

**PREPARATION AND CHARACTERIZATION OF MICROWAVE-
TREATED CARBOXYMETHYL CHITIN AND MICROWAVE-TREATED
CARBOXYMETHYL CHITOSAN FILMS FOR POSSIBLE USE IN WOUND
CARE APPLICATIONS**

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ABSTRACT

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Carboxymethyl chitin (CM-chitin) and carboxymethyl chitosan (CM-chitosan) films were successfully crosslinked by microwave treatment. Crosslinking of the microwave-treated CM-chitin films involved mainly the carboxylate and the secondary alcohol groups, while crosslinking of microwave-treated CM-chitosan films involved the carboxylate and the amino groups. In addition, the crystallinity of CM-chitin increased with increasing microwave treatment time, whereas the increase in the crystallinity of the microwave-treated CM-chitosan films was not observed. At a similar percentage of weight loss, the crosslinking of either CM-chitin or CM-chitosan films by microwave treatment required much less stringent condition when compared with the crosslinking by autoclave treatment. Based on both direct and indirect cytotoxicity assays, the cytotoxicity of the microwave treated CM-chitin films was negative, while that of the microwave-treated CM-chitosan films was positive. Human fibroblast cells adhered on the surface of microwave-treated CM-chitosan films much better than on the surface of microwave-treated CM-chitin films.

บทคัดย่อ

ปัญหา: วงศ์พานิช: การเตรียมและวิเคราะห์คุณสมบัติของคาร์บอกซีเมทิลทิวไคตินและคาร์บอกซีเมทิลทิวไคโตซานฟิล์มที่ผ่านการให้ความร้อนด้วยเครื่องไมโครเวฟเพื่อศึกษาความเป็นไปได้ในการนำมาใช้เป็นผลิตภัณฑ์เพื่อการรักษาบาดแผล (Preparation and characterization of microwave-treated carboxymethyl chitin and microwave-treated carboxymethyl chitosan films for possible use in wound care applications) อ. ที่ปรึกษา : ผศ.ดร. รัตนา รุจิรวนิช และ ศ.ดร. เซอิจิ โทะคุระ 76 หน้า ISBN 974-993-718-10

ซีเอ็มไคตินและซีเอ็มไคโตซานสามารถเชื่อมโยงได้ด้วยการผ่านความร้อนด้วยเครื่องไมโครเวฟ การเชื่อมโยงของซีเอ็มไคตินเกิดจากหมู่ไฮดรอกซีและหมู่คาร์บอกซีเลท ในขณะที่ซีเอ็มไคโตซานเกิดจากหมู่เอมีโนกับหมู่คาร์บอกซีเลท เปอร์เซ็นต์การเสียน้ำหนักและการบวมตัวในน้ำของซีเอ็มไคตินและซีเอ็มไคโตซานฟิล์มลดลงเมื่ออุณหภูมิและเวลาในการอบฟิล์มด้วยไมโครเวฟนานขึ้น และยังพบอีกว่า ปริมาณผลึกของซีเอ็มไคตินนั้นเพิ่มขึ้นตามเวลาในการผ่านความร้อนที่นานขึ้น แต่ในกรณีของซีเอ็มไคโตซาน ไม่สามารถสังเกตการเพิ่มขึ้นทางความเป็นผลึกได้อย่างชัดเจน ที่ค่าเปอร์เซ็นต์การเสียน้ำหนักเท่ากัน เครื่องไมโครเวฟใช้เวลาในการให้ความร้อนกับฟิล์มต่ำกว่าเครื่องอบความร้อนสูงด้วยไอน้ำ ผลจากการทดสอบความเป็นพิษต่อเซลล์ทั้งแบบทางตรงและทางอ้อม ซีเอ็มไคตินหลังจากผ่านการให้ความร้อนด้วยไมโครเวฟไม่พบว่าเป็นพิษต่อเซลล์ แต่กรณีของซีเอ็มไคโตซานที่ผ่านการให้ความร้อนด้วยไมโครเวฟพบว่ามีความเป็นพิษต่อเซลล์ เซลล์สามารถเกาะลงบนผิวของซีเอ็มไคโตซานที่ผ่านการให้ความร้อนด้วยไมโครเวฟได้ดีกว่าซีเอ็มไคตินที่ผ่านความร้อนด้วยไมโครเวฟที่สภาวะเดียวกัน

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