

**SISAL FIBER-REINFORCED POLYBENZOXAZINE/EPOXY  
COMPOSITES**

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## ABSTRACT

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The diamine-based benzoxazine monomer was synthesized and characterized. Sisal fibers were incorporated in benzoxazine/epoxy resin which was later cured to form a unidirectional reinforced composite. The effects of varying fiber contents and resin composition on the mechanical properties of the composites were studied. Surface modifications of the sisal fiber were carried out using sodium hydroxide, glycidoxypropyltrimethoxysilane and aminopropyltrimethoxysilane. The surface treatments lead to changes in morphology, chemical groups and hydrophilicity of fibers. The effect of fiber surface treatment on interfacial adhesion and mechanical properties of composites was also studied.

## บทคัดย่อ

นางสาวสุชาดา ตระกูลวิเชียร : พอลิเบนซอกซาซีน/อีพอกซีคอมพอสิตที่เสริมแรงด้วยเส้นใยป่านารายณ์ (Sisal Fiber-Reinforced Polybenzoxazine/Epoxy Composites) อ. ที่ปรึกษา : รศ.ดร.นันทยา ยานุกเมส และ ศ.ดร.ฮัทชีโอะ อิชิคะ 61 หน้า ISBN 974-9937-24-4

มอนอเมอร์ของเบนซอกซาซีนได้ถูกสังเคราะห์จากปฏิกิริยาแมนนิชของเอริทีนไดเอมีน ฟีนอลกับฟอร์มัลดีไฮด์ จากนั้นจึงนำมาศึกษาโครงสร้างทางเคมีและคุณสมบัติทางความร้อน เส้นใยป่านารายณ์ถูกนำมาใช้ร่วมกับเบนซอกซาซีน/อีพอกซีเรซินเพื่อสร้างวัสดุคอมพอสิต ซึ่งมีการเสริมแรงในทิศทางเดียว อิทธิพลของปริมาณเส้นใยและสัดส่วนของเรซินต่อคุณสมบัติเชิงกลของคอมพอสิตได้ถูกศึกษา เส้นใยป่านารายณ์ได้รับการปรับปรุงพื้นผิวด้วยไซเดียมไฮดรอกไซด์ กลัยซิโดอกซีโพรพิลไตรเมทอกซีไซเลนและอะมิโนโพรพิลไตรเมทอกซีไซเลน ซึ่งนำไปสู่การเปลี่ยนแปลงของลักษณะพื้นผิว โครงสร้างทางเคมี และไฮโดรฟิลิซิตีของเส้นใย ผลกระทบของการปรับปรุงพื้นผิวของเส้นใยต่อการยึดติดระหว่างเส้นใยกับเมทริกซ์และคุณสมบัติเชิงกลของคอมพอสิตได้รับการศึกษา

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## ABBREVIATIONS

ASTM	American Standard Testing Method
$\gamma$ -APS	$\gamma$ -Aminopropyltrimethoxysilane
ATR	Attenuated Total Reflection
DSC	Differential Scanning Calorimetry
FTIR	Fourier Transform Infrared Spectrometer
$\gamma$ -GPS	$\gamma$ -Glycidoxypropyltrimethoxysilane
NMR	Nuclear Magnetic Resonance Spectrometer
SEM	Scanning Electron Microscope
TGA	Thermogravimetric Analysis