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SURFACE CHARACTERIZATION OF POLYCARBONATE BY ATR FT-IR SPECTROSCOPY

Miss Adchara Padermshoke

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By	Miss Adchara Padermshoke
Department	Petrochemistry and Polymer Science
Thesis Advisor	Sanong Ekgasit, Ph.D.

Accepted by Faculty of Science, Chulalongkorn University in Partial Fulfillment of the Requirement for the Master's Degree.

.....Dean of Faculty of Science

(Associate Professor Wanchai Phothiphichitr , Ph.D.)

Thesis Committee

.....Chairman

(Associate Professor Supawan Tantayanon, Ph.D.)

.....Thesis Advisor

(Sanong Ekgasit, Ph.D.)

.....Member

(Associate Professor Amorn Petsom, Ph.D.)

.....Member

(Assistant Professor Warinthorn Chavasiri, Ph.D.)

.....Member

(Nongnuj Jaiboon, Ph.D.)

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งานวิจัยนี้ศึกษาเกี่ยวกับการพัฒนาเทคนิคการวิเคราะห์เชิงพื้นผิวของพอลิเมอร์โดยเทคนิคเอทีอาร์ เอฟทีไอาร์ สเปกโทรสโกปี พอลิเมอร์ที่ใช้ในการศึกษาครั้งนี้ได้แก่พอลิคาร์บอเนต และพอลิไวนิลคลอไรด์ งานวิจัยประกอบด้วยการคำนวณหาจำนวนครั้งของการสะท้อนของแสงในปริซึมโดยใช้ข้อมูลจากผลการทดลอง การหาสภาวะที่ทำให้เกิดการสัมผัสอย่างสมบูรณ์ระหว่างสารตัวอย่างที่เป็นของแข็งกับปริซึม ซึ่งเป็นเงื่อนไขสำคัญในการวิเคราะห์เชิงพื้นผิวด้วยเทคนิคเอทีอาร์ เอฟทีไอาร์ สเปกโทรสโกปี และการหาความลึกของการสุ่มตัวอย่างในเทคนิคเอทีอาร์ จากการศึกษาพบว่าจำนวนครั้งของการสะท้อนของแสงในปริซึมที่คำนวณได้จากผลการทดลองจะต่ำกว่าค่าที่คำนวณได้จากทฤษฎีเสมอ การสัมผัสระหว่างสารตัวอย่างที่เป็นของแข็งกับปริซึมสามารถปรับปรุงให้ดีขึ้นได้โดยการแทนที่ช่องอากาศที่บริเวณผิวสัมผัสระหว่างสารตัวอย่างกับปริซึมด้วยของเหลว แล้วทำให้ของเหลวระเหยไป แรงคาปิลลารีจะช่วยทำให้สารตัวอย่างสัมผัสกับปริซึมดีขึ้น และค่าความลึกของการสุ่มตัวอย่างสามารถคำนวณได้จากลักษณะการลดลงอย่างมีระบบของสนามไฟฟ้า โดยค่าดังกล่าวสามารถเขียนให้อยู่ในรูปของเงื่อนไขทางการทดลอง สมบัติของสาร และความเข้มของการดูดกลืนแสงของสาร

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This research is the study concerning with the development of a technique for surface characterization of polymers by ATR FT-IR spectroscopy. Polymers being employed in this study are polycarbonate (PC) and polyvinyl chloride (PVC). The research consists of the calculation of number of reflections in ATR prism from experimental results, the determination of the condition under which an optical contact between solid sample and ATR prism is obtained, and the determination of sampling depth in ATR experiment. It was found that the number of reflections in ATR prism calculated from experimental results is always smaller than that calculated via theoretical means. The contact between solid sample and ATR prism can be improved by replacing an air gap existing at the interface between the sample and ATR prism with easily evaporated liquid. The capillary force improves contact between the two surfaces. The sampling depth can be calculated from the decay characteristic of the electric field. The calculated value can be expressed in terms of experimental parameters, material characteristics, and the spectral intensity of material.

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LIST OF ABBREVIATIONS

ATR	: attenuated total reflection
d_p	: penetration depth
FT-IR	: Fourier transform infrared
Ge	: germanium
IRE	: internal reflection element
MATR	: multiple attenuated total reflection
MSEF	: mean square electric field
MSEvF	: mean square evanescent field
PC	: polycarbonate
PVC	: polyvinyl chloride
UV	: ultra violet
ZnSe	: zinc selenide

LIST OF SYMBOLS

μ	: micro