

**EFFECT OF SURFACTANT STRUCTURE ON NANOCCLAYS AND  
PP REACTIVE NANOCOMPOSITES**

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**ABSTRACT**

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Na-bentonite (local clay mineral) and Na-montmorillonite were treated with several kinds of quaternary alkylammonium cations by ion exchange reaction for use as a nano-reinforcement. The effect of the molecular structure and functional groups of the surfactants on the organoclays was investigated by X-ray diffraction (XRD), Thermogravimetric Analysis (TGA) and an FT-IR spectrometer. It was shown that the different molecular structure and the functional groups of the surfactant influence the interlayer spacing of the clay layer and the interlayer structure of the intercalated alkylammonium silicate. For the preparation of nanocomposites, organoclays were melt-blended with polypropylene in a twin screw extruder and Surlyn<sup>®</sup> ionomer was used as a reactive compatibilizer. The clay dispersions in the composites were investigated by X-ray diffraction (XRD). XRD spectra indicated that the silicate clay layer has a nearly exfoliated dispersion in the polymer matrix. The degradation temperature of nanocomposites was higher than that of PP compatibilized system. The results of mechanical properties showed that the modulus of nanocomposites was improved significantly compared with the PP compatibilized system.

## บทคัดย่อ

นางสาวอดิษฐ พันธุ์ดี: อิทธิพลของโครงสร้างสารลดแรงตึงผิวต่อนาโนเคลย์และพอลิพรอพิลีนนาโนคอมพอสิต (Effect of Surfactant Structure on Nanoclays and PP Reactive Nanocomposites) อ. ที่ปรึกษา: รศ.ดร.รัตนวรรณ มกรพันธุ์, อ. ที่ปรึกษาร่วม: ผศ.ดร.มานิตย์ นิธิธนากุล และ ดร.หทัยกานต์ มนัสปิยะ 62 หน้า ISBN 974-9937-86-4

โซเดียมเบนโทไนท์ (แร่ดินเหนียวภายในประเทศ) และ โซเดียมมอนต์มอริโลไนท์ถูกดัดแปลงด้วยแอลคิลแอมโมเนียมไอออนแบบจตุรภูมิหลายชนิดโดยผ่านปฏิกิริยาการแลกเปลี่ยนไอออนเพื่อใช้เป็นสารเสริมแรงในระดับนาโน อิทธิพลของโครงสร้างทางโมเลกุลและหมู่ฟังก์ชันของสารลดแรงตึงผิวต่อออร์กาโนเคลย์ถูกตรวจสอบโดยใช้ X-ray diffraction (XRD), Thermogravimetric analysis (TGA) และ FT-IR spectrometer. พบว่าความแตกต่างของโครงสร้างทางโมเลกุลและหมู่ฟังก์ชันของสารลดแรงตึงผิวมีผลต่อระยะห่างระหว่างชั้นซิลิเกตและการจัดเรียงตัวของสารดัดแปลงในชั้นซิลิเกต สำหรับนาโนคอมพอสิตของพอลิพรอพิลีนนั้นเตรียมได้โดยนำออร์กาโนเคลย์, พอลิพรอพิลีน และเซอลินไอโอโนเมอร์ มาผสมให้เข้ากันแบบหลอมเหลวในเครื่องอัลตราซาวด์ โดยเซอลินไอโอโนเมอร์จะทำหน้าที่เป็นตัวเชื่อมประสานที่มีความว่องไวระหว่างพอลิเมอร์กับแร่ดินเหนียว การกระจายตัวของชั้นซิลิเกตในคอมพอสิตถูกตรวจสอบโดยใช้ X-ray diffraction (XRD) พบว่าชั้นซิลิเกตมีการกระจายตัวแบบเอ็กซ์โพสิเอคในพอลิพรอพิลีน นอกจากนี้ยังพบว่าอุณหภูมิในการเสีรูปของนาโนคอมพอสิตมีค่าสูงกว่าพอลิพรอพิลีนที่มีการผสมกับสารช่วยผสม ส่วนผลด้านสมบัติทางเชิงกลพบว่านาโนคอมพอสิตมีมอดูลัสสูงกว่าระบบที่มีการผสมพอลิพรอพิลีนกับสารช่วยผสม

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## TABLE OF CONTENTS

	<b>PAGE</b>
Title Page	i
Abstract (in English)	iii
Abstract (in Thai)	iv
Acknowledgements	v
Table of Contents	vi
List of Tables	ix
List of Figures	x
<b>CHAPTER</b>	
<b>I INTRODUCTION</b>	<b>1</b>
1.1 Structure of Silicate Clays	2
1.2 Organomodification of Silicate Clays	4
1.3 Polymer/ Clay Nanocomposites	5
1.4 Polypropylene (PP)	7
1.5 Compatibilizer	8
<b>II LITERATURE REVIEW</b>	<b>10</b>
<b>III EXPERIMENTAL</b>	<b>18</b>
3.1 Materials	18
3.1.1 Clay Minerals	18
3.1.2 Polymer	18
3.1.3 Compatibilizer	18
3.1.4 Surfactants	18
3.2 Equipments	19
3.2.1 X-Ray Diffractometer (XRD)	19
3.2.2 Thermogravimetric Analysis (TGA)	20
3.2.3 Differential Scanning Calorimetry (DSC)	20

<b>CHAPTER</b>	<b>PAGE</b>
3.2.4 Fourier Transform Infrared Spectroscopy (FTIR)	20
3.2.5 Instron Universal Testing Machine	20
3.2.6 Impact Tester	21
3.2.7 Twin Screw Extruder	21
3.2.8 Injection Molding	21
3.2.9 Compression Molding Machine	21
3.3 Methodology	21
3.3.1 Preparation of Organomodified Bentonite and Montmorillonite	21
3.3.2 Characterization of Organomodified Bentonite and Montmorillonite	22
3.3.3 Preparation of PP/ Clay Nanocomposites	22
3.3.4 Characterization of Nanocomposites	23
<b>IV RESULTS AND DISCUSSION</b>	<b>25</b>
4.1 Characterization of Organomodified Bentonite and Montmorillonite	25
4.2 Selection of Compatibilizer Loading	31
4.3 Characterization of Nanocomposites	33
4.3.1 Structure Analysis of Nanocomposites	33
4.3.2 Melting and Crystallization Behavior	35
4.3.3 Thermal Properties	40
4.3.4 Mechanical Properties	43
<b>V CONCLUSIONS AND RECOMMENDATIONS</b>	<b>48</b>
<b>REFERENCES</b>	<b>49</b>

<b>CHAPTER</b>	<b>PAGE</b>
<b>APPENDIX (or APPENDICES)</b>	52
<b>Appendix A</b> Thermal Behavior of Organomodified Clay	52
<b>Appendix B</b> Experimental Data	54
<b>Appendix C</b> Interlayer Structure of Alkylammonium Layered Silicates	60
<b>Appendix D</b> Cation Exchange Capacities (CEC) Values of Clay Minerals	61
<b>CURRICULUM VITAE</b>	62



**LIST OF TABLES**

<b>TABLE</b>		<b>PAGE</b>
<b>CHAPTER I</b>		
1.1	Chemical formula and characteristic parameter of commonly used 2:1 phyllosilicates	3
<b>CHAPTER IV</b>		
4.1	Characteristics of the organomodified clay	27
4.2	Thermal behaviors of organomodified clay	28
4.3	Effect of compatibilizer loading on mechanical properties	32
4.4	Effect of compatibilizer loading on thermal properties	33
4.5	Melting and crystallization behavior of PP and nanocomposites	36
4.6	Thermal behaviors of PP and nanocomposites formed	43

**LIST OF FIGURES**

<b>FIGURE</b>		<b>PAGE</b>
<b>CHAPTER I</b>		
1.1	Structure of 2:1 phyllosilicates	3
1.2	Scheme of different types of composite arising from the interaction of layered silicates and polymers	7
1.3	Structure of sodium-neutralized ethylene-methacrylic acid (E-MAA) ionomer	9
<b>CHAPTER II</b>		
2.1	Schematic diagrams of the possible interlayer structures of each quaternary alkylammonium derivative	11
2.2	Schematic model of surfactant chains used for calculating the expected interlamellar spacings	12
2.3	Possible arrangements of two chains in the interlamellar space of complexes of Eucatex vermiculite and dialkyl-dimethyl ammonium bromides	13
<b>CHAPTER III</b>		
3.1	Chemical structures of surfactants	19
<b>CHAPTER IV</b>		
4.1	The WAXD patterns of organomodified bentonite	25
4.2	The WAXD patterns of organomodified montmorillonite	26
4.3	Infrared spectra of pristine clays and their quaternary alkylammonium derivatives (A) organomodified bentonite, (B) organomodified montmorillonite	30

FIGURE	PAGE
4.4 The WAXD patterns for (a) DTDM-B, (b) PP/ DTDM-B, (c) PP/ DTDM-B/ 3%Surlyn, (d) PP/ DTDM-B/ 6%Surlyn, (e) PP/ DTDM-B/ 9%Surlyn	31
4.5 The SAX patterns for (a) PP/ Surlyn/ DTDM-B, (b) PP/ Surlyn/ DCEM-B, (c) PP/ Surlyn/ DOEM-B, (d) PP/ Surlyn/ DOAM-B	34
4.6 The SAX patterns for (a) PP/ Surlyn/ DTDM-M, (b) PP/ Surlyn/ DCEM-M, (c) PP/ Surlyn/ DOEM-M, (d) PP/ Surlyn/ DOAM-M	34
4.7 DSC thermograms of PP/Surlyn and nanocomposites formed (A) organomodified bentonite nanocomposites (B) organomodified montmorillonite nanocomposite	38
4.8 The WAXD patterns of pure PP and organomodified bentonite nanocomposites	39
4.9 The WAXD patterns of pure PP and organomodified montmorillonite nanocomposites	39
4.10 TG-DTA curves of PP/Surlyn and organomodified bentonite nanocomposites	41
4.11 TG-DTA curves of PP/Surlyn and organomodified montmorillonite nanocomposites	42
4.12 Young's modulus of the PP/Surlyn, PP/Surlyn/modified bentonite and PP/Surlyn/modified montmorillonite nanocomposites with various intercalation agents	45
4.13 Tensile strength of the PP/Surlyn, PP/Surlyn/modified bentonite and PP/Surlyn/modified montmorillonite nanocomposites with various intercalation agents	45

<b>FIGURE</b>	<b>PAGE</b>
4.13 Strain at break of the PP/Surlyn, PP/Surlyn/modified bentonite and PP/Surlyn/modified montmorillonite nanocomposites with various intercalation agents	46
4.14 Impact strength of the PP/Surlyn, PP/Surlyn/modified bentonite and PP/Surlyn/modified montmorillonite nanocomposites with various intercalation agents	46