

**TRIBOLOGICAL PROPERTIES OF PFMA-PMMA COPOLYMER
THIN FILMS**



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ABSTRACT

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The science and engineering of friction and wear involving polymer surfaces are not well understood. From various types of polymeric materials available, we investigated tribological properties of films made from copolymers of perfluoroalkylethyl methacrylate and methyl methacrylate monomers. 5wt% copolymer solutions were spun cast onto 1mm thick PMMA sheet substrates. The effects of monomer ratio and processing method on tribological properties were studied from contact angle measurements, and TE79 multi-axis tribology measurements. We found that there was an optimum ratio of FMA to MMA, in the range of $(1-5) \times 10^{-3}$, to attain a minimum kinetic friction coefficient. The results obtained are discussed in terms of proposed friction and wear mechanisms.

บทคัดย่อ

ยินดี ทองขุนคำ: สมบัติทางไทรบอโลยีของโคพอลิเมอร์เมทริล เมทอะไครเลตเปอร์ฟลูออโรอัลคิลเอทริล เมทอะไครเลต(Tribological Properties PFMA-PMMA Copolymer Thin Films) อ.ที่ปรึกษา: รศ. ดร. อนุวัฒน์ สิริวัฒน์ และ ศ. ดร. วิทโท บรรอสทาว 99 หน้า ISBN 974-03-1610-7

เนื่องด้วยในภาวะปัจจุบัน ความรู้ความเข้าใจในเชิงวิทยาศาสตร์และวิศวกรรมเกี่ยวกับสมบัติความเสียดทานและการสึกหรอของพอลิเมอร์ยังมีการศึกษากันน้อยมากเมื่อเทียบกับโลหะและเซรามิกซ์ ในการศึกษาครั้งนี้เป็นการมุ่งศึกษาโคพอลิเมอร์ของเมทริล เมทอะไครเลตและเปอร์ฟลูออโรอัลคิลเอทริล เมทอะไครเลต เพื่อนำไปใช้เป็นฟิล์มลดความเสียดทาน ชิ้นงานที่ใช้ในการทดสอบเป็นฟิล์มของสารละลายพอลิเมอร์ข้างต้นที่ความเข้มข้น 5%โดยน้ำหนักในตัวทำละลายโทลูอินฉาบบนแผ่นพอลิเมทริล เมทอะไครเลตที่มีความหนา 1 มิลลิเมตร โดยวิธีการฉาบด้วยเทคนิคการหมุนด้วยความเร็วสูง สมบัติที่ศึกษาได้แก่ มุมสัมผัส พลังงานผิว สัมประสิทธิ์ความเสียดทาน และสมบัติการสึกหรอ โดยใช้เครื่องทดสอบสมบัติการสึกหรอ จากการศึกษาพบว่าสัดส่วนของเปอร์ฟลูออโรอัลคิลเอทริล เมทอะไครเลตต่อเมทริล เมทอะไครเลต ที่เหมาะสมที่แสดงค่าสัมประสิทธิ์ความเสียดทานต่ำสุดอยู่ในช่วง $(1-5) \times 10^{-3}$ นอกจากนี้การอภิปรายเพื่อหาเหตุผลอธิบายการเกิดการเสียดทานและการสึกหรอประกอบเอกสารอ้างอิงได้นำมากล่าวไว้ ณ ที่นี้ด้วย

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