

**SYNTHESIS AND CHARACTERIZATION OF NOVEL
POLYSILOXANE PHOTORESISTS USED IN A DNA DETECTOR**

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For the Degree of Master of Science
The Petroleum and Petrochemical College, Chulalongkorn University
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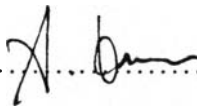
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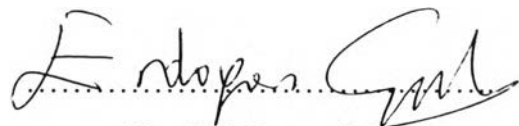
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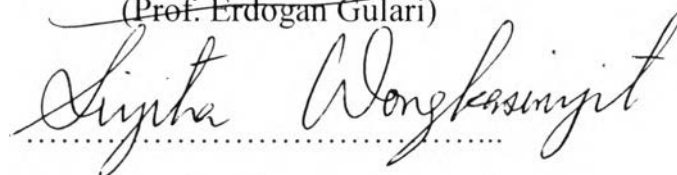
Thesis Title : Synthesis and Characterization of Novel Polysiloxane
Photoresists Used in a DNA Detector
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Program : Polymer Science
Thesis Advisors : Professor Erdogan Gulari
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ABSTRACT

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Pornponrse Sowawattanakul: Synthesis and Characterization of Novel Polysiloxane Photoresist Used in a DNA Detector. Thesis Advisors: Prof. Erdogan Gulari and Assoc. Prof. Sujitra Wongkasemjit. 72 pp ISBN 974-334-189-7

A novel polymeric photoresist using polysiloxane as side-wall deposition on SiO₂ wafer is produced images by Near-UV radiation. Without photoacid and photobase generator, photoresist patterns are easily prepared from reactive functional groups of silane compound, 2-chloroethylmethyldichlorosilane, to form crosslinked siloxane polymer in one step. With especially chemical bonded structure of crosslinked polysiloxane, a chemical solvent is used to etch uncrosslinked parts to present highly hydrophobic resolution images. Leading to innovational photoresist, negative and positive patterns are produced using the same starting material with different types of photomasks. The polymeric photoresist exhibited many interesting properties, viz good chemical stability, good moisture resistance and enough thickness formation for further use in a DNA detector.

บทคัดย่อ

นายพรพงษ์ โสววัฒนกุล : การสังเคราะห์และตรวจสอบโครงสร้างของพอลิไซลอกเซนในกระบวนการโฟโตรีซิส (Synthesis and Characterization of Novel Polysiloxane Photoresists Used in a DNA Detector) อ. ที่ปรึกษา : ศาสตราจารย์ เออร์โดแกน กุลารี และ รองศาสตราจารย์ สุจิตรา วงศ์เกษมจิตต์ 72 หน้า ISBN 974-334-189-7

พอลิเมอร์โฟโตรีซิสชนิดพอลิไซลอกเซนสำหรับสร้างผนังกันสารพันธุกรรม (DNA) บนแผ่นซิลิกอนได้ถูกผลิตขึ้นจากกระบวนการฉายด้วยแสงอัลตราไวโอเล็ต ปฏิกริยานี้เกิดได้ไม่ซับซ้อนเนื่องจากมีหมู่ฟังก์ชันที่มีความว่องไว จึงส่งผลให้สามารถลดขั้นตอนของกระบวนการโฟโตรีซิสให้เหลือเพียงขั้นตอนเดียวได้ เนื่องจากลักษณะพิเศษของพันธะว่างแหวที่เกิดหลังจากปฏิกิริยาการฉายแสง สารเคมีที่ใช้ในการสลายพันธะของพอลิเมอร์ที่ไม่เกิดพันธะว่างแหวจึงต้องมีคุณสมบัติเฉพาะ เพื่อให้เกิดความคมชัดของลักษณะรูปภาพผนังกันที่ได้ออกแบบไว้ นอกจากนี้ ยังได้ค้นพบนวัตกรรมใหม่ของกระบวนการโฟโตรีซิสว่า สารชนิดไซลอกเซนที่มีหมู่ว่องไวต่อแสงนี้สามารถให้ภาพของผนังกันหลังผ่านการฉายแสงอัลตราไวโอเล็ตได้ทั้งชนิดบวกและลบโดยเริ่มปฏิกิริยาจากสารตั้งต้นชนิดเดียวกัน คุณสมบัติของผนังกันที่สังเคราะห์ได้พบว่ามี ความคงทนต่อสารเคมีและความชื้นอย่างมาก รวมทั้งความหนาของผนังกันที่สังเคราะห์ได้มีความเหมาะสมต่อการนำไปใช้กันสารพันธุกรรมในการสร้างเครื่องมือตรวจสอบลำดับของสารพันธุกรรมต่อไป

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