

**PREPARATION AND CHARACTERIZATION OF CHITOSAN, CM-  
CHITIN, AND CM-CHITOSAN SCAFFOLDS BY USING FREEZE-DRYING  
TECHNIQUE**



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## บทคัดย่อ

ลัดดาวัลย์ ลักษณะภรณ์: การเตรียมและการวิเคราะห์คุณสมบัติของวัสดุเพาะเซลล์จากไคโตแซน ซีเอ็ม-ไคตินและซีเอ็ม-ไคโตแซน ด้วยเทคนิคฟรีซดรายอิง (Preparation and Characterization of chitosan, CM-chitin and CM-chitosan by Using Freeze-drying Technique) อ.ที่ปรึกษา: ผศ. ดร. รัตนา รุจิรวนิช ดร. วนิตา จันทร์วิภูถ และ ศ. ดร. เซอิชิ โทคุระ 98 หน้า ISBN 974-9651-55-3

วัสดุเพาะเซลล์ที่มีรูพรุนของไคโตแซน ซีเอ็ม-ไคตินและซีเอ็ม-ไคโตแซนถูกขึ้นรูปโดยเทคนิคฟรีซดรายอิง หลังจากนั้นใช้วิธีอบไอน้ำในออดิเคลฟเพื่อให้เกิดการเชื่อมโยง ในงานวิจัยนี้ได้ทำการศึกษาถึงผลของอุณหภูมิการอบไอน้ำที่มีผลต่อการเชื่อมโยงของโพลิเมอร์ นอกจากนี้ได้ทำการศึกษาพฤติกรรมการบวมตัว สมบัติเชิงกล และลักษณะของวัสดุเพาะเซลล์ที่อบไอน้ำจากการศึกษาการเปลี่ยนแปลงทางโครงสร้างทางเคมีของวัสดุเพาะเซลล์ที่อบไอน้ำโดยใช้ FT-IR สเปกโตรสโคปี พบว่าหลังจากการอบไอน้ำมีการลดลงของหมู่อะมิโน อาจเนื่องมาจากหมู่อะมิโนของไคโตแซนและอนุพันธ์ของไคโตแซนมีส่วนเกี่ยวข้องในการเกิดการเชื่อมโยง จากการลดความสามารถในการละลายของวัสดุเพาะเซลล์ที่อบไอน้ำทำให้คาดว่า การอบไอน้ำในออดิเคลฟทำให้เกิดการเชื่อมโยงเกิดขึ้น นอกจากนี้พบว่าเปอร์เซ็นต์ของน้ำหนักที่สูญหาย และอัตราการบวมตัวของวัสดุเพาะเซลล์ที่อบไอน้ำขึ้นกับอุณหภูมิการอบไอน้ำ จากการศึกษาโดยใช้กล้องสแกนนิ่งอิเล็กตรอนไมโครสโคป (Scanning Electron Microscope) พบว่าลักษณะของวัสดุเพาะเซลล์ที่ไม่ได้ผ่านการอบไอน้ำและผ่านการอบไอน้ำมีรูแบบเปิดและมีรูปร่างเป็นแท่ง

## ABSTRACT

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Porous scaffolds of chitosan, carboxymethylchitin (CM-chitin), and carboxymethylchitosan (CM-chitosan) were fabricated via freeze-drying technique and further crosslinked by steam treatment in an autoclave. The effect of steaming temperatures on crosslinking of the polymers was investigated. The degrees of swelling, mechanical properties, and morphology of the steamed scaffolds were evaluated. The changes in chemical structures of the scaffolds after steam treatment were observed by FT-IR spectroscopy. The reduction in the number of amino groups observed by FTIR implied that amino groups of chitosan and its derivatives involved in crosslinking reactions during steam treatment. Steam treatment of the scaffolds resulted in decreasing of solubility of the scaffolds, indicating the formation of crosslinking by steam treatment. The percentage of weight loss and the degree of swelling of the steamed scaffolds depended on steaming temperatures. The pore structures of the scaffolds with and without steam treatment were open pore and columnar shape along the vertical direction.

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