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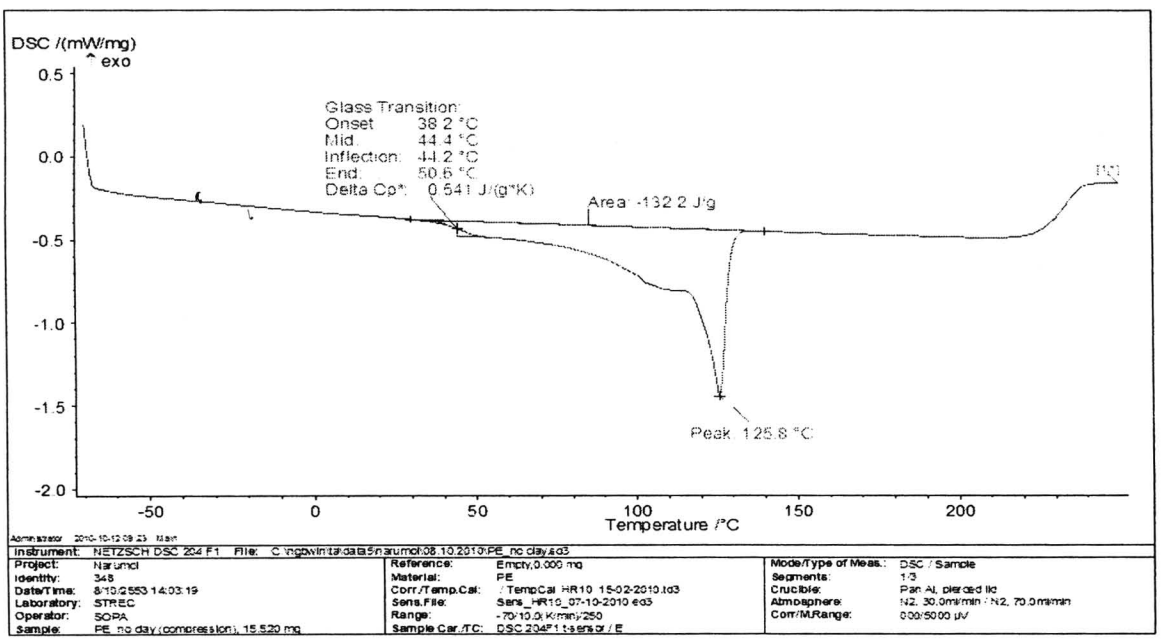
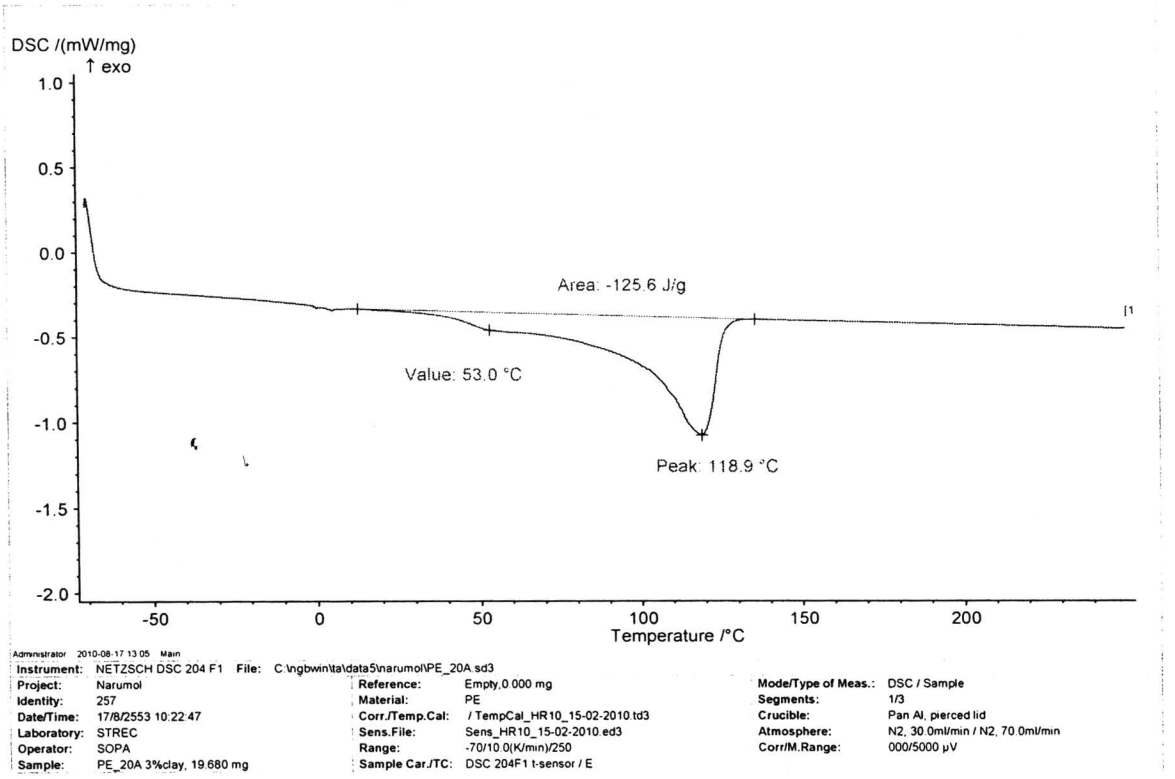
ภาคผนวก

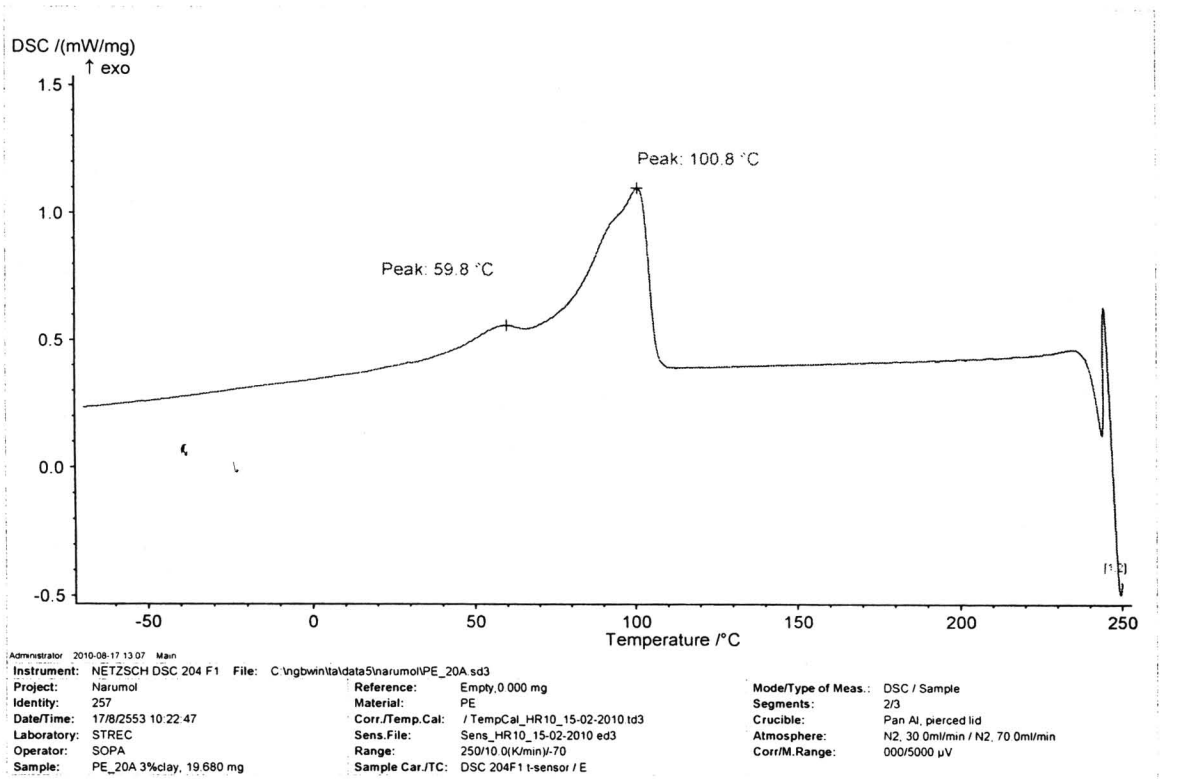
ก. DSC thermogram ของฟิล์มพอลิเอธิลีนและฟิล์มพอลิเอธิลีนนาโนคอมโพสิทชนิดต่างๆ



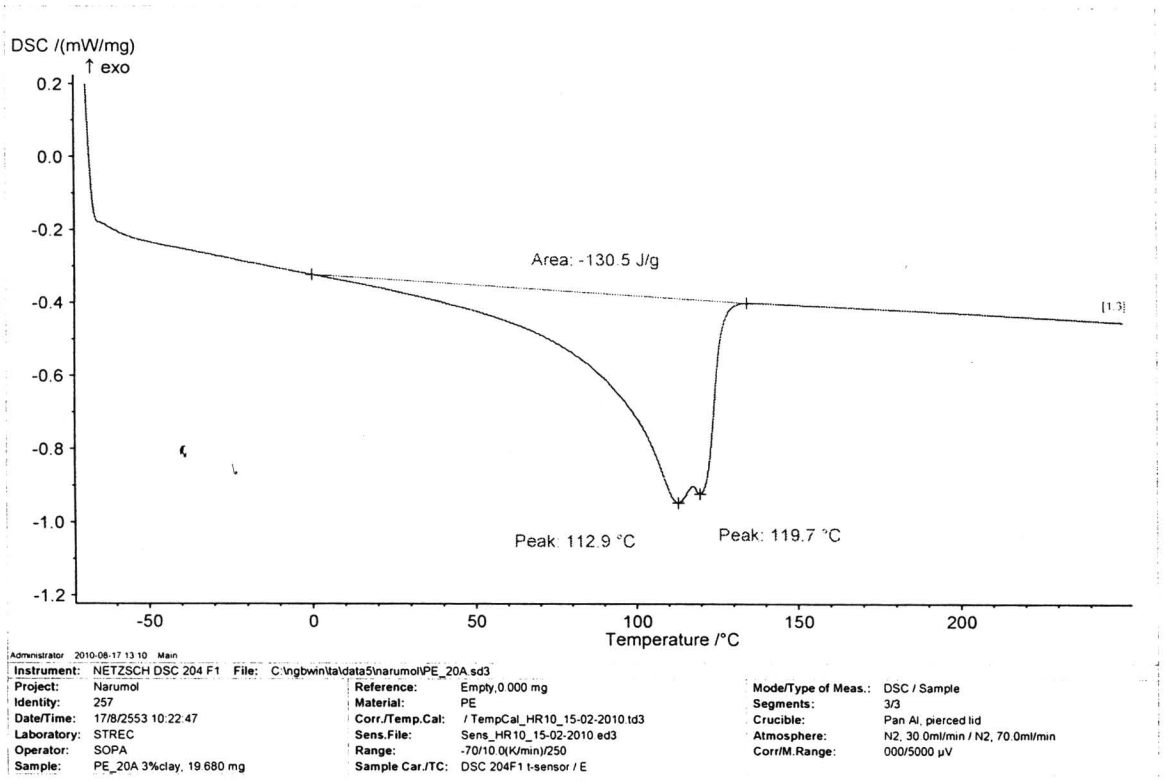
รูปที่ ก.1 DSC thermogram (first run) ของฟิล์มพอลิเอธิลีน



รูปที่ ก.2 DSC thermogram (first run) ของฟิล์มพอลิเอธิลีนนาโนคอมโพสิท ผสมสาร Cloisite20A

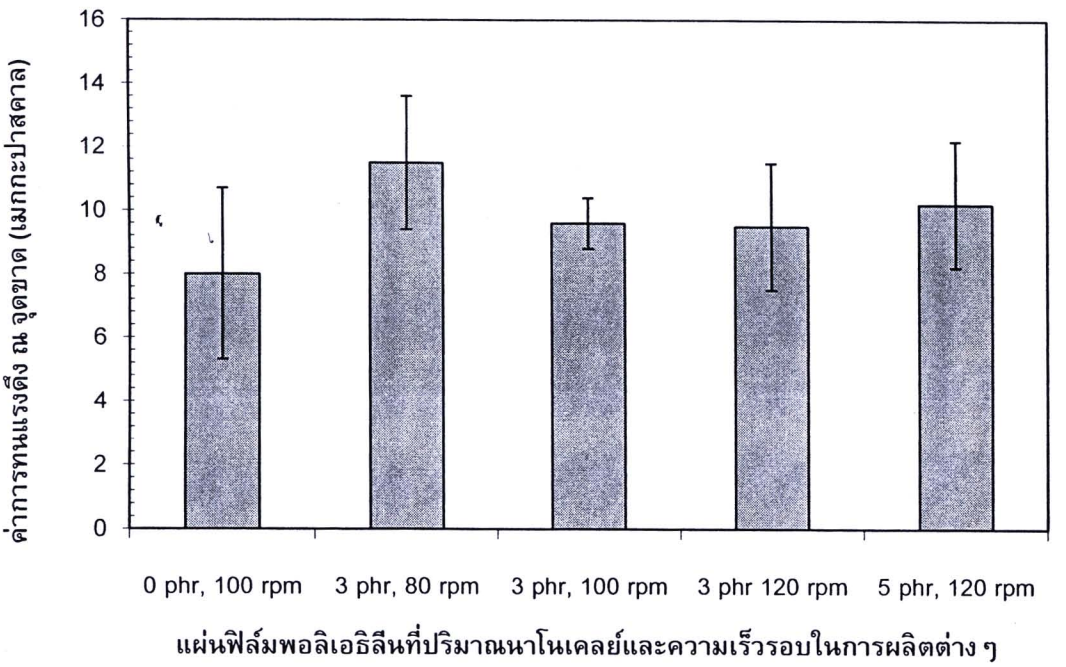


รูปที่ ก.3 DSC thermogram (cooling line) ของฟิล์มพอลิเอธิลีนนาโนคอมโพสิท ผสมสาร Cloisite20A

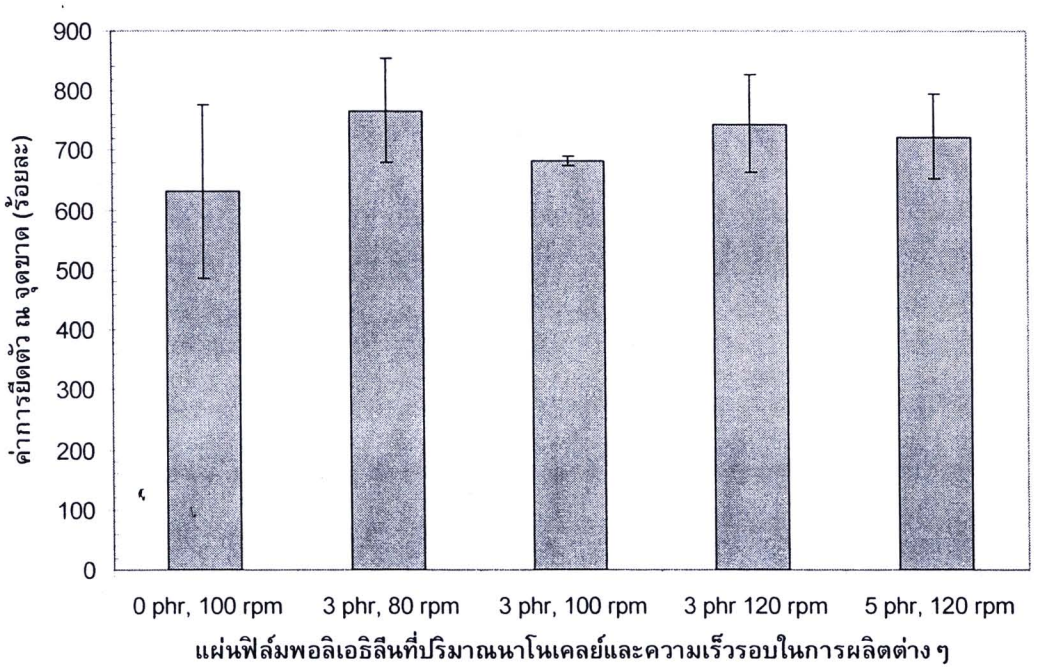


รูปที่ ก.4 DSC thermogram (second run) ของฟิล์มพอลิเอธิลีนนาโนคอมโพสิท ผสมสาร Cloisite20A

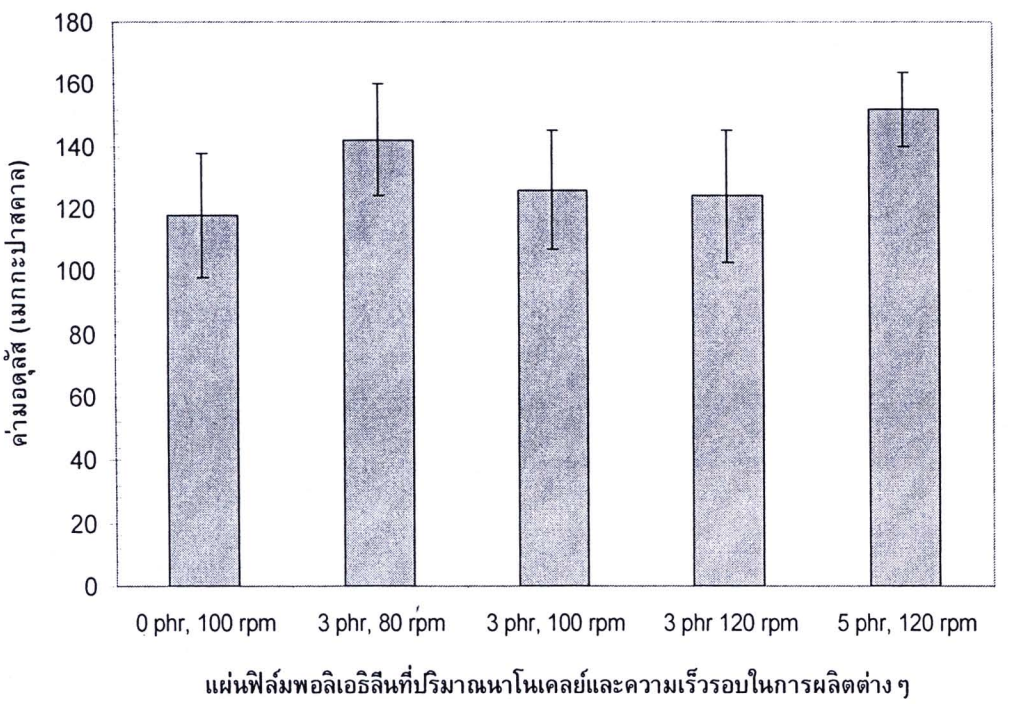
ข. สมบัติด้านการทนแรงดึงของฟิล์มพอลิเอธิลีนชนิดต่างๆ



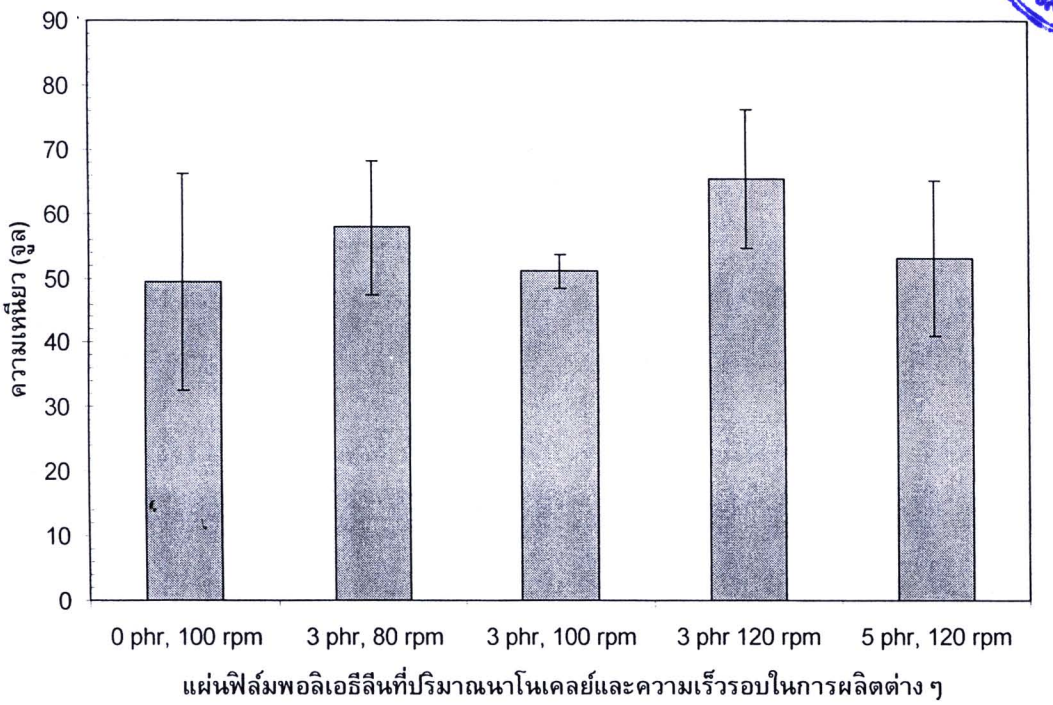
รูปที่ ข.1 ค่าการทนแรงดึง ณ จุดขาดของแผ่นฟิล์มพอลิเอธิลีนที่ปริมาณนาโนเคลย์และความเร็วรอบต่างๆ



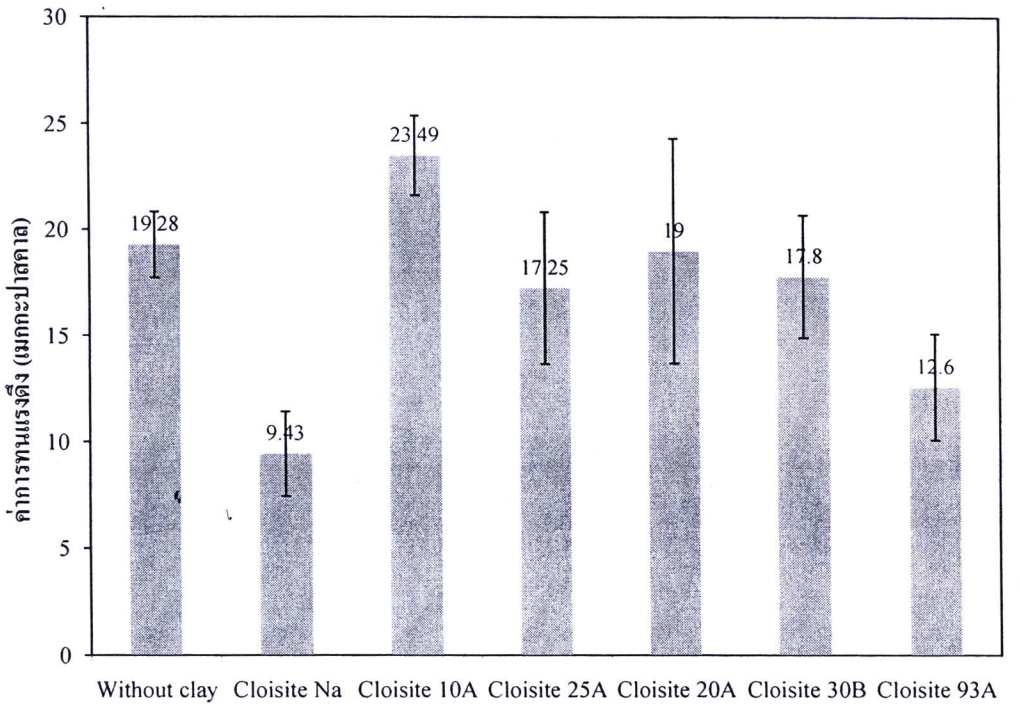
รูปที่ ข.2 ค่าการยืดตัว ณ จุดขาด ของแผ่นฟิล์มพอลิเอธิลีนที่ปริมาณนาโนเคลย์และความเร็วรอบต่างๆ



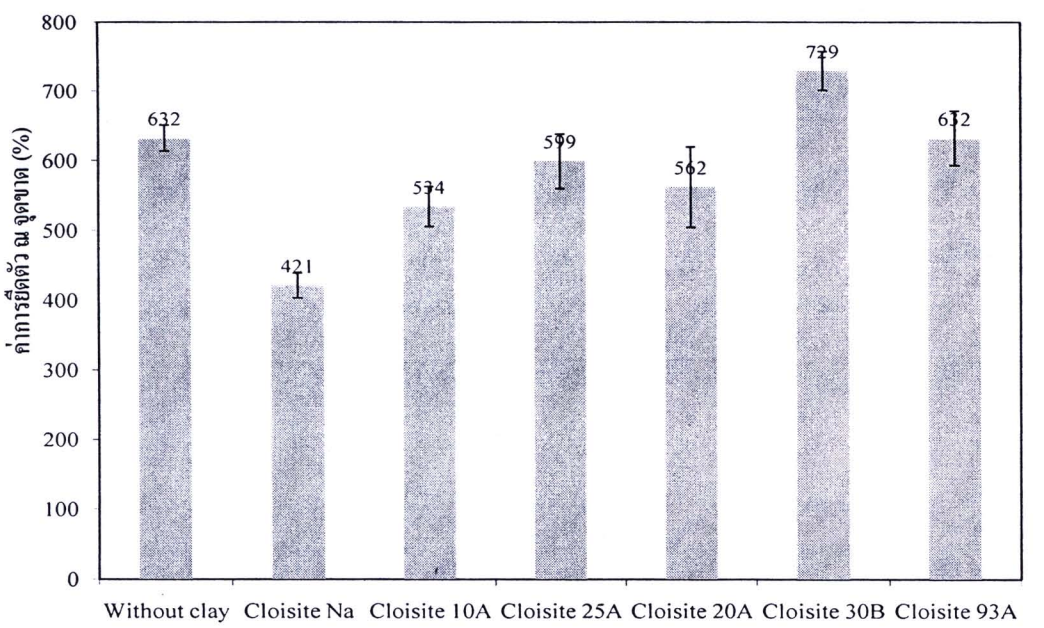
รูปที่ ข.3 ค่ามอดุลัสของแผ่นฟิล์มพอลิเอธิลีนที่ปริมาณนาโนเคลย์และความเร็วรอบในการผลิตต่างๆ



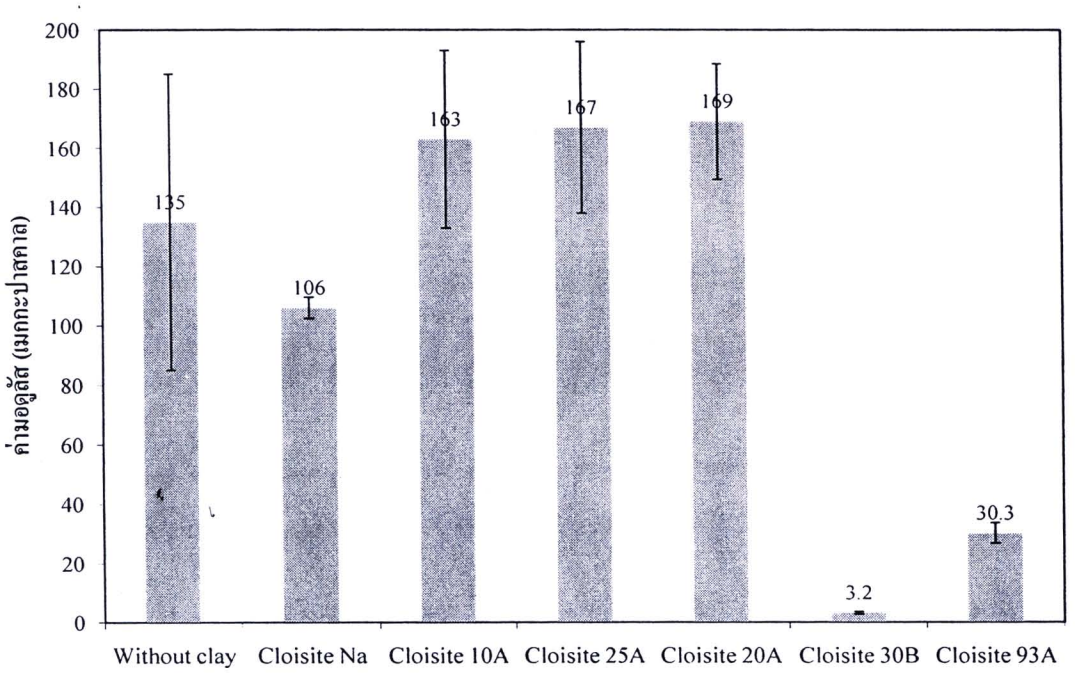
รูปที่ ข.4 ค่าพลังงานของแผ่นฟิล์มพอลิเอธิลีนที่ปริมาณนาโนเคลย์และความเร็วรอบในการผลิตต่างๆ



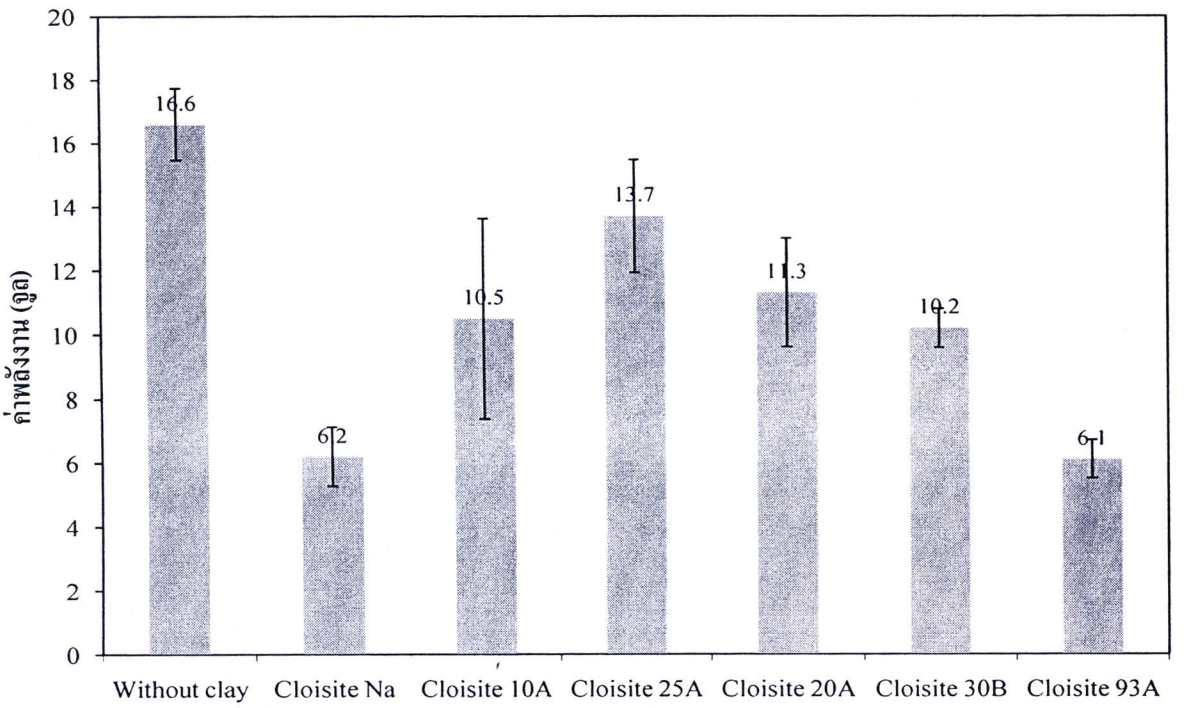
รูปที่ ข.5 ค่าการทนแรงดึง ณ จุดขาดของแผ่นฟิล์มพอลิเอธิลีนนาโนคอมโพสิทที่เติมสารนาโนเคลย์ชนิดต่างๆ



รูปที่ ข.6 ค่าการยืดตัว ณ จุดขาดของแผ่นฟิล์มพอลิเอธิลีนนาโนคอมโพสิทที่เติมสารนาโนเคลย์ชนิดต่างๆ



รูปที่ ข.7 ค่ามอดุลัสของแผ่นฟิล์มพอลิเอธิลีนนาโนคอมโพสิทที่เติมสารนาโนเคลย์ชนิดต่างๆ

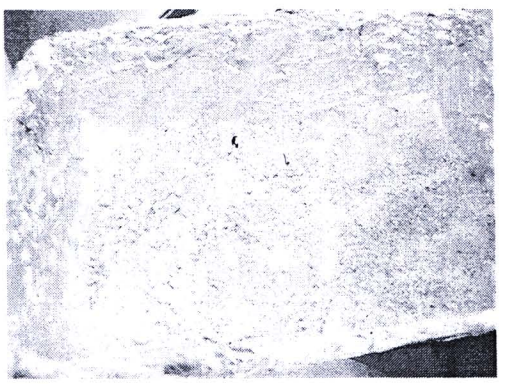


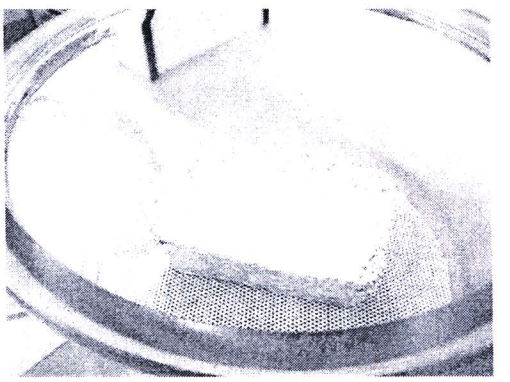
รูปที่ ข.8 ค่าความเหนียวของแผ่นฟิล์มพอลิเอธิลีนนาโนคอมโพสิทที่เติมสารนาโนเคลย์ชนิดต่างๆ

ฉ. ภาพตัวอย่างการดำเนินการทดลอง

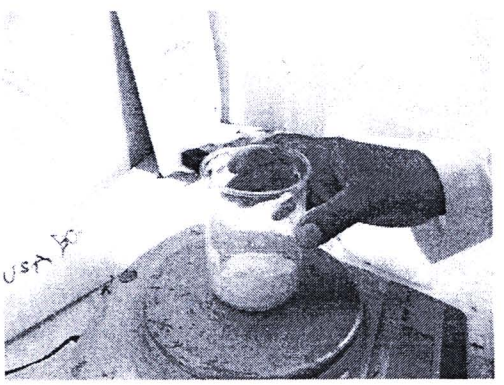
การเตรียม master batch

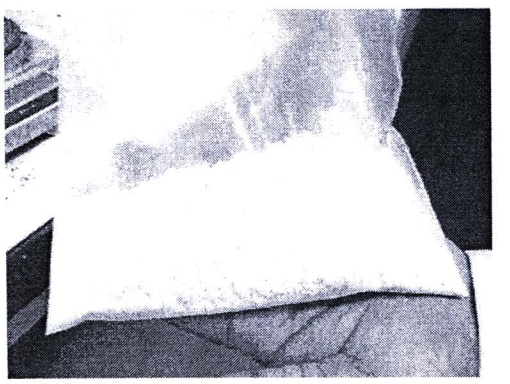
1. นำเคลย์อบที่อุณหภูมิ 80 °C เป็นเวลา 12 ชั่วโมง จากนั้นเก็บไว้ใน Desiccators



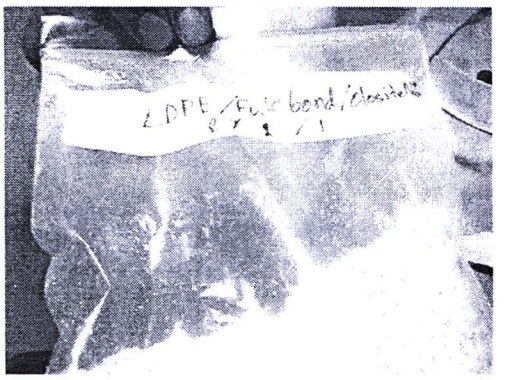


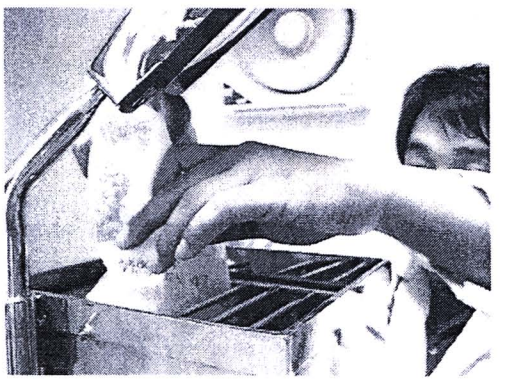
2. เตรียม master batch โดยชั่ง clay, LDPE, Fusabond ในอัตราส่วน1:2:2 และทำการผสมให้เกิดการกระจายตัว

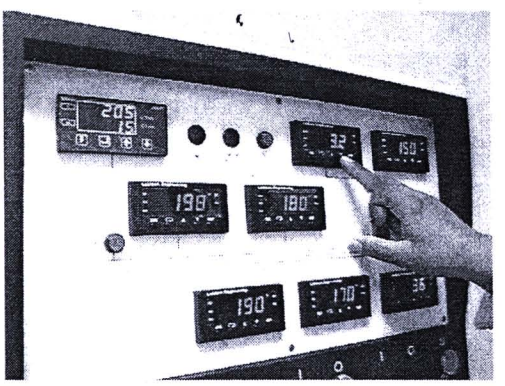


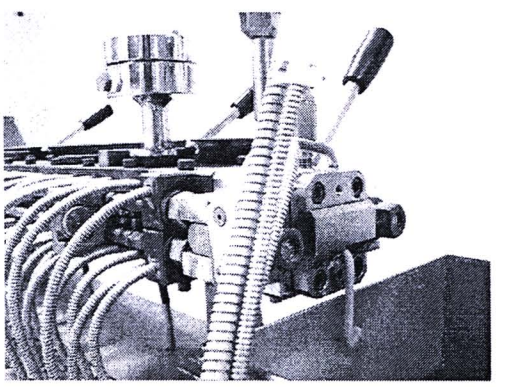


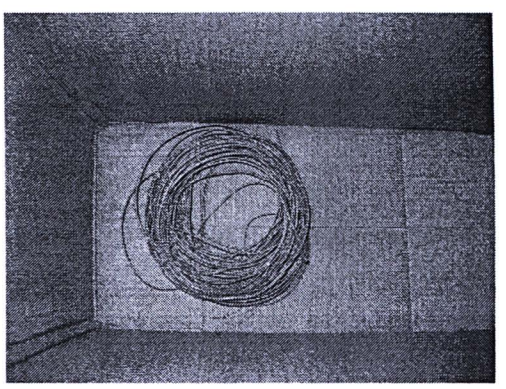
3. ทำการผสมด้วยเครื่องอัดรีดแบบเกลียวหนอนคู่

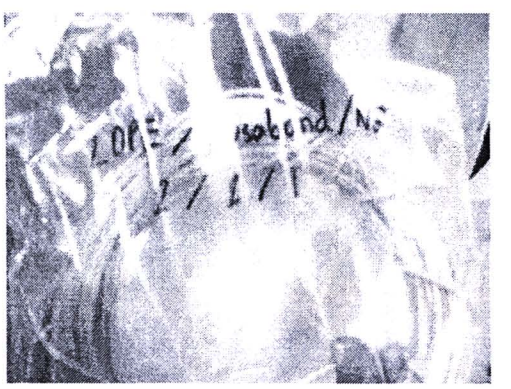




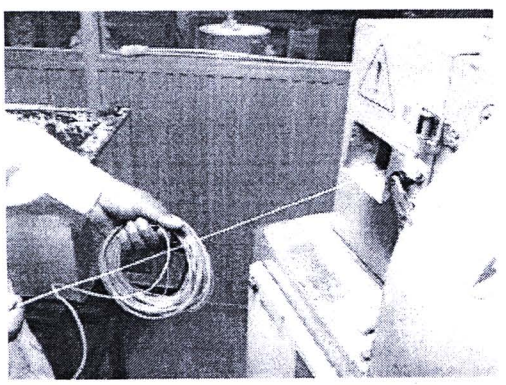


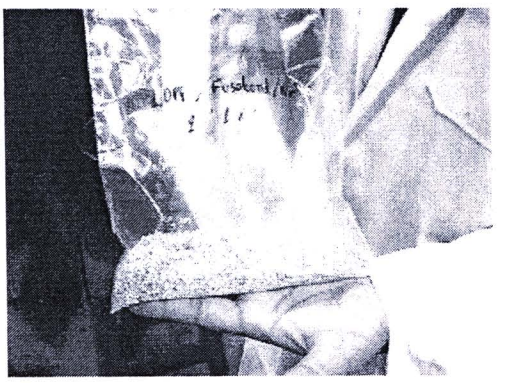






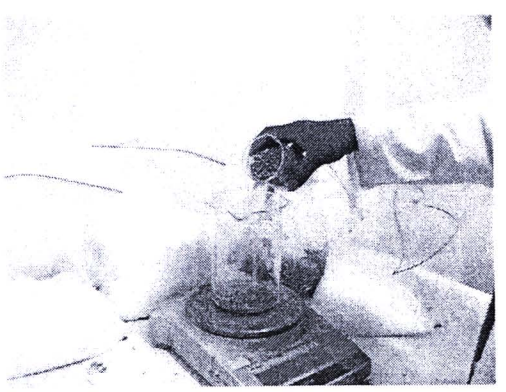
4. ทำการตัดเม็ด masterbatch



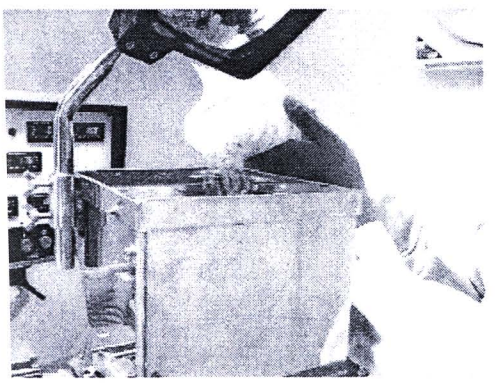


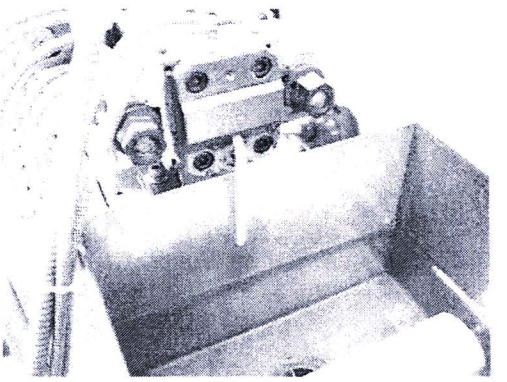
การเตรียมพอลิเอธิลีน-นาโนคอมโพสิท

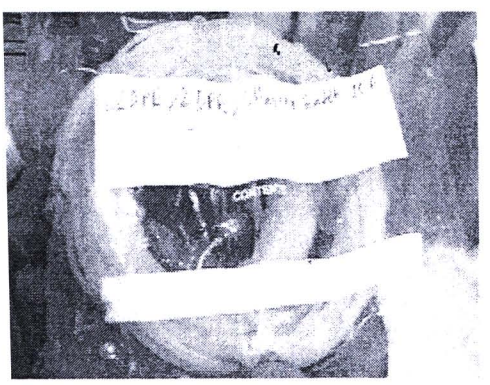
1. ชั่ง masterbatch, LDPE, LLDPE และทำการผสมให้เกิดการกระจายตัว



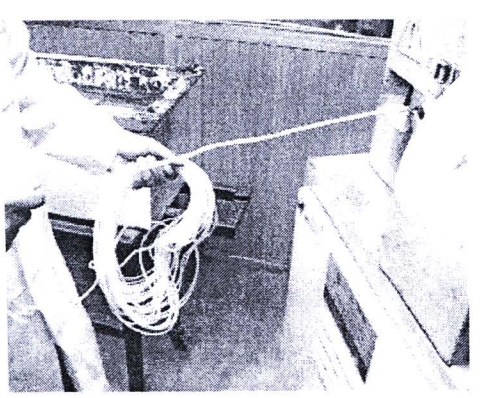
2. ทำการผสมด้วยเครื่องอัดรีดแบบเกลียวหนอนคู่





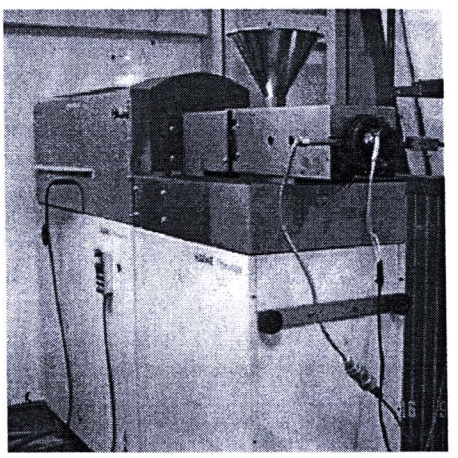


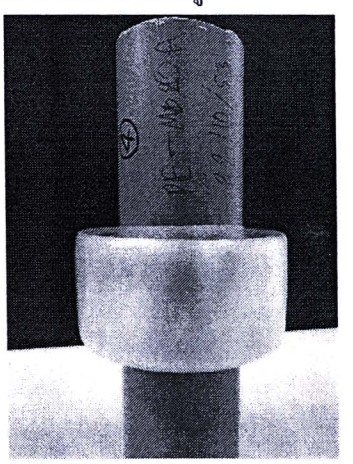
ทำการตัดเม็ด



การขึ้นรูปเป็นแผ่นฟิล์ม

นำเม็ดคอมโพสิทพอลิเอธิลีน-นาโนเคลย์เทลงในเครื่องอัดรีดแบบเกลียวหนอนคู่





ฉ.ประวัตินักวิจัย

CURRICULUM VITAE

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Polymer Science Program, University of New South Wales, Australia.
Thesis: Interfacial adhesion in acrylic based adhesives

1986-1989: B.Sc. (Chemistry)
Mahidol University, Bangkok, Thailand
Project: Radiation curing of natural rubber latex

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Research Interest

Conducting polymers for solar cell and fuel cells
Biopolymers

Professional Membership :

2004 Member, Rubber Division, American Chemical Society.

Research Grants

1. Preparation of Block Copolymer via Living Radical Polymerization (MT-B-S6-08-20-101). The National Metal and Materials Technology Center (MTEC). (03/01/1998-02/01/1999). (171,000 Baht)
2. Controlled Polymerization of Isoprene through a Living Radical Polymerization (PDF/04/2542). The Thailand Research Fund (TRF). (01/07/1999-30/06/2000), (200,000 Baht)
3. A study on the Effects of Block Copolymers on Natural-Synthetic Rubber Blends. The National Metal and Materials Technology Center (MTEC), (08/05/2000–07/05/2002) (457,408 Baht)
4. Examination and Control of Crosslink Distribution and Properties of Natural-Acrylic Rubber Blends (Grant code; RSA/17/2545).The Thailand Research Fund (TRF) (01/11/2001-31/10/2004). (1,080,000 Baht)
5. Feasibility on modification of cassava starch for packaging use in commercial (Phase 1: Chemical modification and blending with plastics) (MT-S-45-POL-20-203-G) The National Metal and Materials Technology Center (MTEC) (30/06/2002-29/06/2003) (192,045 Baht)
6. Development of rubber product from natural-acrylic rubber blends (MT-B-45-POL-20-220-G). The National Metal and Materials Technology Center (MTEC), (949,370 Baht)
7. Development of encapsulating materials for solar cells (C0-B-22-1H-20-4701), The National Science and Technoilogy Development Center (NSTDA), (15/07/2004–14/07/2006),(1,357,600 Baht)
8. Modification of poly(vinylidene fluoride) for a development of electrolyte membrane in direct methanol fuel cell (The Thailand Reseacrh Fund (TRF), (1,200,000 Baht) (August 2005 – August 2008)
9. Development of nanocomposite membrane for use as an electrolyte in fuel cell (National Nanotechnology Center), (650,000 Baht), (2006-2008)
10. The Development of Plastic Food Containers from Polycarbonate [Phase 1.1: A Study on BPA leaching and health risk assessment of the BPA (Literature Search)] **PTT PHENOL Co. Ltd.** 1,000,000 Baht
11. The Development of Plastic Food Containers from Polycarbonate [Phase 1.2: Database development and Patent Mapping] PTT PHENOL COMPANY LIMITED 400,000 Baht.
12. Synthesis and a study on structure-properties relationships of semi-conducting polymers for solar cell applications. cell (The Thailand Reseacrh Fund (TRF), (1,200,000 Baht) (May 2008 – May 2011)
13. Development of PVC Sheet for Livestock Housing, B.T. International Co. Ltd. (Betagro), 405,114 Baht. (August 2008 – January 2009).
14. Development of biodegradable packaging film from PLA (PTT research and technology Institute, 1,580,000 Baht (9th February 2009 – 8th December 2009)

15. Technology transfer and process development for producing PVC sheet for livestock housing use: From laboratory to factory scale production process. B.T. International Co. Ltd. (Betagro), 494,319 Baht (1st May 2009 – 31st October 2009)
16. Development of biodegradable packaging film from PLA: Phase II Improvement of PLA Compounding formulation for enhancing commercial competency. (PTT research and technology Institute, 1,03,000 Baht (22nd February 2010 – 30th December 2010)
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2. *"การศึกษาสภาพพื้นผิวของโพลีเมอร์โดยใช้เทคนิค Atomic Force Microscopy "*, ดร.จตุพร วุฒิกนกกาญจน์ วารสารเทคโนโลยีวัสดุ ฉบับที่ 15 เมษายน - มิถุนายน 2542

อนุสิทธิบัตรและสิทธิบัตร (Patents and Petty Patents)

1. อนุสิทธิบัตร เรื่อง *"สูตรผสมยางวัลคาไนซ์ที่ทนความร้อนและน้ำมันและกรรมวิธีการผลิตสูตรผสมดังกล่าว"* เลขที่ 2770 (ออกให้ ณ วันที่ 11 สิงหาคม 2549 – หมดอายุ วันที่ 7 พฤษภาคม 2555)
2. สิทธิบัตร เรื่อง *"สูตรผสมฟิลม์พอลิเมอร์โปร่งแสงสำหรับใช้ห่อหุ้มเซลล์แสงอาทิตย์และกรรมวิธีการผลิตฟิลม์พอลิเมอร์โปร่งแสงดังกล่าว"* เลขที่คำขอ 0601002985 (วันที่ 29 มิถุนายน 2549)
3. สิทธิบัตร เรื่อง *"วัสดุห่อหุ้มเซลล์แสงอาทิตย์ประเภทที่ทำจากเอธิลีนออคทีนโคพอลิเมอร์"* เลขที่คำขอ 0801003446 (วันที่ 4 กรกฎาคม 2551)

รางวัลที่ได้รับ (Awards)

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