

**ELECTROSPUN POLYDIPHENYLAMINE-POLYETHYLENE OXIDE AS A  
METHANOL SENSOR MATERIAL**



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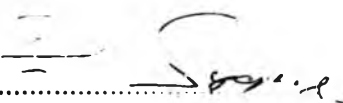
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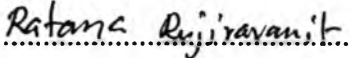
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## ABSTRACT

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Polydiphenylamine (or PDPA) possesses excellent properties: e.g., robustness, relatively inexpensive for a monomer, thermal stability, environmental stability, and stability in a larger pH range. Due to these properties, PDPA is a candidate for unique sensory material. The sensitivity of chemical gas sensors is strongly affected by the specific surface area of the sensing materials. A higher specific surface area of a sensing material leads to a higher sensor sensitivity. This work aims to investigate the electrical sensitivity of PDPA pellets and PDPA fibers when they are exposed to methanol vapor. The Dedoped-PDPA (De-PDPA) pellets were doped with HCl acid at various doping ratios: 1:1, 10:1, 100:1, and 200:1. PDPA in its blends with PEO at various ratios was also fabricated into fibers by electrospinning. The De-PDPA pellets that had been doped at the ratio of 100 showed the highest electrical sensitivity toward methanol vapor. The electrical sensitivity of the PDPA fibers is relatively low with increasing the amount of PEO when exposed to methanol vapor.

## บทคัดย่อ

ชราภรณ์ เพิ่มพูล : การศึกษาความตอบสนองทางไฟฟ้าของเส้นใยของพอลิไคฟีนิลเอมีน-พอลิเอทรีลีนออกไซด์เพื่อใช้ในการตรวจวัดไอของเมทานอล (Electrospun Polydiphenylamine-Polyethylene Oxide as Methanol Sensor) อ. ที่ปรึกษา : รศ. ดร. อนุวัฒน์ ศิริวัฒน์ และ ศ. ดร. พิชญ์ สุภผล 83 หน้า

พอลิไคฟีนิลเอมีนเป็นพอลิเมอร์นำไฟฟ้าที่มีหลายคุณสมบัติเด่น เช่น มีความแข็งแรง ทนทาน มอนอเมอร์มีราคาถูก สามารถทนต่ออุณหภูมิ สภาพแวดล้อม และ ความเป็นกรด-เบสได้ดี จากคุณสมบัติที่กล่าวมาทำให้พอลิไคฟีนิลเอมีนเป็นพอลิเมอร์ที่สามารถใช้เป็นวัสดุในการตรวจจับสารเคมีที่มีความเป็นพิษต่างๆ ซึ่งพื้นที่ผิวของวัสดุมีผลกระทบต่อความไวในการตรวจวัดระดับของสารเคมี วัสดุที่มีพื้นที่ผิวมากส่งผลให้วัสดุมีความไวต่อสารเคมีมากขึ้น จุดประสงค์ของงานวิจัยนี้ คือ ศึกษาคุณสมบัติการตอบสนองทางไฟฟ้าของแผ่นและเส้นใยพอลิไคฟีนิลเอมีนเมื่อสัมผัสกับไอของเมทานอล แผ่นพอลิไคฟีนิลเอมีนถูกกระตุ้นค่าการนำไฟฟ้าโดยใส่กรดไฮโดรคลอริกลงในหลายอัตราส่วน คือ ไฮโดรคลอริก 1, 10, 100 และ 200 เท่าของพอลิไคฟีนิลเอมีน พอลิไคฟีนิลเอมีนถูกทำให้เป็นเส้นใยด้วยกระบวนการปั่นเส้นใยด้วยไฟฟ้าสถิต โดยต้องผสมพอลิเอทรีลีนออกไซด์ลงไปเพื่อเพิ่มความเหนียวให้เหมาะสม แผ่นพอลิไคฟีนิลเอมีนที่ถูกกระตุ้นด้วยกรดไฮโดรคลอริก 100 เท่า แสดงค่าการตอบสนองทางไฟฟ้าสูงสุดเมื่อสัมผัสกับไอของเมทานอล ส่วนค่าการตอบสนองทางไฟฟ้าของเส้นใยพอลิไคฟีนิลเอมีนมีค่าค่อนข้างต่ำเมื่อเพิ่มปริมาณของพอลิเอทรีลีนออกไซด์

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