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**MECHANICAL PROPERTIES OF CALCINED BONE ASH  
REINFORCED POLYETHYLENE COMPOSITES**

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พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ที่เชียงใหม่ที่เชียงใหม่



วิมลรัตน์ ศรีจรัสสี : สมบัติเชิงกลของวัสดุเชิงประกอบพอลิเอทิลีนเสริมแรงด้วยเถ้ากระดูกเผา  
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งานวิจัยนี้มุ่งประสงค์เพื่อศึกษาสมบัติเชิงกลของวัสดุเชิงประกอบพอลิเอทิลีนเสริมแรงด้วยเถ้ากระดูกเผาที่อัตราส่วนโดยปริมาตรต่างจากกันจนถึง 0.50 และนับเป็นการบุกเบิกวัสดุเชิงประกอบที่สามารถทดแทนกระดูกได้ สมบัติเชิงกลที่ศึกษาได้แก่ โมดูลัสของยัง ความทนแรงดึง ความเหนียวที่จุดแตกหัก ความทนแรงคดโค้งและความแข็ง เปรียบเทียบผลการวิจัยกับแบบจำลองทฤษฎีที่เกี่ยวข้อง และใช้กล้องจุลทรรศน์อิเล็กตรอนแบบสแกน ศึกษาพื้นฐานของทั้งสองเฟส การกระจายตัวของเถ้ากระดูกเผาในเนื้อพอลิเอทิลีน และผิวการแตกหักของวัสดุเชิงประกอบ

จากการศึกษาพบว่า ค่าโมดูลัสของยังเพิ่มขึ้นเมื่อเพิ่มอัตราส่วนโดยปริมาตรของเถ้ากระดูกเผา แต่ในขณะเดียวกันความทนแรงดึงและความเหนียวที่จุดแตกหักกลับลดลง ผลของสมบัติเชิงกลสามารถเปรียบเทียบกันทฤษฎีบางชุดได้ ส่วนค่าความแข็งของชิ้นงานเพิ่มขึ้น เมื่ออัตราส่วนโดยปริมาตรของเถ้ากระดูกเผาเพิ่มขึ้น และพบว่า ค่านี้เป็นตัวทำนายค่าโมดูลัสของยังของวัสดุเชิงประกอบได้ดี ผลของกล้องจุลทรรศน์อิเล็กตรอนแบบสแกน แสดงให้เห็นว่า การเสียรูปทางพลาสติก มีอิทธิพลมากปริมาณของเถ้ากระดูกเผา ดังนั้น การวิเคราะห์การแตกหักที่อัตราส่วนโดยปริมาตรเพิ่มขึ้น จึงเปลี่ยนจากลักษณะเปราะเป็นเปราะ

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ลายมือชื่ออาจารย์ที่ปรึกษา.....  
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WIMONRAT SRICHARUSSIN : MECHANICAL PROPERTIES OF CALCINED BONE ASH  
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The mechanical properties of calcined bone ash reinforced polyethylene composite at various volume fractions up to 0.50 was investigated. Such composites have been pioneered as analogue materials for cortical bone replacement. The dependence of the Young's modulus, tensile strength, strain to failure, flexural strength and hardness on the amount of filler was presented. The experimental results were compared with a few theoretical model predictions to explore the validity of the models at high filler loading. Scanning electron microscope was used to examine the morphology of the two phases, the dispersion of calcined bone ash in polyethylene matrix and the fracture surface of them.

The results show that the Young's modulus increases with an increase in calcined bone ash volume fraction, whereas the tensile strength and strain to failure decrease over the same range. The theoretical models have been examined for fit to the experimental data. At the same time, microhardness test increases with increasing calcined bone ash content and then it is a good predictor for Young's modulus of the composite. Microscopic method reveals that plastic deformation is strongly influenced by the amount of calcined bone ash content. Hence, failure analysis changes from ductile to brittle mode.

ภาควิชา.....วัสดุศาสตร์.....      ลายมือชื่อนิสิต *Wimourat Sricharussin*  
สาขาวิชาวิทยาศาสตร์พอลิเมอร์ประยุกต์และเทคโนโลยีโพลายเมอร์ที่ปรึกษา *Khemchai Hemachandra*  
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