

**REACTIVE COMPATIBILIZATION OF POLYETHYLENE AND
POLY(VINYL CHLORIDE) USING METHYL METHACRYLATE
AS COMPATIBILIZER**

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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 Oklahomas,
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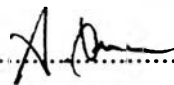
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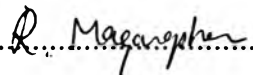
Thesis Title : Reactive Compatibilization of Polyethylene and Poly
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บทคัดย่อ

ชัชวัฒน์ ไทวิชชารัง: การศึกษาสมบัติของโพลิเมอร์ผสมระหว่างโพลิเอทิลีน และโพลิไวนิลคลอไรด์ด้วยวิธีการแบบรีแอคทีฟโดยใช้เมทิลเมทาคริลเลตเป็นตัวช่วยผสม (Reactive Compatibilization of Polyethylene and Poly(vinyl chloride) Using Methyl Methacrylate as Compatibilizer) อ. ที่ปรึกษา : ศ. ดร. อเล็กซานเดอร์ เอ็ม เจมสัน (Prof. Alexander M. Jamieson) และ ดร.รัตนวรรณ มกรพันธุ์ 42 หน้า ISBN 974-331-921-2

การเกิดปฏิกิริยาระหว่างเมทิลเมทาคริลเลต (methyl methacrylate) กับ โพลิเอทิลีนความหนาแน่นสูง (High-Density Polyethylene) สามารถเกิดขึ้นได้ด้วยวิธีการผสมแบบรีแอคทีฟ (reactive blending) โดยใช้ตัวเริ่มปฏิกิริยาไดคิวมิวเปอร์ออกไซด์ (dicumyl peroxide initiator) ผลึกภัณฑ์ที่ได้จากปฏิกิริยานี้ก็คือโคโพลิเมอร์แบบกิ่งระหว่างเมทิลเมทาคริลเลตกับโพลิเอทิลีน (MMA grafted HDPE) ซึ่งสามารถตรวจสอบการเกิดโคโพลิเมอร์และปริมาณการเกิดโคโพลิเมอร์นี้ได้โดยใช้ฟูรีเออร์ทรานสฟอร์มอินฟราเรดสเปกโตรมิเตอร์ (FTIR spectrometer) ในขณะเดียวกันผลึกภัณฑ์ที่ได้ยังเกิดการขาดของโมเลกุล (Chain degradation) และการเชื่อมโยงระหว่างโมเลกุล (Crosslinking) อีกด้วย เมื่อผสมโคโพลิเมอร์นี้กับโพลิไวนิลคลอไรด์ (poly(vinyl chloride)) ด้วยวิธีการผสมแบบรีแอคทีฟในขั้นตอนเดียว (one-step reactive blending) พบว่าโพลิเมอร์ผสมที่ได้จะมีการเปลี่ยนแปลงสมบัติรูป อสังฐาน (morphology) และคุณสมบัติทางกล (mechanical properties) ไปในทางที่ดีขึ้นเมื่อเปรียบเทียบกับโพลิเมอร์ผสมระหว่างโพลิเอทิลีนและโพลิไวนิลคลอไรด์ จากการศึกษาพบว่า การเปลี่ยนแปลงสมบัติต่างๆนี้จะขึ้นอยู่กับปริมาณของเมทิลเมทาคริลเลตและตัวเริ่มปฏิกิริยาที่ใช้ในการเตรียมโคโพลิเมอร์และปริมาณของโพลิไวนิลคลอไรด์ในโพลิเมอร์ผสม

ABSTRACT

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KEY WORD : HDPE/PVC blends / MMA / MMA grafted HDPE

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The grafting of methyl methacrylate monomer (MMA) to high-density polyethylene (HDPE) prepared by reactive blending in brabender batch mixer has been studied. Grafting was successful with the free radical initiator dicumyl peroxide (DCP). The presence of MMA grafting and grafted content were determined by FT-IR spectroscopy, and the degree of crosslinking inferred from gel content and melt flow index. The effects of initial MMA and DCP concentration on the grafted content and basic properties were studied. Melt blending of these grafted HDPE with poly(vinyl chloride) (PVC) was obtained in all cases using one-step reactive blending. The changes in morphology to finer dispersed phase and enhancement of mechanical properties of blends obtained in all case of MMA grafted HDPE/PVC blends. These conclusions are supported by the observation of hydrogen bonding between two phases that showed by FT-IR.

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