

**COMPOUNDING OF LOW MOLECULAR WEIGHT OLIGOMER  
TO REDUCE TACK IN NATURAL RUBBER**

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A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Science  
The Petroleum and Petrochemical College, Chulalongkorn University  
in Academic Partnership with  
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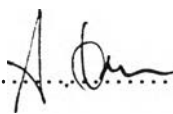
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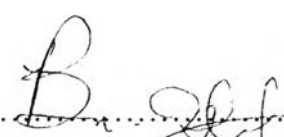
**Thesis Title** : Compounding of Low Molecular Weight Oligomer to  
Reduce Tack in Natural Rubber  
**By** : Ms. Wipawee Pattanakul  
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Dr. Rathanawan Magaraphan

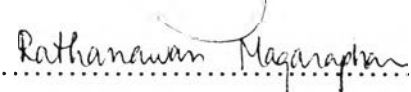
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**ABSTRACT**

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KEY WORDS : NR / PDMS / Autohesive tack

Wipawee Pattanakul: Compounding of Low  
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Tack reduction was performed by modification of natural rubber latex. Being non-tacky and inert, poly(dimethylsiloxane) (PDMS) was compounded in concentrated latex to make vulcanized rubber sheet and vulcanized rubber film. Vulcanized rubber sheet and vulcanized rubber film surface were examined with Fourier Transform Infrared Spectroscopy using attenuated total reflection (FTIR-ATR) and by contact angle measurements. Autohesive tack and tensile properties were determined. For sheet and dipped film, FTIR-ATR showed that PDMS migrated on both surfaces and gave a slippery property as detected by T-peel test. The contact angle of ethylene glycol on the rubber decreased with increasing amounts of PDMS. Autohesive tack for sheet and dipped film before and after aging decreased with increasing PDMS amount; autohesive tack for sheet after aging was larger. PDMS caused a decrease in tensile strength for the sheet but did not affect percent elongation. The tensile strength and percent elongation for dipped film were not affected by PDMS.

## บทคัดย่อ

วิภาวี พัฒนกุล : การลดความเหนียวติดกันของยางธรรมชาติโดยการผสมสารพอลิเมอร์ที่มีน้ำหนักโมเลกุลต่ำ (Compounding of Low Molecular Weight Oligomer to Reduce Tack in Natural Rubber) อ. ที่ปรึกษา: Assoc. Prof. Brian P. Grady และ อาจารย์รัตนวรรณ มกรพันธ์ 64 หน้า ISBN974-344-199-4

งานวิจัยนี้ศึกษาการลดความเหนียวติดกันของยางธรรมชาติโดยการปรับสูตรน้ำยางธรรมชาติด้วยพอลิไดเมทิลไซลอกเซนซึ่งเป็นสารที่ไม่เหนียวและเนียนเพื่อเตรียมเป็นแผ่นยางและฟิล์มยางที่ผ่านการบ่มเร่ง ในงานวิจัยนี้ได้ตรวจสอบการเคลื่อนตัวของพอลิไดเมทิลไซลอกเซนมาที่พื้นผิวชั้นยางที่เป็นแผ่นยางกับฟิล์มยางซึ่งผ่านการบ่มเร่งแล้วด้วยรังสีอินฟราเรดแบบการสะท้อนสะสมทั้งหมด (FTIR-ATR) และการวัดมุมสัมผัส และศึกษาถึงอิทธิพลของพอลิไดเมทิลไซลอกเซนต่อสมบัติความเหนียวติดกันและสมบัติทางกลของยางที่ผสมพอลิไดเมทิลไซลอกเซนก่อนและหลังบ่มเร่ง จากผลการวิเคราะห์สเปกตรัมที่ได้โดย FTIR-ATR และโดยวิธีวัดมุมสัมผัสของเอทิลีนไกลคอลพบว่าพอลิไดเมทิลไซลอกเซนเคลื่อนมาที่พื้นผิวทั้งสองด้าน ทำให้พื้นผิวลื่นมากขึ้นและให้ค่ามุมสัมผัสลดลงเมื่อปริมาณพอลิไดเมทิลไซลอกเซนเพิ่มขึ้น จากการศึกษาการลอกแบบตัวที่ขึ้นยางที่ผสมพอลิไดเมทิลไซลอกเซนมีสมบัติความเหนียวติดกันลดลงตามปริมาณพอลิไดเมทิลไซลอกเซน แต่พบว่าความเหนียวติดกันของแผ่นยางและฟิล์มยางหลังบ่มเร่งเพิ่มขึ้น สำหรับสมบัติทางกลพอลิไดเมทิลไซลอกเซนส่งผลให้ค่าแรงดึงจนขาดของแผ่นยางลดลง แต่ไม่มีผลต่อค่าการยืดจนขาด ส่วนค่าแรงดึงจนขาดและค่าการยืดจนขาดของฟิล์มยางไม่ได้รับผลกระทบจากพอลิไดเมทิลไซลอกเซน

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