

**PREPARATION AND CHARACTERIZATION OF COCONUT
OIL-INCORPORATED SILK FIBROIN WOUND DRESSING**

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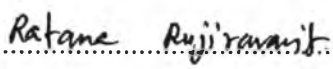
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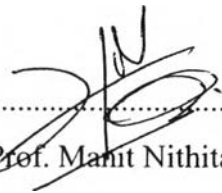
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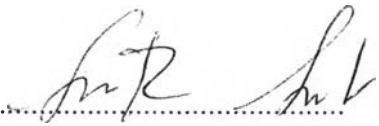

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ABSTRACT

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Jenjira Klinkajorn: Preparation and Characterization of
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Silk fibroin (SF) is an interesting biopolymer for wound care application because of its properties that can provide a moist environment for a wound, resulting in a better wound healing. However, silk fibroin itself has no antimicrobial activity to prevent the wound from infection. Accordingly, in this study, coconut oil (CCO) was incorporated into the silk fibroin sheet in order to attain a silk fibroin-based wound dressing possessing antimicrobial activity. Due to the immiscibility between a silk fibroin aqueous solution and coconut oil, a Pluronic F68 surfactant was mixed with the two components so that an oil-in-water emulsion was obtained. After drying in air, followed by drying under vacuum, a fibroin sheet was obtained. The optimum concentration of a surfactant, Pluronic F68 was determined. It was found that homogeneous sheets were formed when the surfactant content was 18 % (w/v). The sheets were further coated with silk fibroin by dipping them in the aqueous fibroin solution. Silk coating was important to sustain the oil release from the coated sheet for controlling the release rate. The coated oil-incorporated fibroin sheet was found to have the ability to control wound exudates. Incorporation of the coconut oil within the silk fibroin sheets imparted antimicrobial activity against *Escherichia coli* and *Staphylococcus aureus* which rendered the sheets an effective wound dressing material.

บทคัดย่อ

เจนจิรา กลิ่นขจร : การเตรียมและการวิเคราะห์คุณสมบัติของวัสดุปิดแผลจากไหมไฟโบรอิน โดยมีน้ำมันมะพร้าวเป็นส่วนผสม(Preparation and Characterization of Coconut oil-incorporated Silk Fibroin Wound Dressing) อ. ที่ปรึกษา : รศ. ดร. รัตนา รุจิรวานิช และ ศ. ดร. อีโรชิ ทามูระ

ไหมไฟโบรอินเป็นวัสดุพอลิเมอร์ชีวภาพที่น่าสนใจชนิดหนึ่ง สำหรับการนำมาใช้เพื่อการรักษาแผล เนื่องจากไหมไฟโบรอินสามารถควบคุมความชุ่มชื้นของแผลได้ ซึ่งเป็นสมบัติที่ส่งผลดีต่อรักษาแผล แต่อย่างไรก็ตามไหมไฟโบรอินไม่มีคุณสมบัติในการต้านเชื้อแบคทีเรียเพื่อป้องกันการอักเสบของแผล ดังนั้นในงานวิจัยนี้จึงได้ผสมน้ำมันมะพร้าวลงในไหมไฟโบรอิน เพื่อเพิ่มคุณสมบัติในการต้านเชื้อแบคทีเรีย แต่เนื่องจากความไม่เข้ากันระหว่างน้ำมันมะพร้าวและไหมไฟโบรอิน ดังนั้นจึงต้องเติม Pluronic f68 ซึ่งเป็นสารลดแรงตึงผิวเพื่อช่วยในผสมน้ำมันมะพร้าวลงในไหมไฟโบรอินในรูปอิมัลชัน และนำไปขึ้นรูปเป็นแผ่นโดยการทำให้แห้งภายใต้สภาวะสุญญากาศ ซึ่งพบว่าสารลดแรงตึงผิว Pluronic f68 18% โดยน้ำหนักต่อปริมาณของสารละลายอิมัลชันทั้งหมดเป็นปริมาณที่เหมาะสมในการเตรียมแผ่นอิมัลชันของไหมไฟโบรอินและน้ำมันมะพร้าว ที่มีความสามารถในการดูดซับน้ำได้ถึงประมาณ 40% ซึ่งแสดงให้เห็นถึงประสิทธิภาพในการดูดซับเลือดและน้ำหนองจากแผล นอกจากนี้ยังพบอีกว่าการเคลือบแผ่นอิมัลชันของไหมไฟโบรอินและน้ำมันมะพร้าวด้วยไหมไฟโบรอิน โดยการจุ่มในสารละลายของไหมไฟโบรอินจะช่วยเพิ่มความสามารถในการควบคุมการปล่อยของน้ำมันมะพร้าวที่มีความสามารถในการยับยั้งเชื้อแบคทีเรียทั้งชนิด *Escherichia coli* และ *Staphylococcus aureus* ซึ่งแสดงให้เห็นถึงประสิทธิภาพที่ดีในการใช้วัสดุชนิดนี้เป็นวัสดุปิดแผล

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