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**SURFACE DEGRADATION OF POLYETHYLENE TEREPHTHALATE
INDUCED BY UV-EVANESCENT FIELD**

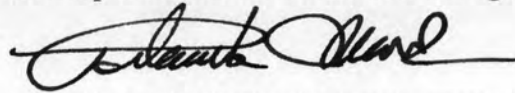
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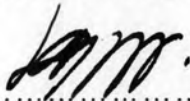


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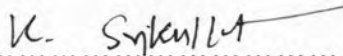
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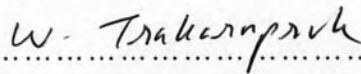
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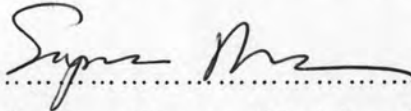
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เอกพันธ์ ชัชวาลกุลชัย : การสลายเชิงผิวของพอลิเอทิลีนเทเรฟทาเลตด้วยการเหนี่ยวนำของสนามยูวีอีวานเนสเซนส์ (SURFACE DEGRADATION OF POLYETHYLENE TEREPHTHALATE INDUCED BY UV-EVANESCENT FIELD) อ. ที่ปรึกษา: รศ. ดร. สนอง เอกสิทธิ์, 84 หน้า

พอลิเอทิลีนเทเรฟทาเลตเป็นพอลิเมอร์ที่สำคัญในเชิงพาณิชย์ชนิดหนึ่ง สามารถนำไปประยุกต์ใช้ได้หลากหลายอุตสาหกรรม เช่น อุตสาหกรรมสิ่งทอ อุตสาหกรรมอาหาร อุตสาหกรรมยานยนต์ เป็นต้น อย่างไรก็ตามเนื่องจากเป็นพอลิเมอร์ที่มีสมบัติไม่ชอบน้ำ การนำไปใช้งานบางประเภทจึงไม่เหมาะสม การสลายเชิงผิวของพอลิเอทิลีนเทเรฟทาเลตภายใต้การเหนี่ยวนำของสนามยูวีอีวานเนสเซนส์เป็นเทคนิคใหม่ สำหรับการเพิ่มสมบัติความชอบน้ำของพอลิเอทิลีนเทเรฟทาเลต โดยการสลายตัวจะเกิดขึ้นภายใต้กระบวนการสะท้อนกลับหมดภายในของแสงยูวีที่บริเวณพื้นผิวของตัวอย่างที่สัมผัสกับวัสดุที่ทำให้เกิดการสะท้อนกลับภายใน (ยูวี-เอทีอาร์) เทคนิคนี้จะเหนี่ยวนำให้เกิดการสลายเชิงผิวและให้สปีชีส์ที่มีความชอบน้ำบนพื้นผิวของพอลิเอทิลีนเทเรฟทาเลตด้านที่ฉายรังสีเท่านั้น แต่จะไม่สามารถเหนี่ยวนำการสลายตัวของด้านตรงข้าม ซึ่งสามารถตรวจสอบการเปลี่ยนแปลงทางเคมีเหล่านี้ได้ด้วยเทคนิคเอทีอาร์เอฟทีไออาร์สเปกโทรสโกปีและเอฟทีรามานสเปกโทรสโกปี เนื่องจากกระบวนการนี้ทำให้เกิดการเปลี่ยนแปลงทางเคมีที่บริเวณพื้นผิวของพอลิเอทิลีนเทเรฟทาเลตเท่านั้น (ระดับนาโนเมตร) จึงคาดว่าสมบัติเชิงกลของตัวอย่างจะไม่เกิดการเปลี่ยนแปลง

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EKGAPONTH CHUTCHAWALKULCHAI: SURFACE DEGRADATION OF
POLYETHYLENE TERETHALATE INDUCED BY UV-EVANESCENT FIELD.
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Poly (ethylene terephthalate), PET, is a commercial polymer with various applications in many industries such as textile, food and automotive industries. However, PET has hydrophobic property, thus it is not appropriate for some applications. Surface degradation induced by UV-evanescent is a novel technique for improving hydrophilic property of PET. The degradation was initiated under the total internal reflection of the UV radiation at the interface of specimen that contacted with internal reflection element (UV-ATR). This technique induces surface degradation and creates hydrophilic species on the exposed side of PET surface only, but it cannot induce the degradation of opposite side. These chemical changes were investigated by attenuated total reflection Fourier transform infrared (ATR FT-IR) spectroscopy and FT-Raman spectroscopy. Since the change only occurs at the surface of PET (nanometer level), the mechanical properties of the degraded PET under UV-evanescent field are expected to be unchanged.

Field of study Petrochemistry and Polymer Science Student's signature Ekgaponth
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CONTENTS

	Page
ABSTRACT IN THAI.....	iv
ABSTRACT IN ENGLISH.....	v
ACKNOWLEDGEMENTS.....	vi
LIST OF FIGURES.....	x
LIST OF TABLES.....	xvi
LIST OF ABBREVIATIONS.....	xvii
LIST OF SYMBOL.....	xviii
CHAPTER I INTRODUCTION.....	1
1.1 UV evanescent field induced surface degradation of PET.....	1
1.2 The objective of research.....	2
1.3 Scope of research.....	3
CHAPTER II THEORETICAL BACKGROUND.....	4
2.1 Poly (ethylene terephthalate) or PET.....	4
2.2 Surface modification techniques.....	5
2.3 UV evanescent field theory.....	8
2.3.1 UV radiation.....	8
2.3.2 Fundamental of light reflection and refraction.....	9
2.3.3 Principles of total internal reflection of light.....	10
2.3.4 Interaction between electromagnetic radiation and matter under total internal reflection.....	12
2.3.5 Application of evanescent field irradiation.....	16
2.4 Diamond internal reflection element (Diamond IRE).....	16
2.5 Polymer degradation.....	18
2.5.1 Photo-degradation of PET.....	18

	Page
2.6 Spectroscopic Characterization techniques.....	20
2.6.1 ATR-FTIR spectroscopy.....	20
2.6.2 FT-Raman spectroscopy.....	21
2.6.3 Comparison of Infrared and Raman spectroscopy.....	23
 CHAPTER III EXPERIMENT.....	 24
3.1 Instrument.....	24
3.2 Accessories.....	24
3.3 Chemicals and material.....	24
3.4 Sample preparation.....	25
3.4.1 PET film.....	25
3.4.2 Staple PET fiber.....	25
3.4.3 PET filament.....	25
3.5 UV irradiation techniques.....	26
3.5.1 UV irradiation condition.....	26
3.5.2 UV transmission irradiation.....	26
3.5.3 UV evanescent field irradiation.....	27
3.6 Characterization conditions.....	29
3.7 Characterization techniques.....	31
3.7.1 ATR FT-IR spectroscopy.....	31
3.7.2 Curve fitting.....	33
3.7.3 FT-Raman spectroscopy.....	33
3.8 Preliminary study on the degradation of PET surface by UV irradiation	 34
3.9 Degradation of PET by UV irradiations.....	34
3.9.1 Degradation by the UV transmission technique.....	34
3.9.2 Degradation by the UV evanescent field technique.....	34
3.10 Comparison of irradiated PET by both the UV evanescent field and UV transmission irradiations.....	 35

	Page
3.11 UV evanescent field induced surface degradation of various PET	35
3.12 Stability of hydrophilic species of irradiated PET under UV evanescent.....	35
CHAPTER IV RESULTS AND DISCUSSION.....	36
4.1 Preliminary study on the degradation of PET surface by UV irradiation.....	36
4.2 Degradation of PET by UV irradiations.....	41
4.2.1 Degradation by the UV transmission irradiation.....	41
4.2.2 Degradation by the UV evanescent field irradiation.....	45
4.3 Comparison of irradiated PET by both the UV evanescent field and UV transmission irradiations.....	48
4.3.1 Curve fitting ATR FT-IR spectra.....	48
4.3.2 FT-Raman spectroscopy.....	57
4.3.3 Photo-degradation mechanisms.....	63
4.4 UV evanescent field induced surface degradation of various PET	65
4.4.1 Staple fiber.....	66
4.4.2 Filament yarns.....	66
4.5 Stability of hydrophilic species of irradiated PET under the UV evanescent field.....	70
CHAPTER V CONCLUSION.....	72
REFERENCES.....	74

	Page
APPENDICES.....	78
Appendix A: Curve fitting details of hydroxyl and carbonyl bands.....	79
Appendix B: Calculation of diamond refractive index.....	81
Appendix C: Infrared and Raman spectra library of PET.....	82
CURRICULUM VITAE.....	84

LIST OF FIGURES

Figure	Page
2.1 The PET structure.....	4
2.2 The electromagnetic radiation propagates in space. Both electric and magnetic fields oscillate together, but perpendicular to each other while normal to the propagation direction.....	8
2.3 Reflection and refraction of radiation at the interface.....	9
2.4 Total internal reflection at the interface.....	10
2.5 Model of the system for total internal reflection.....	10
2.6 The electric field intensity of p and s polarizations at the interface as a function of the incident angle ($n_1=1.46$ and $n_2=1.33$).....	12
2.7 Reflectance at various absorption indices as a function of angle of incidence with diamond as the IRE at $\nu=1000\text{ cm}^{-1}$ $n_1 = 2.4$, $\hat{n}_2(\nu)=1.5+ik_2(\nu)$ and $k_2(\nu)=0.0, 0.1, 0.2, 0.3, 0.4$ and 0.5 , respectively.....	13
2.8 The MSEF and its decay characteristics at $\lambda=365\text{ nm}$, $\theta=45^\circ\text{C}$, $n_1=2.417$ and $n_2=1.58$	14
2.9 A round brilliant cut of diamond based on Tolkowsky's diamond cut proportion and a summary of angle of incidence at the pavilion facet.....	17
2.10 Norrish type I and II degradation reactions of PET.....	19
2.11 The relationship of radiation interactions and summation of incident energy with material.....	19
2.12 ATR FT-IR configuration.....	21
2.13 The energy level processes of Raman scattering.....	22

Figure	Page
3.1 Sample preparation of staple PET fibers.....	25
3.2 Sample preparation of PET filaments.....	25
3.3 UV spectrum of Hamamatsu L5662-01 UV spot light.....	26
3.4 UV transmission irradiation of PET.....	27
3.5 UV evanescent field irradiation setup.....	28
3.6 μ ATR probe for UV evanescent field irradiation.....	29
3.7 Nicolet Magna 750 FT-IR spectrometer and Nicplan FT-IR microscope.....	30
3.8 Nicolet NXR 9650 FT-Raman spectrometer.....	31
3.9 Conventional ATR accessory: (A) Single reflection attenuated total reflection (SATR) accessory (the Seagull TM , Harrick Scientific, USA) and (B) ZnSe IRE holder	32
3.10 ATR FT-IR spectra acquisition with a μ ATR probe	33
4.1 The ATR FT-IR spectra of an un-irradiated PET acquired by using the homemade diamond μ ATR and the conventional ATR with a 45° ZnSe IRE: (A) The observed PET spectra by diamond μ ATR; (a) Transflectance spectra of diamond, (b) ATR spectra of PET and transflectance spectra of diamond, and (c) Diamond-ATR spectra of PET and (B) The observed PET spectrum by conventional ATR.....	37
4.2 ATR FT-IR spectra of PET after a subsequent increment of pressure	39
4.3 ATR FT-IR spectra of irradiated PET at various irradiation times: (A), (C) and (E) at 1, 10, 30 minutes under the UV evanescent field and (B), (D) and (F) at 1, 10, 30 minutes by UV transmission: (a) irradiated PET and (b) un-irradiated PET.....	40
4.4 Conventional ATR FT-IR spectra of irradiated PET by UV transmission.....	42

Figure	Page
4.5 Diamond μ ATR FT-IR spectra of PET after the irradiation under UV transmission for 1-10 minutes.....	43
4.6 Area plot of hydroxyl region at 2750-3650 cm^{-1} (-OH stretching and -CH stretching) and aromatic skeletal at 1505 cm^{-1} at various irradiation times.....	44
4.7 Diamond μ ATR FT-IR spectra of PET film after the UV evanescent field for 1-10 minutes.....	46
4.8 Area plotting of hydroxyl region at 2750-3650 cm^{-1} (-OH stretching and -CH stretching) and aromatic skeletal at 1505 cm^{-1} at various irradiation times.....	47
4.9 The ATR FT-IR spectra of irradiated PET by both techniques and un-irradiated PET: (a) spectrum of un-irradiated PET, (b) spectrum of PET under the UV evanescent field irradiation, and (c) spectrum of PET by UV transmission.....	49
4.10 ATR spectra of the exposed side and the opposite side of the PET film after the UV transmission irradiation were compared with that of the un-irradiated PET: (a) opposite side of irradiated PET, (b) un-irradiated PET, and (c) exposed side of irradiated PET.....	50
4.11 The un-irradiated PET spectrum compared with that of annealed PET: (a) un-irradiated PET and (b) annealed PET at 170 $^{\circ}\text{C}$ for 10 minutes.	52
4.12 The ATR spectra of irradiated PET both the exposed side and the opposite side under the UV evanescent field irradiation were compared with that of un-irradiated PET: (a) the opposite side of irradiated PET, (b) the un-irradiated PET, and (c) the exposed side of irradiated PET.....	52
4.13 Curve fitting of hydroxyl region in both irradiation techniques; (A) irradiated PET by UV transmission and (B) irradiated PET under UV evanescent field	53

Figure	Page
4.14 The proposed hydrogen bonding of degraded PET structure.....	54
4.15 Curve fitting of carbonyl band of un-irradiated PET and irradiated PET: (A) un-irradiated PET, (B) irradiated PET by transmission, and (C) irradiated PET by UV evanescent field irradiation.....	56
4.16 FT-Raman spectra of un-irradiated PET with irradiated PET at 10 minutes irradiation time: (A) un-irradiated PET, (B) irradiated PET by UV transmission, and (C) irradiated PET under UV evanescent field.....	60
4.17 FT-Raman spectra of transparent PET at various focusing point from the surface: (a) at the surface, (b) at 400 μm from the surface, (c) at 800 μm from the surface, and (d) at 1200 μm from the surface.....	61
4.18 FT-Raman spectra of the irradiated PET by UV transmission: (a) an un-irradiated PET, (b) the opposite side, and (c) the exposed side of the irradiated PET	61
4.19 The un-irradiated PET spectra compared with that of annealed PET: (a) un-irradiated PET and (b) annealed PET	62
4.20 FT-Raman spectra of irradiated PET under the UV evanescent field irradiation: (A) un-irradiated PET (B) opposite side and (C) exposed side.....	62
4.21 The photo-degradation pathways of irradiated PET by UV transmission and the UV evanescent field irradiation.....	64
4.22 ATR FT-IR spectrum of polycarbonate (PC) substrate.....	65
4.23 ATR FT-IR spectra of irradiated staple fiber under the UV evanescent field irradiation for 1-10 minutes irradiation time and that of un-irradiated PET (0 minute)	67
4.24 ATR FT-IR spectra of irradiated SDY PET filament under the UV evanescent field irradiation for 1-10 minutes irradiation time and that of un-irradiated PET (0 minute).....	68

Figure	Page
4.25 ATR FT-IR spectra of irradiated DTY PET filament under the UV evanescent field irradiation for 1-10 minutes irradiation time and that of un-irradiated PET (0 minute).....	69
4.26 ATR FT-IR spectra of PET film irradiated for 1-10 minutes and the un-irradiated PET after a three-month storage at the ambient condition	71

LIST OF TABLES

Table	Page
2.1 Physical constants of PET.....	5
2.2 Properties of hydrophilic modification techniques.....	7
2.3 The penetration depth of UV evanescent field at various wavelength with $\theta = 45^\circ$, $n_1 = 2.417$ and $n_2 = 1.58$).....	15
2.4 The major differences between IR and Raman techniques.....	23
4.1 Infrared band assignments of un-irradiated PET.....	38
4.2 The observed spectra changes of irradiated PET by UV transmission.....	44
4.3 Area of hydroxyl region and aromatic skeletal of irradiated PET by UV transmission at various irradiation.....	45
4.4 Area of hydroxyl region and aromatic skeletal of irradiated PET under UV evanescent field at various irradiation times.....	48
4.5 FT-Raman bands assignment of PET spectrum.....	59

LIST OF ABBREVIATIONS

ATR	: attenuated total reflection
DTY	: draw textured yarn
FT-IR	: Fourier transform infrared
IRE	: internal reflection element
MCT	: mercury-cadmium-telluride
MSEF	: mean square electric field
MSE _v F	: mean square evanescent field
N/A	: not applicable
PET	: poly(ethylene terephthalate)
SDY	: spin draw yarn
TIR	: total internal reflection
UV	: ultraviolet
ZnSe	: zinc selenide

LIST OF SYMBOL

A	: absorbance
$^{\circ}\text{C}$: celsius
d_p	: penetration depth
E	: electric field
H	: magnetic field
I_A	: intensity of absorbed beam
I_0	: intensity of incident beam
I_R	: intensity of reflected beam
I_S	: intensity of scattered beam
I_T	: intensity of transmitted beam
k	: absorption index
n	: refractive index
R	: reflectance
s	: senkrecht
p	: parallel
μ	: micron (10^{-6} m)
ν	: frequency (cm^{-1})
θ	: degrees