

**EFFECTS OF DIFFERENT NUCLEATING AGENTS ON  
CRYSTALLIZATION AND MELTING BEHAVIOR AND MECHANICAL  
PROPERTIES OF SYNDIOTACTIC POLYPROPYLENE**

Ms. Paninlada Charoenphol

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**By:** Paninlada Charoenphol  
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**Thesis Advisors:** Asst. Prof. Pitt Supaphol

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*K. Bunyakiat*  
..... College Director  
(Assoc. Prof. Kunchana Bunyakiat)

**Thesis Committee:**

*Pitt Supaphol*  
.....  
(Asst. Prof. Pitt Supaphol)

*Anuvat Sirivat*  
.....  
(Assoc. Prof. Anuvat Sirivat)

*Sujitra Wongkasemjit*  
.....  
(Assoc. Prof. Sujitra Wongkasemjit)

**ABSTRACT**

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The effects of various nucleating agents [e.g. 1,3:2,4-dibenzylidene sorbitol (DBS), 1,3:2,4-di-*p*-methylidibenzilidene sorbitol (MDBS), 1,3:2,4-di-*m,p*-methylbenzylidene sorbitol (DMDBS), kaolin, talcum, marl, titanium dioxide (TiO<sub>2</sub>), and silica (SiO<sub>2</sub>)] on non-isothermal melt-crystallization and subsequent melting behavior and mechanical properties of nucleated syndiotactic polypropylene (sPP) were investigated and compared with those of the neat sample. The analysis of the non-isothermal melt-crystallization exotherms reveals that the ability for these fillers in nucleating sPP could be ranked from the best to the worst as follows: DBS > talcum > MDBS > kaolin > SiO<sub>2</sub> > DMDBS > marl > TiO<sub>2</sub>. The analysis of the subsequent melting endotherms reveals that most of the sPP compounds exhibited double melting peaks, while only marl-filled sPP exhibited triple melting peaks. The wide-angle X-ray diffraction analysis shows that the addition of these fillers did not affect the modification of the sPP crystals. Mechanical property measurements reveal that both of the tensile strength and the percentage of elongation at yield for sPP compounds investigated are not much different from those of the neat sPP.

## บทคัดย่อ

ปณิตดา เจริญผล: การศึกษาผลของสารก่อผลึกชนิดต่าง ๆ ต่อพฤติกรรมการตกผลึกและการหลอมเหลว และสมบัติเชิงกลในซินดีโอแทคติกพอลิโพรพิลีน (Effects of Different Nucleating Agents on Crystallization and Melting Behavior and Mechanical Properties of Syndiotactic Polypropylene) อ.ที่ปรึกษา: ผศ. ดร.พิชญ์ สุภผล 78 หน้า ISBN 974-9651-62-6

ผลของสารก่อผลึกชนิดต่าง ๆ เช่น 1,3:2,4-ไดเบนซิลดีนซอบิทอล 1,3:2,4-ไดพาราเมทิลเบนซิลดีนซอบิทอล 1,3:2,4-ไดเมตาพาราเมทิลเบนซิลดีนซอบิทอล เกาลิน ทอลคัม มาร์ล ไททานเนียมไดออกไซด์และซิลิกาไดออกไซด์ต่อการตกผลึกแบบอณูหุมีไม่คงที่ พฤติกรรมการหลอมเหลวและสมบัติเชิงกลของซินดีโอแทคติกพอลิโพรพิลีน จากการศึกษาการตกผลึกแบบอณูหุมีไม่คงที่ สามารถเรียงลำดับความสามารถในการก่อผลึกของการก่อผลึกชนิดต่าง ๆ ได้ดังนี้ ไดเบนซิลดีนซอบิทอล > ทอลคัม > ไดพาราเมทิลเบนซิลดีนซอบิทอล > เกาลิน > ซิลิกาไดออกไซด์ > ไดเมตาพาราเมทิลเบนซิลดีนซอบิทอล > มาร์ล > ไททานเนียมไดออกไซด์ จากการศึกษาพฤติกรรมการหลอมเหลวของซินดีโอแทคติกพอลิโพรพิลีนที่ผสมด้วยสารก่อผลึกส่วนใหญ่พบพีคของการหลอมเหลว 2 พีค ในขณะที่ซินดีโอแทคติกพอลิโพรพิลีนที่ผสมด้วยมาร์ลพบพีคของการหลอมเหลว 3 พีค จากเทคนิค WAXD พบว่าการเติมสารก่อผลึกเหล่านี้ไม่ส่งผลกระทบต่อผลึกของซินดีโอแทคติกพอลิโพรพิลีน จากการศึกษาสมบัติทางเชิงกล เมื่อเปรียบเทียบความทนแรงดึงและเปอร์เซ็นต์ของระยะยืดจากจุดครากของซินดีโอแทคติกพอลิโพรพิลีนที่ผสมด้วยสารก่อผลึกเหล่านี้ กับซินดีโอแทคติกพอลิโพรพิลีนที่บริสุทธิ์พบความแตกต่างเพียงเล็กน้อย

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