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APPENDICES

Appendix A Effect of Plasma Treatment Time on Contact Angle Measurement

Table A1 Effect of DBD plasma treatment time on water contact angle values of cellulose sheet

Time of plasma treatment (s)	Contact angle value (θ)
0	55.70 \pm 3.38674
5	11.33 \pm 1.74738
10	11.87 \pm 1.4093
20	11.50 \pm 0.96437
30	9.99 \pm 0.82682
60	10.37 \pm 0.97125
90	10.67 \pm 1.15036
120	10.17 \pm 1.00167
180	10.57 \pm 1.11505
300	9.40 \pm 1.05357

Appendix B Effect of Plasma Treatment Time on Amount of coating NR

Table B Effect of plasma treatment time on amount of coated natural rubber (NR) on cellulose sheets

Concentrations of reacted Br ₂ (mM/cm ²)	Concentration of NR (%w/v)			
	0.2	0.5	1.0	1.4
0 s	0.228±0.04782	1.303±0.23544	0.841±0.09860	0.251±0.03732
10 s	2.176±0.24382	2.844±0.34405	2.130±0.24331	2.293±0.31942
30 s	4.107±0.62751	10.830±0.4521	9.370±0.51849	6.653±0.79071
60 s	2.966±0.16289	6.030±0.27853	4.029±0.64238	3.219±0.28623
90 s	2.092±0.28761	4.193±0.88342	2.325±0.26556	2.146±0.24934

Appendix C Effect of Plasma Treatment Time on Contact Angle Measurement

Table C1 Effect of plasma treatment time on water contact angle values of NR-coated cellulose sheet

Water contact angle (degree)	Concentration of NR (%w/v)			
	0.2	0.5	1.0	1.4
0 s	60.6667±1.1150	68.4667±3.7740	63.3667±2.9771	61.8333±1.3796
10 s	66.0667±3.6909	74.7333±2.1221	68.8333±3.4385	66.7667±2.3115
30 s	71.8667±3.0105	79.3667±3.8591	78.8000±3.8196	74.2000±3.1096
60 s	65.5667±1.5567	72.6333±1.8502	69.7667±3.9501	67.3333±3.0664
90 s	64.9333±1.1239	68.7333±2.3586	66.4333±3.4703	66.2000±1.8681

Appendix D Effect of The Number of Coating Cycle on The Amount of Coated Natural Rubber**Table D1** Effect of the number of coating cycle on the amount of coated natural rubber (NR) on cellulose sheet

The number of coating cycle (times)	Concentrations of reacted Br ₂ (mM/cm ²)
0	0.09967±0.025166
1	10.83000±0.452106
2	14.09333±1.463227
3	13.47667±1.364747
4	15.06333±0.818189
5	14.07333±1.520076

Appendix E Effect of The Number of Coating Cycle on Contact Angle Measurement

Table E1 Effect of the number of coating cycle on water contact angle values of NR-coated cellulose sheet

The number of coating cycle (times)	Contact angle value (θ)
0	55.70000 \pm 3.38673
1	79.36667 \pm 3.85918
2	86.26667 \pm 3.28075
3	87.93333 \pm 2.45017
4	87.26667 \pm 1.35769
5	87.80000 \pm 1.99749

Appendix F Effect of ZnO on The Amount of NR coated on Cellulose Sheets

Table F1 Effect of ZnO on amount of NR coated on cellulose sheets

Concentrations of reacted Br ₂ (mM/cm ²)	Samples		
	A	B	C
0 s	1.30333±0.235443	1.30333±0.235443	13.46667±0.8082
10 s	2.84433±0.344056	13.19333±0.89399	26.16667±0.8082
30 s	10.83000±0.45210	23.70000±0.99292	34.83333±1.2096
60 s	6.03000±0.278539	28.63333±1.07857	43.80000±2.2912
90 s	4.193333±0.88342	16.32333±0.93874	29.36667±1.7009

Appendix G Effect of ZnO on Contact Angle Measurement

Table G1 Effect of ZnO on water contact angle values of NR-coated cellulose sheet

Water contact angle (degree)	Concentration of NR (%w/v)		
	A	B	C
0 s	68.46667±3.77403	68.46667±3.77403	84.80000±3.95094
10 s	74.73333±2.12210	82.60000±2.36431	99.80000±3.38673
30 s	79.36667±3.85918	96.83333±1.80092	116.60000±3.2695
60 s	72.63333±1.85022	100.05000±2.7574	124.43303±1.9502
90 s	68.73333±2.35867	85.07500±3.93478	105.76670±3.2746

Appendix H Effect of $Zn(NO_3)_2$ Concentration on The Amount of NR-coated on Cellulose Sheets

Table H1 Effect of $Zn(NO_3)_2$ concentration on the amount of NR-coated on cellulose sheets

$Zn(NO_3)_2$ concentration (M)	Concentrations of reacted Br_2 (mM/cm ²)
0	28.63±1.078579
0.05	34.13±1.201388
0.1	38.4±1.053565
0.5	43.8±2.291288
1	44.27±1.877054

Appendix I Effect of $Zn(NO_3)_2$ Concentration on Water Contact Angle

Table II Effect of $Zn(NO_3)_2$ concentration on water contact angle values of NR-coated cellulose sheet

$Zn(NO_3)_2$ concentration (M)	Contact angle value (θ)
0	100.83±2.779089
0.05	108.13±1.357694
0.1	115.53±1.656301
0.5	124.43±1.950214
1	123.8±2.306513

CURRICULUM VITAE

Name: Ms. Chanikan Saelim

Date of Birth: November 25, 1988

Nationality: Thai

University Education:

2007–2010 Bachelor Degree of Industrial Chemistry, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand.

Proceedings:

1. Saelim, C. and Rujiravanit, R. (2013, April 23) Preparation of Natural Rubber-coated Banana Cellulose-based Sheet by Plasma Treatment for Water Resistance Improvement. Proceedings of the 4th Research Symposium on Petrochemical and Materials Technology and The 19th PPC Symposium on Petroleum, Petrochemicals, and Polymers, Bangkok, Thailand.

Presentations:

1. Saelim, C. and Rujiravanit, R. (2013, April 23) Preparation of Natural Rubber-coated Banana Cellulose-based Sheet by Plasma Treatment for Water Resistance Improvement. Proceedings of the 4th Research Symposium on Petrochemical and Materials Technology and The 19th PPC Symposium on Petroleum, Petrochemicals, and Polymers, Bangkok, Thailand.
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