

**HYDROPHOBIC-MODIFIED CELLULOSE FIBERS AND CELLULOSE
MICROFIBRILS AS REINFORCEMENT FOR BIOCOMPOSITES**



Ms. Wilailak Chanklin

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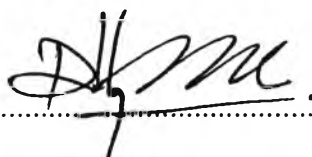
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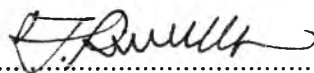
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Prof. Huining Xiao
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..... College Dean
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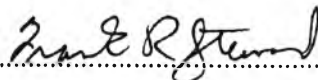
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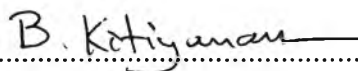
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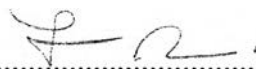
.....
(Prof. Huining Xiao)



.....
(Prof. Frank R. Steward)



.....
(Asst. Prof. Boonyarach Kitiyanan)



.....
(Dr. Boonrod Sajjakulnukit)

ABSTRACT

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The hydrophobic modification of sulfite cellulose fiber (CF) and cellulose microfibril (CMF) was conducted by grafting 1–Octadecanol (18OH) on the surfaces via covalent coupling agent, Toluene 2,4–diisocyanate (TDI), which induced the isocyanate functionality onto the fibers surface. The grafting of 18OH onto cellulose fibers was confirmed by FTIR spectra with a peak that present a decreasing of the O–H bond of the grafted fibers. The thermogravimetric analysis (TGA) indicates the amount of grafting yield which is 4.38% and 5.79% for CF-g-TDI/18OH and CMF-g-TDI/18OH, respectively. Moreover, the surface morphology and hydrophobicity of the grafted fibers and the PP–based composites were investigated by scanning electron microscopy (SEM) and static contact angle measurement which resulting in the improvement of the interfacial interaction between cellulose fibers and PP matrix.

บทคัดย่อ

วิไลลักษณ์ จันทร์กลิ่น: วัสดุผสมชีวภาพจากการเปลี่ยนแปลงเส้นใยเซลลูโลส (CF) และเส้นใยเซลลูโลสขนาดเล็ก (CMF) โดยการเสริมแรงด้วยสารที่มีคุณสมบัติไม่ชอบน้ำ (Hydrophobic-Modified Cellulose Fibers and Cellulose Microfibrils as Reinforcement for Biocomposites) อ. ที่ปรึกษา : ดร.สุขหญิง เจียว และ ผศ.ดร. ชिरศักดิ์ ฤกษ์สมบูรณ์ 126 หน้า

การเปลี่ยนแปลงคุณสมบัติความไม่ชอบน้ำของเส้นใยเซลลูโลสและเส้นใยเซลลูโลสขนาดเล็กด้วยการกราฟต์สเตียริกแอลกอฮอล์บนผิวของเส้นใย โดยมีทีดีไอเป็นสารเชื่อมในปฏิกิริยาการกราฟต์ เนื่องจากทีดีไอเป็นสารที่มีหมู่ไอโซไซยานเนตซึ่งทำปฏิกิริยาเคมีกับหมู่ไฮดรอกซิลได้ดี เส้นใยที่กราฟต์แล้วถูกพิสูจน์ด้วยเครื่องมือวิเคราะห์สารด้วยอินฟราเรด พบว่า ค่าสัดส่วนการดูดซับของคลื่นอินฟราเรดของหมู่แอลกอฮอล์นั้นลดลง แสดงให้เห็นว่า การเกิดปฏิกิริยาการกราฟต์ระหว่างเส้นใยและสเตียริกแอลกอฮอล์โดยมีทีดีไอเป็นสารเชื่อมนั้นสามารถพัฒนาความไม่ชอบน้ำของเส้นใยได้ในขณะที่เครื่องมือการวัดน้ำหนักโดยใช้ความร้อนได้แสดงผลผลิตจากการกราฟต์ที่ร้อยละ 4.38 และ 5.79 สำหรับเส้นใยเซลลูโลสและเส้นใยเซลลูโลสขนาดเล็ก นอกจากนี้ ผลการทดสอบลักษณะทางสัณฐานวิทยาของพื้นผิวของเส้นใยและวัสดุผสมโพลีโพรพิลีนชีวภาพด้วยกล้องจุลทรรศน์อิเล็กตรอนแบบส่องกราด พบว่าแรงยึดเหนี่ยวพันธะระหว่างเส้นใยและโพลีโพรพิลีนดีขึ้น สืบเนื่องมาจากการกราฟต์ของสเตียริกแอลกอฮอล์ ในขณะที่ค่าความไม่ชอบน้ำของวัสดุผสมมีค่ามากขึ้น จากการทดสอบด้วยการวัดมุมสัมผัสของวัสดุผสมที่กราฟต์ด้วยสเตียริกแอลกอฮอล์ พบว่า องศาความสัมผัสเพิ่มขึ้นจาก 0 องศา เป็น 136 และ 111 องศา สำหรับเส้นใยเซลลูโลสและเส้นใยเซลลูโลสขนาดเล็กตามลำดับ นั่นคือแรงยึดเหนี่ยวระหว่างพื้นผิวของเส้นใยและโพลีโพรพิลีนนั้นพัฒนาขึ้น

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TABLE OF CONTENTS

		PAGE
	Title Page	i
	Abstract (in English)	iii
	Abstract (in Thai)	iv
	Acknowledgements	v
	Table of Contents	vi
	List of Tables	ix
	List of Figures	xi
	Abbreviations	xvii
CHAPTER		PAGE
I	INTRODUCTION	1
II	LITERATURE REVIEW	3
	2.1 Introduction	3
	2.2 Cellulose Fibers	7
	2.3 Modifications of Cellulose Fiber	13
	2.3.1 Physical Modification	15
	2.3.2 Surface Chemical Modification	16
	2.3.2.1 Chemical Coupling Agents	17
	2.3.2.2 Graft Copolymerization	36
III	EXPERIMENTAL	48
	3.1 Materials and Chemicals	48
	3.2 Equipments	48
	3.3 Experiment Procedures	49
	3.3.1 Modification of Cellulosic Materials (CF and CMF) via TDI Coupling Agent	50

CHAPTER	PAGE
3.3.1.1 CMF Grafting with 1–Octadecanol	50
3.3.1.2 CF Grafting with 1–Octadecanol	52
3.3.2 Modify Cellulose Microfibril (CMF) via EP Coupling Agent	52
3.3.3 Extrusion Process	53
3.4 Characterizations	54
IV RESULTS AND DISCUSSIONS	56
4.1 Properties of Cellulose Fibers-g-TDI/18OH (Modified Cellulose Fibers)	56
4.1.1 Characterizations of Surface Modified Fibers	56
4.1.2 Surface Wettability	61
4.2 Properties of PP/Cellulose Fibers-g-TDI/18OH Composites	62
4.2.1 Mechanical Properties of PP–reinforced Modified Cellulose Fiber Composites	62
4.2.2 Surface Morphology	64
4.2.3 Thermogravimetric Analysis	65
4.2.4 Thermal Analysis of PP–based Biocomposites	66
4.3 The Effect of Alcohol Types	68
4.4 The Effect of the Amount of Alcohol (Modifier Amount)	71
4.5 The Effect of Grafting Procedure	72
4.6 The Effect of Coupling Agents	73
4.7 The Effect of Cellulose Fiber Characteristics	75
V CONCLUSIONS AND RECOMMENDATIONS	77

CHAPTER	PAGE
REFERENCES	79
APPENDICES	
APPENDIX A In situ atom transfer radical polymerization (ATRP) of butyl acrylate (BA) in an attempt to render the surface of CF and CMF hydrophobic	86
APPENDIX B Enhancement of the paper performance	117
APPENDIX C BET results	122
CURRICULUM VITAE	126

LIST OF TABLES

TABLE		PAGE
2.1	The length of fibers after processed	4
2.2	Example of interior and exterior parts produced from natural materials	5
2.3	The annual fiber production and the availability of some cellulose fibers	10
2.4	The summation of advantages and disadvantages of cellulose fibers over traditional glass fibers	11
2.5	Chemical composition and structural parameters of some natural fibers	12
2.6	Properties of typical thermoplastic polymers used in natural fiber composite fabrication	14
2.7	Elemental analysis of Avicell before and after modification with different coupling agents	25
2.8	Variation of tensile properties of LDPE–sisal composites with fiber treatments	28
2.9	Mechanical properties of WF/PP and its composites	30
2.10	The water uptake at equilibrium (WU) and diffusion coefficient of water (D) for LDPE based composites when immersed in water at room temperature	36
4.1	The grafting yield and efficiency of modified cellulose fibers	60
4.2	The mechanical properties of PP–reinforced modified cellulose fibers composites	63
4.3	The melting temperature of PP and its composites	67
4.4	The properties of different alcohol used in the grafting reaction	68
4.5	The grafting efficiency and grafting yield of CMF grafted with various alcohol	69

TABLE	PAGE	
4.6	The degradation temperature of CMF grafted various alcohols	71
4.7	The grafting efficiency and grafting yield of CMF-g-TDI/18OH at different ratio	71
4.8	The grafting efficiency and grafting yield of CMF-g-TDI/18OH and 18OH-g-TDI/CMF approach	73
4.9	The grafting efficiency and grafting yield of TDI and EP coupling agents in the grafting reaction of CMF and 18OH	74
4.10	The grafting efficiency and grafting yield of CMF-g-TDI/18OH and CF-g-TDI/18OH	76
A.1	Macro-initiators	94
A.2	Thermostability and contact angle results of CMF, CMF-PBA-l and CMF-PBA-h	109
A.3	GPC results and calculated values from the results of TGA	111
B.1	The samples preparation for the enhancement of the paper performance	117
B.2	Physical properties of modified-paper	118
B.2	Physical properties of modified-paper (cont')	119
C.1	BET Results of CMF and modified-CMF	122

LIST OF FIGURES

FIGURE		PAGE
2.1	Natural fiber applications in the current Mercedes-Benz E-Class	6
2.2	Flax, hemp, sisal, wool and other natural fibers used in 50 Mercedes-Benz E-Class components	6
2.3	(a) A natural fiber mat processed and (b) a door inner panel from natural fiber-reinforced PP, 50% Kenaf with 50% PP	7
2.4	The structure of cellulose	8
2.5	Schematic representation of hydrogen bonding in natural fibers	9
2.6	The modification reaction of cellulose fiber and oleoyl chloride schematic	18
2.7	SEM microphotography of (a) non-treated jute fibers; (b) modified jute fibers in pyridine for 3 hours; (c) modified jute fibers in pyridine for 24 hours	19
2.8	Structure of maleic and succinic anhydride	20
2.9	FTIR spectra of microfibrillated cellulose (a) coated with succinic acid compared with that of MFC and (b) coated with maleic acid compared with that of microfibrillated cellulose	21
2.10	Zeta potentials at pH 7.0 of unmodified microfibrillated cellulose microfibrillated cellulose coated with succinic acid (Succ), maleic acid (Maleic), diisocyanate followed by reactions with bis-(3-aminopropyl) amine (Bisamine) and with 3-(diethylamino) propylamine (DEAPA)	22
2.11	The structure of 3-isopropenyl- $\alpha\alpha'$ -dimethylbenzyl Isocyanate (TMI) and 2-isocyanatoethyl methacrylate (IEM) coupling agents	23

FIGURE	PAGE	
2.12	Chemical structure of the coupling agents used for cellulose surface modification	24
2.13	Full XPS spectra of cellulose surface, before and after modification with different coupling agents	26
2.14	The reaction pathway for the preparation of urethane derivative of cardanol	27
2.15	A possible reaction between free isocyanate groups in CTDIC and cellulosic sisal fiber	28
2.16	A possible hypothetical structure of sisal fiber–CTDIC–PE in the interfacial area	29
2.17	Schematic hypothesis of interfacial interaction for WF/m–TMI–PP/PP	30
2.18	SEM micrographs of (a) WF/PP and (b) WF/m–TMI–PP/PP	31
2.19	SEM photographs of fractured surfaces of (a) neat PP and PP–based composites with DIC content of, (b) 1.0 (c) 2.5 and (d) 5.0 phr	32
2.20	The reactions of DIC compatible with PP or MAPP	33
2.21	Scanning electron micrographs of fractured surface of cellulose fibers/LDPE composites: (a) 30 wt% of SMC (organosolv/methanol–supercritical carbon dioxide cellulose) fibers, (b) 30 wt% of SMC–DC fibers and (c) 30 wt% of SMC–OC fibers	34
2.22	The tensile strength of unmodified SMC (●), modified SMC–DC (■), and SMC–OC (▲) cellulose fibers filled LDPE composites versus filler loading	35
2.23	Scanning electron micrographs of (a) cellulosic material and (b) acrylonitrile grafted cellulosic material	38
2.24	FTIR spectra of (a) cellulosic MF and CCF before grafting (b) silane–treated MF and PAA–grafted MF with several initiator concentrations	39

FIGURE		PAGE
2.25	FTIR spectra of (a) cellulosic material isolated from Agave Lechuguilla and (b) styrene-grafted Agave Lechuguilla fiber (9%)	40
2.26	Scanning electron microscopic pictures of (a) cellulosic material isolated from Agave Lechuguilla and (b) styrene-grafted Agave Lechuguilla fiber (9%)	41
2.27	DSC curves of (a) cellulosic material isolated from Agave Lechuguilla and (b) styrene-grafted Agave Lechuguilla fiber (9%)	41
2.28	Reaction scheme for PAA grafting onto CM using an epoxide	43
2.29	FTIR traces for CM, CM treated with 1-epoxy-5-hexane and 1,2-epoxy-7-octane	44
2.30	Thermograms of CM, CM-PAA grafted (4% of KPS) and PAA	44
2.31	Infrared spectra of hemp and flax fibers for measurements of lateral crystallinity. (a) Untreated hemp, (b) acetone-extracted hemp, (c) 8% NaOH-treated hemp, (d) 20% NaOH-treated hemp, (e) 2.94% acrylonitrile-grafted hemp and (f) untreated flax	46
2.32	SEM photomicrographs of acrylonitrile-grafted hemp (a) 1.56% grafted, (b) 8.34% grafted and (c) 10.46% grafted	47
3.1	The experimental set up of the grafting reaction	49
3.2	The overall route of the modification of cellulosic fibers	49
3.3	Grafting reaction of cellulose fiber with TDI and 1-Octadecanol (first approach)	50
3.4	Grafting reaction of cellulose fiber with TDI and 1-Octadecanol (second approach)	51

FIGURE	PAGE	
3.5	The preparation of CF pulp from sulfite paper	52
3.6	Grafting reaction of cellulose fiber with EP and 1-Octadecanol	53
4.1	(a) TGA and (b) DTA curves of pure PP and CMF	57
4.2	(a) TGA and (b) DTA curves of CF and CF-g-TDI/18OH	58
4.3	(a) TGA and (b) DTA curves of CMF and CMF-g-TDI/18OH	59
4.4	FTIR spectra of CMF and CMF-g-TDI/18OH	61
4.5	Contact angle images of (a) CF (b) CF-g-TDI/18OH, 136.8°, (c) CMF and (d) CMF-g-TDI/18OH, 111.0°	62
4.6	Scanning Electron Microscope at different magnifications of (a) and (b) PP/CF-g-TDI/18OH; (c) and (d) PP/CMF-g-TDI/18OH	64
4.7	(a) TGA and (b) DTA curves of PP and its composites	66
4.8	DSC curves of PP/CF-g-TDI/18OH and PP/CMF-g-TDI/18OH composites	67
4.9	The structure of different alcohols	69
4.10	(a) TGA and (b) DTA curves of CMF grafted with different alcohols	70
4.11	(a) TGA and (b) DTA curves of CMF-g-TDI/18OH at different ratio	72
4.12	Tolylene 2,4-diisocyanate (TDI) and Epichlorohydrin (EP) structure	73
4.13	The final structure of CMF-g-EP/18OH and CMF-g-TDI/18OH	75
4.14	The morphology of CF and CMF	76
A.1	The mechanism of Atom Transfer Radical Polymerization (ATRP)	87
A.2	Various styrene derivatives polymerized by ATRP	89
A.3	Various acrylate derivatives polymerized by ATRP	90

FIGURE	PAGE	
A.4	Preparation route to the PBA-g-Starch	91
A.5	The mechanism of the SI-ATRP of BA	91
A.6	The effect of the polymerizing time on the C% and PG%	92
A.7	Various methacrylate derivatives polymerized by ATRP	93
A.8	300 MHz ¹³ C NMR spectrum of AS macroinitiator (AS-BIB3) with assigned peaks	95
A.9	Some halogenated alkanes and benzylic halides used as ATRP initiators	97
A.10	Examples of ligands used in copper-mediated ATRP	100
A.11	The preparation of CMF initiator	102
A.12	An ATRP reaction of CMF	103
A.13	Reaction procedure for preparing macro-initiator	104
A.14	FTIR spectra of CMF and CMF-Br	105
A.15	TG curves of CMF and CMF-Br	105
A.16	TG and DTG curves of CMF-Br	106
A.17	Reaction procedure for preparing CMF-PBA	107
A.18	FTIR spectra of CMF and CMF-PBA	108
A.19	TG curves of CMF, CMF-PBA-1 and CMF-PBA-h	109
A.20	GPC traces of the polymers cleaved-off from CMF-PBA-1 and CMF-PBA-2 prepared using the same macro-initiator	110
A.21	Contact angle of CMF, CMF-PBA-1 and CMF-PBA-1	112
A.22	SEM images of the surface of CMF and modified CMF	113
A.23	Light Microscope (LM) images under UV light of the sections of CMF-PBA-1 in PP matrix	114
A.24	SEM images of the ruptured surface of CMF and modified CMF samples in PP matrix	115
B.1	Paper making flow chart	118
B.2	(a) Aggregator and (b) filter	119

FIGURE		PAGE
B.3	(a) Compress system and (b) cutting equipment	120
B.4	(a) Tensile strength and (b) tearing strength equipment	120
B.5	(a) Bust strength and (b) brightness equipment	121
C.1	BET plot of CMF (Blank) sample	123
C.2	BET plot of TDI+18OH Grafted CMF_5% sample	124
C.3	BET plot of TDI+18OH Grafted CMF_5% sample	125

ABBREVIATIONS

18OH	1-Octadecanol
CF	Cellulose Fiber
CMF	Cellulose Microfibril
DSC	Differential Scanning Calorimetry
EP	Epichlorohydrin
FTIR	Fourier Transform Infrared Spectroscopy
PP	Polypropylene
SEM	Scanning Electron Microscopy
TDI	Tolylene 2,4-diisocyanate (TDI)
TGA	Thermogravimetric Analysis