

**EVALUATION OF MECHANICAL RHEOLOGICAL AND THERMAL  
PROPERTIES OF POLY(TRIMETHYLENE  
TEREPHTHALATE)(PTT)/POLYETHYLENE BLEND USING  
COMPATIBILIZER BASED ON CARBOXYLATE AND IONOMER FOR  
AUTOMOTIVE APPLICATION**

Wuttikorn Chayapanja

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**Thesis Title:** Evaluation of Mechanical, Rheological, and Thermal Properties of Poly(trimethylene terephthalate)(PTT)/ Polyethylene Blend using Compatibilizer based on Carboxylate and Ionomer for Automotive Application


**By:** Wuttikorn Chayapanja

**Program:** Polymer Science

**Thesis Advisors:** Asst. Prof. Manit Nithitanakul  
Prof. Brian P. Grady

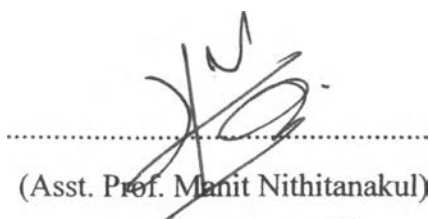
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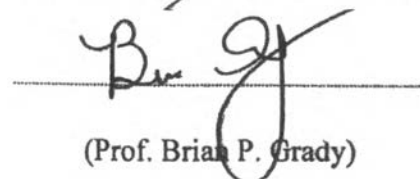


..... College Dean  
(Asst. Prof. Pomthong Malakul)

**Thesis Committee:**



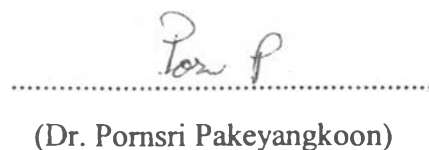
.....  
(Asst. Prof. Manit Nithitanakul)



.....  
(Prof. Brian P. Grady)



.....  
(Asst. Prof. Hathaikarn Manuspiya)



.....  
(Dr. Pomsri Pakeyangkoon)

## ABSTRACT

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Wuttikorn Chayapanja: Evaluation of Mechanical Rheological and Thermal Properties of Poly(trimethylene terephthalate)(PTT)/ Polyethylene Blend using Compatibilizer based on Carboxylate and Ionomer for Automotive Application.

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Keywords: Poly(trimethylene terephthalate)/ Polyethylene/ Compatibilizer/ Polymer blend

Polymer blending is one way for development of new materials with excellent properties. In this study, poly(trimethylene terephthalate) (PTT) and polyethylene blended with maleic anhydride grafted high-density polyethylene (MAH-g-HDPE) and ethylene-methacrylic acid neutralized sodium metal (Na-EMAA), were used as compatibilizers. The blends were prepared by a twin-screw extruder with different ratios of polymers (PTT/HDPE and PTT/LLDPE: 80/20 and 60/40) and compatibilizers (0, 0.1, 0.5, 1, and 5 phr). The blends were characterized on mechanical, rheological, thermal, and morphological properties. By adding the compatibilizers, Young's modulus and tensile strength, impact strength and viscosity of the blends increased and smaller dispersed droplet size micrographs were observed. For the types of compatibilizers, MAH-g-HDPE and Na-EMAA, effected on mechanical properties. The melting and crystallization behavior of the blends also depended on type of compatibilizer.

## บทคัดย่อ

วุฒิกร ญาปัญญา : การศึกษาคุณสมบัติเชิงกล คุณสมบัติการไหล และคุณสมบัติทางความร้อนของพอลิไตรเมทิลีนเทเรฟทาเลตกับพอลิเอทิลีน โดยใช้คาร์บอกซิเลตและไอโอโนเมอร์เป็นสารเพิ่มความเข้ากันได้สำหรับการประยุกต์ใช้ในยานยนต์ (Evaluation of Mechanical Rheological and Thermal Properties of Poly(trimethylene terephthalate)(PTT)/Polyethylene Blend using Compatibilizer based on Carboxylate and Ionomer for Automotive Application)  
อ. ที่ปรึกษา: ผศ.ดร.มานิตย์ นิธิธนากุล และ ศ.ไบรอัน เกรดี 112 หน้า

การผสมพอลิเมอร์เป็นทางเลือกหนึ่งสำหรับพัฒนาวัสดุชนิดใหม่ที่มีคุณสมบัติที่ดี ในงานวิจัยนี้ ทำการผสมพอลิไตรเมทิลีนเทเรฟทาเลตกับพอลิเอทิลีนโดยใช้ MAH-g-HDPE และ Na-EMAA เป็นสารเพิ่มความเข้ากันได้ พอลิเมอร์ผสมถูกเตรียมด้วยเครื่องเอกซ์ทรูเดอร์ชนิดเกลียวคู่โดยใช้อัตราส่วนที่แตกต่างกันของพอลิเมอร์ (PTT/HDPE กับ PTT/LLDPE ในอัตราส่วน 80/20 และ 60/40) และสารเพิ่มความเข้ากันได้ (0, 0.1, 0.5, 1 และ 5 ต่อร้อยส่วนของพอลิเมอร์) ตัวอย่างพอลิเมอร์ที่ถูกผสมแล้วจะถูกวิเคราะห์คุณสมบัติเชิงกล คุณสมบัติการไหล คุณสมบัติทางความร้อนและสัญญาณวิทยา ผลการทดลองพบว่าเมื่อเติมสารเพิ่มความเข้ากันได้ลงในพอลิเมอร์ผสม ค่ามอดูลัสของยัง ค่าความทนต่อแรงดึง ค่าการกระแทก และความหนืดของพอลิเมอร์ผสมมากขึ้นและเมื่อดพอลิเมอร์ของวัฏภาคที่กระจายมีขนาดลดลง สำหรับชนิดของสารเพิ่มความเข้ากันได้พบว่ามีผลต่อคุณสมบัติเชิงกลของพอลิเมอร์ผสมและพฤติกรรมการหลอมและการเกิดผลึกของพอลิเมอร์ผสม

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