

**EXTRUSION OF ADMICELLED NATURAL RUBBER  
FILLED WITH NANOMAGNETIC PARTICLES**



Nuttida Srirachya

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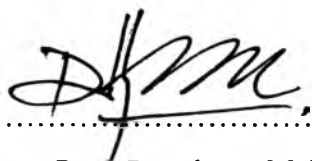
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**By:** Nuttida Srirachya  
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Assoc. Prof. Rathanawan Magaraphan


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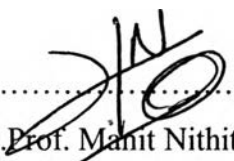
Accepted by the Petroleum and Petrochemical College, Chulalongkorn University, in partial fulfillment of the requirements for the Degree of Master of Science.

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

**Thesis Committee:**

  
.....  
(Dr. Thanyalak Chaisuwan)

  
.....  
(Assoc. Prof. Rathanawan Magaraphan)

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

  
.....  
(Asst. Prof. Wirunya Keawwattana)

## ABSTRACT

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Thin layers of polystyrene (PS) and poly(methyl methacrylate) (PMMA) are coated on natural rubber (NR) particles via admicellar polymerization using bilayers of cetyltrimethylammonium bromide (CTAB) as a reaction template. The obtained admicelled PS-NR and PMMA-NR are characterized by FTIR, SEM, OM, and TGA. From the FTIR study, the admicelled rubbers showed the characteristic peaks of polystyrene and poly(methyl methacrylate), which confirmed the existence of PS and PMMA after the polymerization. The OM and SEM micrographs revealed the even coating of PS and PMMA over latex particles and they showed the core-shell structure of PS, PMMA and NR. As seen in the result of TGA, the admicelled rubbers began to lose weight at higher temperature, compared to that of NR, and they also showed the shift of major decomposition of pure PS and PMMA to higher temperature. The DTG curves also demonstrated an increase of char yields of the admicelled rubbers. As PS and PMMA content increased, the residual content also increased. The admicelled magnetite showed the characteristic peaks of polystyrene, poly(methyl methacrylate) which confirmed the existence of PS and PMMA after the polymerization. The OM micrographs revealed the even coating of PS and PMMA over magnetite particles and they showed the core-shell structure of PS, PMMA and Magnetite particles.

## บทคัดย่อ

ณัฐริดา ศรีราชา: กระบวนการพอลิเมอร์ไรเซชันแบบแอ็ดไมเซลล์ของยางธรรมชาติผสมกับอนุภาคแม่เหล็กขนาดนาโน (Extrusion of Admicelled Natural Rubber Filled with Nanomagnetic Particles) อ. ที่ปรึกษา : ดร.ธัญญลักษณ์ ฉายสุวรรณ, รศ. ดร. รัตนวรรณ มกรพันธุ์ 100 หน้า

ฟิล์มบางของพอลิเมอร์ชนิดพอลิสไตรีน และพอลิเมทิลเมทาคริเลต เคลือบบนอนุภาคของยางธรรมชาติด้วยกระบวนการพอลิเมอร์ไรเซชันแบบแอ็ดไมเซลล่าโดยใช้ชั้นของสารลดแรงตึงผิวชนิดประจุบวก CTAB เป็นตัวช่วย โดยการทดลองนี้ได้ใช้เทคนิค FTIR, SEM, OM และ TGA ในการตรวจสอบความสมบูรณ์ของฟิล์มบางของพอลิเมอร์ที่เคลือบบนอนุภาคยางธรรมชาติ ผลการวิเคราะห์ด้วยเทคนิค FTIR ยืนยันการสังเคราะห์ได้จริงของกระบวนการแอ็ดไมเซลล่าด้วยเทคนิคนี้ จากการตรวจสอบด้วยกล้องจุลทรรศน์ชนิดส่องผ่านและชนิดมองด้วยตาเปล่าพบว่า อนุภาคยางธรรมชาติแต่ละอนุภาคถูกล้อมด้วยฟิล์มบางของพอลิสไตรีน และพอลิเมทิลเมทาคริเลต เช่นเดียวกับการวิเคราะห์ด้วยเทคนิค TGA พบว่าอุณหภูมิการสลายตัวของยางธรรมชาติที่สังเคราะห์ได้จะเพิ่มขึ้นตามความเข้มข้นของสไตรีนมอนอเมอร์ และเมทิลเมทาคริเลตมอนอเมอร์ที่ใช้ในการสังเคราะห์ และจากการเคลือบอนุภาคแม่เหล็กขนาดนาโนด้วยฟิล์มบางของพอลิสไตรีน และพอลิเมทิลเมทาคริเลต ยืนยันการทดสอบด้วยเทคนิค FTIR พบการมีอยู่ของพอลิสไตรีน และพอลิเมทิลเมทาคริเลต และการตรวจสอบด้วยกล้องจุลทรรศน์ชนิดมองด้วยตาเปล่า เห็นฟิล์มบางของพอลิเมอร์เคลือบบนแต่ละอนุภาคแม่เหล็กขนาดนาโนจึงยืนยันได้ว่าสามารถสังเคราะห์แผ่นฟิล์มบางของพอลิเมอร์เคลือบบนผิวของอนุภาคยางธรรมชาติ และอนุภาคแม่เหล็กขนาดนาโนได้

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