

**PREPARATION AND CHARACTERIZATION OF
CARBOXYMETHYL-CHITIN/SILK FIBROIN BLEND FILMS**



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ABSTRACT

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CM-chitin/silk fibroin blend films were prepared by solvent casting method. The effects of CM-chitin to silk fibroin ratio and cross-linking agent on swelling behavior and mechanical properties of the blend films were studied. The blend films exhibited a change in the degree of swelling when the blend films were immersed in both acidic and alkaline solutions. The degree of swelling of the films increased as the CM-chitin content increased. It appeared that cross-linking occurred in the blend films reduced the swelling capacity of the films. For the study on effect of salt type, the films were immersed in various types of aqueous salt solutions, i.e., NaCl, LiCl, CaCl₂, and FeCl₃. Among these salts, the film immersed in NaCl, LiCl, and CaCl₂ had higher degree of swelling than in FeCl₃. The tensile strength increased with the increasing of the amount of cross-linking agent whereas the elongation at break decreased.

บทคัดย่อ

กฤติยา เหมือนใจ: การเตรียมและวิเคราะห์คุณสมบัติของฟิล์มที่ได้จากการผสมระหว่างซีเอ็ม-ไคตินและซิลไฟโบรอิน (Preparation and Characterization of Carboxymethyl-Chitin/Silk Fibroin Blend Films) อ. ที่ปรึกษา: ศ. ดร. เซอิชิ โทคุระ และ ดร. รัตนา รุจิรวนิช 63 หน้า ISBN 974-03-1602-6

ฟิล์มของสารพอลิเมอร์ผสมระหว่างซีเอ็ม-ไคตินและซิลไฟโบรอินได้ถูกเตรียมขึ้นในอัตราส่วนของพอลิเมอร์ต่างๆกันทั้งที่เติมและไม่เติมกลูตารัลดีไฮด์ซึ่งเป็นสารก่อการเชื่อมโยง ในงานวิจัยนี้ได้ทำการศึกษาถึงอิทธิพลของอัตราส่วนระหว่างซีเอ็ม-ไคตินและซิลไฟโบรอินและสารก่อการเชื่อมโยงต่อพฤติกรรมการบวมตัวและสมบัติทางกลของฟิล์มสารพอลิเมอร์ผสม สำหรับพฤติกรรมการบวมตัวของฟิล์มของพอลิเมอร์ผสมดังกล่าว พบว่า ฟิล์มของพอลิเมอร์ผสมเกิดการบวมตัวในสารละลายบัฟเฟอร์ที่เป็นเบสและกรดรวมทั้งในสารละลายเกลือโดยเมื่อปริมาณซีเอ็ม-ไคตินเพิ่มขึ้น การบวมตัวของแผ่นฟิล์มของพอลิเมอร์ผสมจะเพิ่มขึ้น นอกจากนี้ เมื่อปริมาณสารก่อการเชื่อมโยงที่เติมในฟิล์มของพอลิเมอร์ผสมเพิ่มขึ้นการบวมตัวของแผ่นฟิล์มจะมีค่าลดลง สำหรับผลของสารละลายเกลือต่อค่าการบวมตัว พบว่า ฟิล์มของพอลิเมอร์ผสมจะมีค่าการบวมตัวสูงเมื่ออยู่ในสารละลายเกลือโซเดียมคลอไรด์ ลิเทียมคลอไรด์ และแคลเซียมคลอไรด์มากกว่าในสารละลายเกลือเฟอริกคลอไรด์ ในด้านสมบัติทางกล พบว่า ฟิล์มของสารผสมระหว่างซีเอ็ม-ไคตินและซิลไฟโบรอินเมื่อเติมสารก่อการเชื่อมโยงจะมีสมบัติการทนต่อแรงดึงสูงกว่าฟิล์มที่ไม่ได้เติมสารก่อการเชื่อมโยง นอกจากนี้เมื่อเปรียบเทียบค่าอัตราการเปลี่ยนแปลงความยาวต่อความยาวเดิมที่จุดขาดของฟิล์มระหว่างฟิล์มที่เติมและไม่เติมสารก่อการเชื่อมโยง พบว่าฟิล์มที่เติมสารก่อการเชื่อมโยงมีค่าอัตราการเปลี่ยนแปลงความยาวต่อความยาวเดิมที่จุดขาดสูงกว่าฟิล์มที่ไม่เติมสารก่อการเชื่อมโยง

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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	xii
CHAPTER	
I	INTRODUCTION
	1
1.1	Chitin
	2
1.2	Carboxymethyl-Chitin (CM-chitin)
	4
1.3	Silk Fibroin
	5
II	LITERATURE SURVEY
	8
2.1	Carboxymethyl-Chitin (CM-chitin)
	8
2.2	Silk Fibroin
	9
III	EXPERIMENTAL
	12
3.1	Materials
	12
3.2	Equipment
	12
3.2.1	Restch Sieving Machine
	12
3.2.2	Capillary Viscometer
	12
3.2.3	Elemental Analysis
	12
3.2.4	FTIR Spectrophotometer
	12
3.2.5	Wide-angle X-ray Diffractometer (WAXD)
	13
3.2.6	Differential Scanning Calorimeter (DSC)
	13
3.2.7	Thermogravimetric Analysis (TGA)
	13
3.2.8	Lloyd Tensile Tester
	13

CHAPTER	PAGE
3.3 Methodology	14
3.3.1 Preparation of Chitin	14
3.3.2 Preparation of CM-Chitin	14
3.3.3 Degree of Deacetylation of Chitin	15
3.3.4 Degree of Substitution of CM-Chitin	15
3.3.5 Viscosity-Average Molecular Weight of CM-Chitin	15
3.3.6 Preparation Silk Fibroin Solution	16
3.3.7 Preparation CM-Chitin Solution	17
3.3.8 Preparation of Blend Films	17
3.3.9 Equilibrium Water Content (EWC)	17
3.3.10 Swelling Behavior	18
3.3.11 Mechanical Properties	18
IV RESULTS AND DISCUSSION	19
4.1 Preparation of Chitin	19
4.2 Preparation of CM-Chitin	20
4.3 Characterization of CM-Chitin/Silk Fibroin Blend Films	21
4.3.1 FTIR Analysis of Blend Films	21
4.3.2 X-ray Diffraction Patterns	22
4.3.3 Thermal Property	23
4.3.4 Thermal Stability	24
4.4 Swelling Study	26
4.4.1 Equilibrium Water Content (EWC)	26
4.4.2 Effect of pH	28
4.4.3 Effect of Salt Type	31
4.5 Mechanical Properties	32
4.5.1 Tensile Strength	32
4.5.2 Elongation at Break	33
V CONCLUSIONS	34

CHAPTER	PAGE
REFERENCES	35
APPENDICES	40
Appendix A Characterization of CM-chitin	40
Appendix B FTIR spectra of CM-chitin/silk fibroin blend films	43
Appendix C Effect of time on equilibrium water content of blend films	46
Appendix D Effect of pH on swelling behavior of the blend films	50
Appendix E Effect of salt type on swelling behavior of the blend films	58
Appendix F Mechanical properties of the blend films	60
Appendix G Decomposition temperature of pure and blend films	62
CURRICULUM VITAE	63

LIST OF TABLES

TABLE	PAGE
1.1 Some applications of chitin-based materials	3
1.2 Current practical uses of CM-chitin	4
4.1 Yield of chitin production from shrimp shell	19
4.2 FTIR characteristic absorption bands of CM-chitin	20
A1 Viscosity-average molecular weight of CM-chitin	40
A2 Degree of substitution of CM-chitin from elemental analysis	42
C1 Effect of time on equilibrium water content (EWC) of blend films at 15 min	46
C2 Effect of time on equilibrium water content (EWC) of blend films at 30 min	47
C3 Effect of time on equilibrium water content (EWC) of blend films at 60 min	47
C4 Effect of time on equilibrium water content (EWC) of blend films at 90 min	48
C5 Effect of time on equilibrium water content (EWC) of blend films at 120 min	48
C6 Effect of time on equilibrium water content (EWC) of blend films at 180 min	49
C7 Effect of time on equilibrium water content (EWC) of blend films at 24 h	49
C8 Effect of time on equilibrium water content (EWC) of blend films at 48 h	50
D1 Degree of swelling of blend films in pH buffer solution pH = 3	50
D2 Degree of swelling of blend films in pH buffer solution pH = 4	51
D3 Degree of swelling of blend films in pH buffer solution pH = 5	51

D4 Degree of swelling of blend films in pH buffer solution pH = 6	52
D5 Degree of swelling of blend films in pH buffer solution pH = 7	52
D6 Degree of swelling of blend films in pH buffer solution pH = 8	53
D7 Degree of swelling of blend films in pH buffer solution pH = 9	53
D8 Degree of swelling of blend films in pH buffer solution pH = 10	54
D9 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 3	54
D10 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 4	54
D11 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH Buffer solution pH = 5	55
D12 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 6	55
D13 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 7	55
D14 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 8	56
D15 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 9	56
D16 Degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 10	56
D17 Effect of time on degree of swelling of CM-chitin/silk fibroin: 50/50 in pH buffer solution pH = 6 and pH = 10	57
E1 Degree of swelling of blend films in 0.25 M LiCl	58
E2 Degree of swelling of blend films in 0.25 M NaCl	58
E3 Degree of swelling of blend films in 0.25 M CaCl ₂	59
E4 Degree of swelling of blend films in 0.25 M FeCl ₃	59

E5	Degree of swelling of blend films in water	60
F1	Tensile strength of the blend films	60
F2	Tensile strength of the blend films with containing 0.01% glutaraldehyde	61
F3	Elongation at break of the blend films	61
F4	Elongation at break of the blend films with containing 0.01% glutaraldehyde	62
G1	Decomposition temperature of pure and blend films	62

LIST OF FIGURES

FIGURE	PAGE
1.1 Chemical structure of chitin	3
1.2 Chemical structure of CM-chitin	4
1.3 Model of microstructure of silk fibroin	6
4.1 FTIR spectrum of chitin powder	20
4.2 FTIR spectrum of CM-chitin	21
4.3 FTIR spectra of pure and blend films at various blend compositions of CM-chitin to silk fibroin, CM-chitin/silk fibroin composition: (a) 100/0 (CM-chitin); (b) 80/20; (c) 60/40; (d) 50/50; (e) 40/60; (f) 20/80; (g) 0/100 (silk fibroin)	22
4.4 Wide-angle X-ray diffraction patterns of CM-chitin/silk fibroin blend films, CM-chitin/silk fibroin composition: (a) 100/0 (CM-chitin); (b) 80/20; (c) 60/40; (d) 50/50; (e) 40/60; (f) 20/80; (g) 0/100 (silk fibroin)	23
4.5 DSC thermograms of CM-chitin/silk fibroin blend films, CM-chitin/silk fibroin composition: (a) 100/0 (CM-chitin); (a) 80/20; (c) 60/40; (d) 50/50; (e) 40/60; (f) 20/80; (g) 0/100 (silk fibroin)	24
4.6 Decomposition temperature of CM-chitin/silk fibroin blend films as a function of CM-chitin content	25
4.7 Effect of immersion time on equilibrium water content of CM-chitin/silk fibroin blend films containing 0.01% glutaraldehyde. CM-chitin/silk fibroin composition: ● 100/0 (CM-chitin); ○ 80/20; ■ 60/40; □ 50/50; ▲ 40/60; △ 20/80	27
4.8 Equilibrium water content of CM-chitin/silk fibroin blend films with the addition of 0.01% glutaraldehyde	27

4.9	Degree of swelling of CM-chitin/silk fibroin blend films with the addition of 0.01% glutaraldehyde as a function of pH CM-chitin/silk fibroin composition: ● 100/0 (CM-chitin); ○ 80/20; ■ 60/40; □ 50/50; ▲ 40/60; △ 20/80	28
4.10	Effect of glutaraldehyde concentration on degree of swelling of CM-chitin/silk fibroin blends film as a function of pH ● 0.005% glutaraldehyde; ○ 0.01% glutaraldehyde; ■ 0.05% glutaraldehyde	29
4.11	Degree of swelling of CM-chitin/silk fibroin blend films with 50/50 blend ratio containing 0.01% glutaraldehyde on a step change in pH	30
4.12	Effect of salt types on degree of swelling of CM-chitin/silk fibroin blend films containing 0.01% glutaraldehyde as a function of CM-chitin content. ● LiCl 100/0; ○ NaCl; ■ CaCl ₂ ; □ FeCl ₃ ; ▲ H ₂ O	31
4.13	Tensile strength of CM-chitin/silk fibroin blend films as a function of CM-chitin content, □: films without glutaraldehyde; ○: films with 0.01% glutaraldehyde	32
4.14	Elongation at break of CM-chitin/silk fibroin blend films as a function of CM-chitin content, □: films without glutaraldehyde; ○: films with 0.01% glutaraldehyde	33
A1	η_{sp}/c and $\ln(\eta_{rel})/c$ against concentration of CM-chitin solution	41
B1	FTIR spectrum of CM-chitin film	43
B2	FTIR spectrum of the blend film containing 80%CM-chitin	43
B3	FTIR spectrum of the blend film containing 60%CM-chitin	44
B4	FTIR spectrum of the blend film containing 50%CM-chitin	44
B5	FTIR spectrum of the blend film containing 40%CM-chitin	45
B6	FTIR spectrum of the blend film containing 20%CM-chitin	45
B7	FTIR spectrum of silk fibroin film	46