

**PREPARATION AND CHARACTERIZATION OF CHITIN WHISKER
REINFORCED NANOCOMPOSITE FILMS**

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A Thesis Submitted in Partial Fulfilment of the Requirements
for the Degree of Master of Science
The Petroleum and Petrochemical College, Chulalongkorn University
in Academic Partnership with
Case Western Reserve University, The University of Michigan,
The University of Oklahoma, and Institut Français du Pétrole

2004

ISBN 974-9651-53-7

I 21616231

Thesis Title: Preparation and Characterization of Chitin Whisker
Reinforced Nanocomposite Films
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จิตราวดี ศรีอุปโย: การเตรียมและการศึกษาคุณสมบัติของแผ่นฟิล์มที่เสริมแรงด้วยเส้นใยไคตินขนาดเล็ก (Preparation and Characterization of Chitin Whisker Reinforced Nanocomposite Films) อ. ที่ปรึกษา: ผศ. ดร. รัตนา รุจิรวนิช และ ศ. จอห์น แบลคเวล 80หน้า ISBN 974-9651-53-7

งานวิจัยนี้ศึกษาคุณสมบัติของแผ่นฟิล์มโพลีไวนิลแอลกอฮอล์และแผ่นฟิล์มไคโตซานที่มีการเสริมแรงด้วยเส้นใยไคตินขนาดเล็ก ซึ่งฟิล์มที่มีการเสริมแรงนี้เตรียมได้จากการทำให้แห้งในแม่แบบพลาสติก เส้นใยไคตินขนาดเล็กเตรียมได้จากการย่อยไคตินจากเปลือกกุ้งด้วยกรด เส้นใยไคตินขนาดเล็กที่เตรียมได้มีความยาวระหว่าง 150-800 นาโนเมตรและมีความกว้างระหว่าง 5-70 นาโนเมตร ซึ่งสังเกตได้จากกล้องทรานสมิทชันอิเล็กตรอนไมโครสโคป ปริมาณความเป็นผลึกของแผ่นฟิล์มวิเคราะห์ได้โดยเครื่องเอ็กซ์เรย์ดิฟเฟรคชัน โฟโตมิเตอร์ พบว่าเมื่อปริมาณเส้นใยไคตินขนาดเล็กในแผ่นฟิล์มเพิ่มขึ้นปริมาณความเป็นผลึกของแผ่นฟิล์มก็จะเพิ่มขึ้นด้วย เมื่อศึกษาสมบัติทางกลของแผ่นฟิล์ม พบว่าแผ่นฟิล์มที่เสริมแรงด้วยเส้นใยไคตินขนาดเล็กจะมีสมบัติทางกลดีกว่าแผ่นฟิล์มที่ไม่มีการเสริมแรง การปรับปรุงสมบัติของแผ่นฟิล์มเพื่อเพิ่มความสามารถในการทนต่อการละลายในน้ำทำได้โดยการให้ความร้อนต่อแผ่นฟิล์ม จากการให้ความร้อนต่อแผ่นฟิล์ม พบว่าแผ่นฟิล์มสามารถทนต่อการละลายในน้ำได้ในระยะเวลาที่นานขึ้นและปริมาณน้ำหนักรั่วไหลของแผ่นฟิล์มในน้ำได้ลดปริมาณลง นอกจากนี้ค่าการบวมน้ำและปริมาณน้ำหนักรั่วไหลของแผ่นฟิล์มจะลดลงเมื่อปริมาณเส้นใยไคตินขนาดเล็กในแผ่นฟิล์มเพิ่มขึ้น

ABSTRACT

4572007063: POLYMER SCIENCE PROGRAM
Jittrawadee Sriupayo: Preparation and Characterization of Chitin
Whisker Reinforced Nanocomposite Films
Thesis Advisors: Asst. Prof. Ratana Rujiravanit and
Prof. John Blackwell, 80 pp. ISBN 974-9651-53-7
Keywords: Chitin whisker/ Mechanical properties/ Swelling behaviour/
Nanocomposite

Chitin whisker-reinforced poly (vinyl alcohol) (PVA) and chitosan nanocomposite films were prepared by solution-casting technique. The chitin whisker was prepared by acid hydrolysis of chitin from shrimp shell. Whiskers have a length ranging from 150 nm to 800 nm and a width ranging from 5 nm to 70 nm as observed by TEM. The XRD results showed the increase in relative crystallinity of both nanocomposite films as whisker content increased. The mechanical properties of chitin whisker-reinforced PVA and chitosan films were found to be improved as compared to the unreinforced films. Heat treatment was used to create crosslinks within the films in order to prolong dissolution time and to decrease percent weight loss of films in water. In addition, degree of swelling and percent weight loss of nanocomposite films decreased with increasing whisker content.

ACKNOWLEDGEMENTS

The author would like to thank the Petroleum and Petrochemical College, Chulalongkorn University, where the author has gained her knowledge and enriched her skill in polymer science. The author would also like to acknowledge KPT Cooperation (Thailand) for kindly supplied NaOH solution utilized for the preparation of chitosan.

The author would like to express grateful appreciation to her advisors, Asst. Prof. Ratana Rujiravanit and Prof. John Blackwell for their invaluable suggestion and criticism.

This thesis work is partially funded by Postgraduate Education and Research Programs in Petroleum and Petrochemical Technology (PPT Consortium).

Finally, the author would like to take this opportunity to thank PPC Ph.D. students and all her PPC friends for their friendly assistance, cheerfulness, creative suggestions, and encouragement. The author had the most enjoyable time working with all of them. Also, the author is greatly indebted to her parents and her family for their support, love, and understanding.

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