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ที่ทำจากพอลิเอทเธอร์ฟลูออโรเอทิลีนสำหรับการวิเคราะห์ทางเคมี



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จุฬาลงกรณ์มหาวิทยาลัย

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DEVELOPMENT OF FT-IR ANALYSIS TECHNIQUE USING HIGH
EFFICIENCY POLYTETRAFLUOROETHYLENE INFRARED CARD
FOR CHEMICAL ANALYSIS



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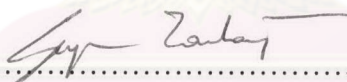
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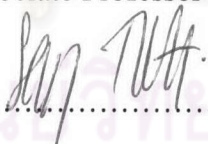
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อินฟราเรดการ์ดจากฟิล์มบางของพอลิเททระฟลูออโรเอทิลีนได้ประดิษฐ์ขึ้นจากฟิล์มหนาของพอลิเททระฟลูออโรเอทิลีนที่มีจำหน่ายทั่วไป ข้อดีของอินฟราเรดการ์ดคือ ใช้เวลาเตรียมตัวอย่างไม่นาน ไม่มีปัญหาการปนเปื้อนเนื่องจากอินฟราเรดการ์ดเป็นอุปกรณ์ที่ไม่มีการนำกลับมาใช้ใหม่ นอกจากนี้ยังสามารถเก็บอินฟราเรดการ์ดที่ใช้วิเคราะห์ตัวอย่างแล้วสำหรับเปรียบเทียบในภายหลังได้ อินฟราเรดการ์ดซึ่งมีจำหน่ายในเชิงพาณิชย์ที่ทำจากฟิล์มพอลิเททระฟลูออโรเอทิลีนมีความหนาเกินไป จึงไม่เหมาะที่จะนำไปใช้วิเคราะห์สารตัวอย่างที่มีความเข้มข้นน้อยๆ หรือสารตัวอย่างที่มีลักษณะเป็นฟิล์มบาง และสารตัวอย่างที่เป็นของเหลวระเหยง่าย ด้วยเหตุนี้งานวิจัยจึงมุ่งที่จะประดิษฐ์และประยุกต์อินฟราเรดการ์ดประสิทธิภาพสูงที่ทำจากฟิล์มบางของพอลิเททระฟลูออโรเอทิลีน อินฟราเรดการ์ดที่ประดิษฐ์ขึ้นนี้สามารถวิเคราะห์สารตัวอย่างได้ทั้งของแข็งและของเหลวหนืด การทำให้พอลิเททระฟลูออโรเอทิลีนมีความหนาลดลงจะช่วยเพิ่มสภาพไวเมื่อนำไปใช้ในการวิเคราะห์สารตัวอย่างที่มีลักษณะเป็นฟิล์มบางๆติดอยู่ที่ผิวหน้าของวัสดุต่างๆ รวมทั้งสามารถประยุกต์สำหรับการวิเคราะห์ตัวอย่างที่เป็นของเหลวระเหยง่าย โดยการทำให้ของเหลวอยู่ในสภาพของแคปิลลารีฟิล์มระหว่างฟิล์มบางของพอลิเททระฟลูออโรเอทิลีน สภาพไวที่เพิ่มขึ้นนี้เป็นข้อพิสูจน์ให้เห็นว่าอินฟราเรดการ์ดที่ประดิษฐ์ขึ้นสามารถประยุกต์ในเชิงนิติเวชศาสตร์ได้

ศูนย์วิทยทรัพยากร จุฬาลงกรณ์มหาวิทยาลัย

สาขาวิชา... ปิโตรเคมีและวิทยาศาสตร์พอลิเมอร์..... ลายมือชื่อนิสิต..... ศรีนวล จำปาเงิน.....
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Infrared card (IR card) from thin polytetrafluoroethylene (PTFE) film has been fabricated from commercial thick PTFE film. The major advantages of the IR card include; preparation time and low cost. Cross contamination problem is eliminated since the IR card is disposable and the sample may be preserved on the IR card for future comparison. The commercial IR card can not be employed for volatile liquid, low concentration sample or thin film. In this research, high efficiency thick IR card was fabricated from thin PTFE film. The fabricated IR card was employed for infrared analysis of solids and viscous liquids. The thin PTFE film is expected to enhance sensitivity when employed as substrate for thin film sample adhered onto the surface of various substrates. In addition, IR card from thin PTFE film can be used to analyze volatile liquids. By depositions minute amount of liquid sample onto the first IR card, then place the second IR card on top of the first IR card. The “sandwich” sample cell is obtained. This is known as the capillary thin film. The sample can be placed directly onto the sample holder in the sample chamber for further characterization. This superior sensitivity promises the IR card from the thin PTFE film as a tool for forensic analysis.

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LIST OF ABBREVIATIONS

Au	: gold
AgCl	: silver chloride
CsBr	: cesium bromide
CsI	: cesium iodide
FT-IR	: Fourier transform infrared
IRLD	: infrared linear dichroism
KBr	: potassium bromide
KCl	: potassium chloride
NaCl	: sodium chloride
PET	: polyethylene terephthalate
PTFE	: polytetrafluoroethylene
PVC	: polyvinyl chloride
SEIRA	: surface-enhanced infrared absorption
ZnSe	: zinc selenide



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LIST OF SYMBOLS

θ	: angle of vector
μ	: micro
I_0	: intensity of the incident infrared beam
I	: intensity of the beam after interacting with sample
ε	: molar absorptivity
c	: concentration
l	: pathlength of sample
T	: transmittance



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