1974 Nakhonsrithammaratch. He received a Bachelor of Science with a major in Indrustiai Chemistry from Kingmongkut Institue of Technology Chaochunthahan Ladkrabarig Campus in 1996. He started as graduate student in Department of Material Science with a major in Applied Polymer Science And Textile Technology, Chulalongkorn University in November, 1997, and completed the programe in April 2000.