

**PREPARATION OF NATURAL RUBBER-COATED BANANA
CELLULOSE-BASED SHEET BY DBD PLASMA TREATMENT FOR
WATER RESISTANCE IMPROVEMENT**

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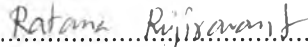
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ABSTRACT

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In recent years, there has been much research conducted for the development of plant-based polymeric alternatives to petroleum-based products. Natural rubber is promising due to its outstanding properties such as water repellency, elasticity, toughness, impermeability, adhesiveness, and electrical resistance. In this work, natural rubber was used as a surface coating on cellulose sheet prepared from banana cellulose pulp in order to obtain eco-friendly cellulose products with improved water resistance. The fabrication of natural rubber-coated banana cellulose-based sheet was accomplished with the aid of dielectric barrier discharge (DBD) plasma treatment in order to enhance the coating ability of natural rubber on the fiber surface. The results showed that the surface hydrophilicity of cellulose sheet was increased after DBD plasma treatment due to the increase of oxygen-containing functional groups on the plasma-treated cellulose surface. The optimum DBD plasma treatment time was 30 s. The plasma-treated cellulose-based sheet was further immersed in natural rubber solution. The water contact angle could be increased from 55.7° in the case of untreated cellulose sheet up to 79.4° for the natural rubber-coated cellulose-based sheet. In addition, SEM micrographs also revealed coating of natural rubber on fiber surface.

บทคัดย่อ

ชณิกาญจน์ แซ่ลิ้ม : การเคลือบยางธรรมชาติบนพื้นผิวแผ่นเซลลูโลสจากต้นกล้วยที่ถูกดัดแปลงด้วยเทคนิคพลาสมาแบบไดอิเล็กทริกแบริเออร์ดีสชาร์จ เพื่อเพิ่มสมบัติการต้านทานน้ำ (Preparation of Natural Rubber-coated Banana Cellulose-based sheet by DBD Plasma Treatment for Water Resistance Improvement) อาจารย์ที่ปรึกษา : รศ. ดร.รัตนา รุจิรวนิจ 64 หน้า

ในงานวิจัยนี้ได้ทำการเคลือบยางธรรมชาติบนพื้นผิวของแผ่นเซลลูโลสจากต้นกล้วยที่ถูกดัดแปลงด้วยเทคนิคพลาสมาแบบไดอิเล็กทริกแบริเออร์ดีสชาร์จ พบว่าคุณสมบัติในการดูดซับน้ำ (Hydrophilicity) บนพื้นผิวมีมากขึ้นหลังจากแผ่นเซลลูโลสผ่านพลาสมา เนื่องจากพลาสมาทำให้เกิดหมู่ฟังก์ชันที่มีขั้ว เช่น C-OH, C=O, และ O-C=O บนพื้นผิวของแผ่นเซลลูโลส เวลาที่เหมาะสมสำหรับการใช้พลาสมาในการปรับปรุงพื้นผิวของแผ่นเซลลูโลสอยู่ที่ 30 วินาที หลังจากนั้นแผ่นเซลลูโลสที่ถูกปรับปรุงพื้นผิวด้วยพลาสมาจะนำไปใส่ลงในสารละลายยางธรรมชาติที่ละลายอยู่ในโทลูอีน พบว่าค่ามุมสัมผัสของน้ำบนผิวของแผ่นเซลลูโลสที่ถูกปรับปรุงพื้นผิวด้วยไดอิเล็กทริกแบริเออร์ดีสชาร์จและเคลือบด้วยยางธรรมชาติมีค่าเพิ่มขึ้นจาก 55.7° เป็น 79.4° นอกจากนี้ภาพจากกล้องจุลทรรศน์อิเล็กตรอนแบบสแกนยังแสดงให้เห็นการเคลือบของยางธรรมชาติบนพื้นผิวของเส้นใยเซลลูโลส

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