

**PREPARATION AND CHARACTERIZATION OF CELLULOSE WHISKER/
CHITIN WHISKER/ SILK SERICIN BIONANOCOMPOSITE SPONGES
FOR WOUND DRESSING APPLICATION**

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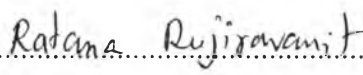
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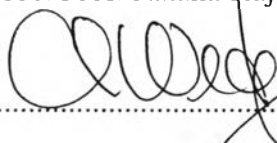
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Thesis Advisors: Assoc. Prof. Ratana Rujiravanit
Prof. Christoph Weder


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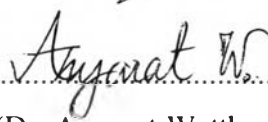

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ABSTRACT

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Pimnattha Ang-atikarnkul: Preparation and Characterization of Cellulose whisker/ Chitin Whisker/ Silk Sericin Bionanocomposite Sponges for Wound Dressing Application.

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A new dressing material composing of biopolymers derived from abundant natural resources found in Thailand was prepared. The material is in the form of a sponge composing of nanofibers of cellulose and chitin (which are referred to as “cellulose whisker” and “chitin whisker”), and sericin. Sericin — a glue protein found in silk cocoons — has several beneficial properties for wound care, such as good skin moisturizing-ability, antioxidant, and antimicrobial properties. However, pure sericin is generally difficult to be fabricated due to its weak structural properties. This limitation of sericin was solved by using cellulose whisker as a support material according to their nanofibrillar structure with a high aspect ratio. Chitin whisker was chosen as another component because of its ability to promote tissue repair of wound. The cellulose whisker/chitin whisker/sericin sponges were characterized for their chemical integrity and morphology. Consequently, their wound healing potential abilities were evaluated in term of sericin releasing.

บทคัดย่อ

พิมพ์ฉันทนา อังโศติกานต์กุล : การเตรียมและวิเคราะห์คุณสมบัติของแผ่นปิดแผลคอมโพสิตเซลลูโลสวิสเกอร์/ไคตินวิสเกอร์/เซริซิน (Preparation and Characterization of Cellulose Whisker/ Chitin Whisker/ Silk Sericin Bionanocomposite Sponges for Wound Dressing Application) อ. ที่ปรึกษา : รศ. ดร. รัตนา รุจิรวนิช และ ศ. ดร. คริสโตพท์ เวเดอร์ 106 หน้า

ปัจจุบันการคิดค้นและพัฒนาผลิตภัณฑ์ต่างๆ จำเป็นต้องคำนึงถึงผลกระทบต่อสิ่งแวดล้อมให้มากพอกับคุณภาพของผลิตภัณฑ์ เนื่องจากทั่วโลกให้ความสำคัญกับปัญหาสิ่งแวดล้อมเป็นอย่างมาก วัตถุประสงค์และกระบวนการผลิตที่ใช้จึงควรส่งผลกระทบต่อสิ่งแวดล้อมและก่อให้เกิดของเสียน้อยที่สุด งานวิจัยนี้ได้นำแนวคิดนี้มาปฏิบัติ โดยการเลือกใช้วัตถุดิบจากธรรมชาติ ได้แก่ เซริซินจากรังไหม ไคตินจากเปลือกกุ้ง และเซลลูโลสจากกล้วย เพื่อผลิตแผ่นปิดแผลที่มีประสิทธิภาพ เซริซินเป็นกาวไหม ซึ่งมีคุณสมบัติที่สำคัญต่อการสมานแผล ได้แก่ ให้ความชุ่มชื้น ด้านสารอนุมูลอิสระ, ด้านการเจริญเติบโตของเชื้อแบคทีเรีย อย่างไรก็ตามเซริซินเป็นสารประเภทโปรตีนที่มีน้ำหนักโมเลกุลต่ำ จึงทำให้ขึ้นรูปได้ยาก การนำไปใช้งานในการผลิตวัสดุทางการแพทย์จึงไม่กว้างขวางนัก งานวิจัยนี้จึงใช้เส้นใยนาโนของเซลลูโลส หรือ เซลลูโลสวิสเกอร์ (Cellulose whisker) มาเป็นวัสดุโครงร่างเพื่อช่วยในการขึ้นรูป (Supported material) นอกจากนั้นยังเพิ่มประสิทธิภาพในการสมานแผลโดยการเติมเส้นใยนาโนของไคติน หรือ ไคตินวิสเกอร์ (Chitin whisker) ร่วมด้วย โดยวิเคราะห์โครงสร้างทางเคมี, สัณฐานวิทยา และประสิทธิภาพในการใช้งานเป็นแผ่นปิดแผล ได้แก่ ความสามารถในการปลดปล่อยเซริซิน (Sericin releasing)

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