

**DEVELOPMENT OF POLYANILINE/METTALIC NANOPARTICLES
HYBRID FILM FOR FOOD PACKAGING SENSORS**

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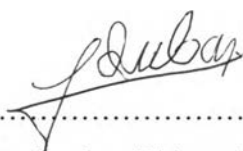
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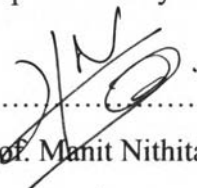


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ABSTRACT

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Optical sensor films were prepared by the layer-by-layer (lbl) self-assembly of polycationic (poly(diallyldimethylammonium chloride) (PDADMAC) and metallic nanoparticle modified with water-soluble polyaniline (Ag-PANI) or PDADMAC and PANI. The metallic nanoparticles were prepared by chemical reduction of silver nitrate by sodium borohydride in the presence of various concentrations of water-soluble polyaniline. Three types of copolymers having different ratios of sulfonic to carboxylic acid groups were used in the interfacial polymerization of aniline to produce three kinds of water-soluble PANI used as capping agent of the silver nanoparticles. The optical and electrical properties of polyaniline and the silver nanoparticle solution as well as the thin film assembly were measured by ultra violet spectroscopy (UV). The three kinds of copolymers led to the formation of PANI, thus having different characteristics of water-soluble PANI to stabilize the silver nanoparticles in solution. The optical properties and conductivity of the films were sensitive to pH change when exposed to acidic and basic compounds. These films could be used as optical sensors for food quality.

บทคัดย่อ

นางสาว นันทพร จิวพิทักษ์จร : การพัฒนาอุปกรณ์ส่งสัญญาณที่ไวต่อก๊าซหรือสารเคมีสำหรับบรรจุภัณฑ์อาหารโดยใช้พอลิอนิลินและโลหะอนุภาคนาโนในการประดิษฐ์เป็นฟิล์ม (Development of Polyaniline/Metallic Nanoparticles Hybrid Films for Food Packaging Sensors) อาจารย์ที่ปรึกษา : ดร. สเดฟาน เทียรี ดูบาส 97 หน้า

พอลิเมอร์นำไฟฟ้าสามารถนำไปใช้ได้หลากหลายรูปแบบ เช่น อุปกรณ์แปลงพลังงานแสงอาทิตย์เป็นพลังงานไฟฟ้า อุปกรณ์ส่งสัญญาณที่ไวต่อก๊าซหรือสารเคมีหรือเซนเซอร์ และอีกมากมาย ในการศึกษาครั้งนี้ใช้พอลิเมอร์ไฟฟ้าเป็นเซนเซอร์สำหรับบรรจุภัณฑ์อาหารในรูปแบบฟิล์มบางด้วยเทคนิคการทำเป็นชั้นๆ เมื่ออาหารเริ่มเน่าและปลดปล่อยก๊าซ เช่น ปลายปล่อยก๊าซแอมโมเนียเนื่องจากใช้เวลานานในการขนส่งนาน เซนเซอร์จะเปลี่ยนสีของฟิล์ม พอลิอนิลินเป็นหนึ่งในพอลิเมอร์นำไฟฟ้าที่นิยมนำมาทำเป็นเซนเซอร์ อีกทั้งยังสามารถปรับปรุงค่าการนำไฟฟ้าได้ด้วยการนำไปสังเคราะห์ต่อเป็นโลหะอนุภาคนาโนซึ่งเตรียมจากพอลิอนิลิน โดยทำหน้าที่เป็นตัวค้ำจุนที่ได้จากวิธีอินเตอร์เฟเชียลพอลิเมอร์โรเซชันเพื่อนำมาทำเป็นฟิล์ม การทำฟิล์มคอลลอยด์หลายชั้นสามารถทำได้โดยการทำเป็นชั้นๆ สลับกันระหว่างไอออนบวกและไอออนลบ วิธีนี้เป็นวิธีที่น่าสนใจในการทำฟิล์มเนื่องจากสามารถควบคุมปริมาณและโครงสร้างได้ ฟิล์มที่ได้นำไปสังเคราะห์ด้วยเทคนิคยูวีสเปกโตรสโกปีและเพื่อยืนยันการผสมพอลิอนิลินและโลหะอนุภาคนาโนตรวจสอบด้วยกล้องจุลทรรศน์อิเล็กตรอน

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