

**MOLECULAR DESIGN AND SYNTHESIS OF EXTERNAL STIMULI
RESPONSIVE STRUCTURE UNDER SELF-ASSEMBLY SYSTEMS**



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A Dissertation Submitted in Partial Fulfilment of the Requirements
for the Degree of Doctor of Philosophy
The Petroleum and Petrochemical College, Chulalongkorn University
in Academic Partnership with
The University of Michigan, The University of Oklahoma,
and Case Western Reserve University

2009


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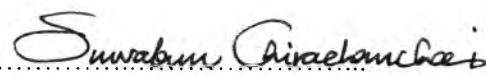
Thesis Title: Molecular Design and Synthesis of External Stimuli
Responsive Structure under Self-assembly Systems
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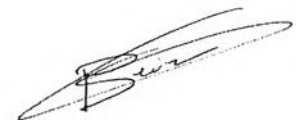
Accepted by the Petroleum and Petrochemical College, Chulalongkorn University, in partial fulfilment of the requirements for the Degree of Doctor of Philosophy.


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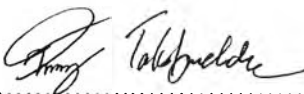

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บทคัดย่อ

ณัฐพร สุเขาวินทร์ : การออกแบบโมเลกุลและสังเคราะห์โครงสร้างที่ตอบสนองได้จากปัจจัยภายนอกภายใต้ระบบของการจัดเรียงตัวอย่างเป็นระเบียบด้วยตัวเอง (Molecular Design and Synthesis of External Stimuli Responsive Structure under Self-assembly Systems) อ. ที่ปรึกษา : รองศาสตราจารย์ ดร. สุวบุญ จิรชาญชัย, รองศาสตราจารย์ ดร.เชบา สเตียน เพอร์รีเออ, และ ผู้ช่วยศาสตราจารย์ ดร. อภิรัตน์ เล่าห์บุตรี 110 หน้า

วิทยานิพนธ์ฉบับนี้มุ่งเน้นไปที่การจัดวางโมเลกุลอย่างเป็นระเบียบได้ด้วยตนเองของระบบไฮส-เกสและสายโซ่พอลิเมอร์ ส่วนแรกเป็นการเชื่อมต่อกูมินอลซึ่งเป็นโมเลกุลที่สามารถเปล่งแสงได้ทางเคมีกับ เอ็น,เอ็น-บิส(5-เมททิล-2-ไฮดรอกซีเบนซิล)เมททิลเอมีน โดยปฏิกิริยาไคอะโซไทเซชัน ทำให้ได้ไฮสโมเลกุลชนิดใหม่ ที่จับไอออนของโลหะได้และสามารถนำไปใช้ในระบบการวิเคราะห์ของฟลูออโรอินเจกชันโดยไม่ต้องใช้ สารคีเลตตัวอื่นใส่เพิ่มเข้าไป ในส่วนที่สองว่าด้วยเรื่องของการใช้เทคนิคกราฟในการเตรียมบล็อกโคพอลิเมอร์ที่สามารถควบคุมโครงสร้างของไมเซลล์และเวสิเคิลได้ งานวิจัยนี้นำเสนอไมเซลล์ที่สามารถตอบสนองได้หลายอย่างโดยการออกแบบโคพอลิเมอร์ให้มีส่วนที่ไวต่ออุณหภูมิซึ่งก็คือ พอลิเอ็นไอโซโพรพิลอะคริลาไมด์, พอลิเมอร์ที่ตอบสนองได้กับความเป็นกรดต่าง ก็คือ พอลิ-2-ไดเมททิลอะมิโน เอททิลอะคริลาไมด์ และพอลิเมอร์ที่มีคุณสมบัติฟลูออเรสเซนส์ คือ พอลิเอ็น ไวนิลคาร์บาโซล งานวิจัยนี้ยังได้แสดงวิธีที่ง่ายในการควบคุมโครงสร้างของโคพอลิเมอร์ของ พอลิเอ็นไอโซโพรพิลอะคริลาไมด์และพอลิ-2-ไดเมททิลอะมิโน เอททิลอะคริลาไมด์ในการเรียงตัวเป็นไมเซลล์หรือเวสิเคิล งานวิจัยนี้ยังแสดงให้เห็นถึงวิธีที่ง่ายในการควบคุมโครงสร้างของฟลูออเรสเซนส์ไมเซลล์และเวสิเคิล โดยการปรับค่าความเป็นกรดต่างและส่วนประกอบของบล็อกโคพอลิเมอร์ ส่วนสุดท้ายรายงานถึงระบบของการผสมระหว่างโคโคซาน นาโนสเฟียร์และฟลูออเรสเซนส์ไมเซลล์

ABSTRACT

4782008063: Polymer Science Program

Natthaporn Suchao-in: Molecular Design and Synthesis of External Stimuli Responsive Structure under Self-assembly Systems.

Thesis Advisors: Assoc. Prof. Suwabun Chirachanchai, Assoc. Prof. Sébastien Perrier, and Asst. Prof. Apirat Laobuthee 110 pp.

Keywords: Self-Assembly/ Fluorescence/ Reversible addition fragmentation chain transfer polymerization/ Luminol/ Flow injection analysis/ *N,N*-Bis(2-hydroxyalkylbenzyl)alkylamine/ PNIPAAm/ External stimuli/ Micelle/ Vesicles/ Mixed Micelle

The present work focuses on the molecular self-assembly of host-guest system and polymeric chain. In the first part, the conjugation of the chemiluminescent molecules, luminol, onto *N,N*-bis(5-methyl-2-hydroxybenzyl)methylamine by diazotization reaction to obtain novel host compound is proposed. The metal ion guest entrapped in host allows the flow injection analysis system being possible to use in a single system where the chelating agent is not required. In the second part, RAFT technique was applied for preparing a copolymer with a controlled structure in micelle and vesicles form. The work originally proposes a multi-responsive micelle by designing a copolymer with a thermoresponsive of poly(*N*-isopropylacrylamide), PNIPAAm, a pH sensitive chain of poly(2-(dimethylamino)ethyl acrylate), PDMAEA, and a fluorescence sensitive chain of poly(*N*-vinylcarbazole), PNVC. The work further shows a simple approach to control morphology of the copolymer containing PNIPAAm and PDMAEA to obtain micelle or vesicles. The work also demonstrates a simple control of pH together with copolymer ratio to obtain a fluorescent vesicle and micelle system of which can be formed selectively. Finally, the mixed micelle systems from chitosan and multi responsive fluorescent micelle were reported.

ACKNOWLEDGEMENTS

The present dissertation would not have been accomplished without her Thai supervisor, Associate Professor Suwabun Chirachanchai, who not only originated this work, but also provided her continuous guidance, intensive recommendation, constructive criticism, invaluable suggestions and discussion, inspiration, and the opportunity to do the research in Australia.

She would like to express her appreciation to her Australia co-advisor, Associate Professor Sébastien Perrier, for the recommendation, worth advices, strong support, helpful comments and warm hospitality during her stays in Australia.

A deep gratitude is expressed to Assistant Professor Apirat Laobuthee (Department of Material Engineering, Faculty of Engineering, Kasetsart University) for his fruitful discussion and invaluable guidance.

She is indebted to Assistant Professor Duangjai Nacapricha for her comments, the knowledges, and helps in flow injection analysis.

She wants to express appreciation to all the Professors who have tendered invaluable knowledge to her at the Petroleum and Petrochemical College, Chulalongkorn University.

She would like to give a sincere thank to all members in the Key Centre for Polymers&Colloids, KCPC, for their helps, good time, and good memories throughout her stays in Australia, especially Dr. Hank De Bruyn who make her understanding light scattering technique clearly. She also wishes to thank Thai friends in Australia, Ms. Varangkana Jitchum and Ms. Wilasinee Sriprom for their encouragement, friendship, and lots of help.

She wishes to thank all members in SWB group for giving her helps and good memories during her study.

She appreciates the financial support from Thailand Research Fund through the Royal Golden Jubilee Ph.D. Program (Ph.D. Grant No. PHD/0087/2549). Her acknowledge also extends to National Center of Excellence for Petroleum, Petrochemicals and Advanced Materials.

Finally, she wishes to express her gratitude to her family for their love, understanding, encouragement, limitless sacrifice, and for being a constant source of her inspiration.

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