

**PREPARATION AND CHARACTERIZATION
OF POLYANILINE/CHITOSAN BLEND FILM**



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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
The University of Michigan, The University of Oklahoma,
Case Western Reserve University and Institut Français du Pétrole

2005

ISBN 974-993-728-7

Thesis Title: Preparation and Characterization of Polyaniline/Chitosan Blend Film
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Accepted by the Petroleum and Petrochemical College, Chulalongkorn University, in partial fulfilment of the requirements for the Degree of Master of Science.

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บทคัดย่อ

ทัศน์พล ธัญพิชชา : การเตรียมและวิเคราะห์คุณสมบัติของแผ่นฟิล์มที่ได้จากการผสมของพอลิอะนิลีนและไคโตรซาน (Preparation and Characterization of Polyaniline/Chitosan Blend Film) อ. ที่ปรึกษา : ผศ. ดร. รัตนา รุจิรวนิช และ ศ. ดร. อเล็กซานเดอร์ เอ็ม จามิสัน 116 หน้า ISBN 974-993-728-7

งานวิจัยนี้ทำการศึกษาการเตรียมและการวิเคราะห์คุณสมบัติต่างๆของแผ่นฟิล์มที่ได้จากการผสมของพอลิเมอร์ที่มีคุณสมบัติเป็นไฮโดรเจลและพอลิเมอร์นำไฟฟ้า โดยได้นำเอาไคโตรซานซึ่งเป็นพอลิเมอร์ธรรมชาติที่มีคุณสมบัติเป็นไฮโดรเจล และพอลิอะนิลีนซึ่งเป็นพอลิเมอร์นำไฟฟ้าชนิดหนึ่งมาใช้ในการศึกษา จากการทดลองพอลิอะนิลีนที่อยู่ในสภาวะอิมเมอร์อลดีนเบส (สภาวะที่ไม่นำไฟฟ้าของพอลิอะนิลีน) จะถูกผสมกับสารละลายของไคโตรซานและทำเตรียมเป็นแผ่นฟิล์ม โดยใช้เทคนิคการหล่อสารละลายผสมลงในแม่แบบ และหลังจากนั้นจึงนำแผ่นฟิล์มที่ได้จากการเตรียมไปผ่านกระบวนการโด๊ปโดยใช้กรดไฮโดรคลอริก เพื่อเปลี่ยนสภาวะอิมเมอร์อลดีนเบสของพอลิอะนิลีนให้เป็นสภาวะอิมเมอร์อลดีนซอลท์ (สภาวะที่นำไฟฟ้าของพอลิอะนิลีน) เพื่อให้มีสมบัติที่เหมาะสมต่อการใช้งาน จากงานวิจัยนี้พบว่าแผ่นฟิล์มผสมที่เตรียมได้จากการทดลองจะมีค่าสมบัติเชิงกลที่ดีและสมบัติการนำไฟฟ้าอยู่ในระดับ 10^{-4} S/cm และยังพบอีกว่าสมบัติเชิงกลและสมบัติการนำไฟฟ้าของแผ่นฟิล์มผสมจะขึ้นอยู่กับสัดส่วนของพอลิอะนิลีนในแผ่นฟิล์ม และสภาวะของกระบวนการโด๊ป ได้แก่ ความเข้มข้นของกรด ระยะเวลา และชนิดของกรดที่ใช้ในกระบวนการโด๊ป นอกจากนี้ยังพบว่า แผ่นฟิล์มที่ได้จากการผสมของพอลิอะนิลีนและไคโตรซานสามารถนำไปประยุกต์ใช้ในระบบนำส่งยาที่สามารถควบคุมการปลดปล่อยยาโดยการกระตุ้นด้วยกระแสไฟฟ้าได้ อีกด้วย

ABSTRACT

4672033063: Polymer Science Program

Tuspon Thanpitcha: Preparation and Characterization of
Polyaniline/Chitosan Blend Film

Thesis Advisors: Asst. Prof. Ratana Rujiravanit, Prof. Alexander M.

Jamieson 116 pp. ISBN 974-993-728-7

Keywords: Conductive polymer/ Polyaniline/ Hydrogel/ Chitosan/ Blend film

Blend films consisting of a chitosan hydrogel and a conductive polymer, polyaniline (PANI), were prepared and characterized for their electrical and mechanical properties. The polyaniline in emeraldine base (EB) form was blended with chitosan solution and the blend films were obtained by solution casting. The PANI in the blend films were then doped by HCl solutions. The blend films exhibited good mechanical properties with appreciable electrical conductivity in the order of 10^{-4} S/cm. The electrical and mechanical properties of the blend films depended on polyaniline content in the composites and the conditions of the doping process: acid type, acid concentration and doping time. The blend films also found the potential application in medicine for electrically controlled release of drugs.

ACKNOWLEDGEMENTS

I would like to thank The Petroleum and Petrochemical College, Chulalongkhon University where I have gained the knowledge in the polymer science. I also would like to acknowledge Surapol Food Public Co., Ltd. for their support in supplying shrimp shells, KPT Cooperation (Thailand) for supply of sodium hydroxide 50 %w/w solution.

I would like to express grateful appreciation to Asst. Prof. Ratana Rujiravanit, Assoc. Prof. Anuvat Sirivat, and Prof. Alexander M. Jamieson for their invaluable suggestion and criticism. I would like to thank Dr. Hathaikarn Manuspiya for being the thesis committee.

I gratefully appreciates to thank Mr. Peerawat Somnuk and Mr. Jaturong Teumsiri, the technicians at The Petroleum and Petrochemical College, who help in the fabrication of electronic device and the mould for the experiment.

I would like to thank my friends for their friendship, helpfulness, cheerfulness, suggestion, and encouragement. I am also greatly indebted my parents for their love, support, understanding, and encouragement during this pursuit.

I am grateful for the partial scholarship and partial funding of the thesis work provide by Postgraduate Education and Research Programs in Petroleum and Petrochemical Technology (PPT consortium).

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