

**A NOVEL ION EXTRACTION MATERIALS DERIVED FROM  
MOLECULAR RECOGNITION PROPERTIES OF SILICA SURFACE  
MODIFIED BENZOXAZINE LOCAL STRUCTURE**

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**Thesis Title** : A Novel Ion Extraction Materials Derived from Molecular Recognition Properties of Silica Surface Modified Benzoxazine Local structure


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**Program** : Polymer Science


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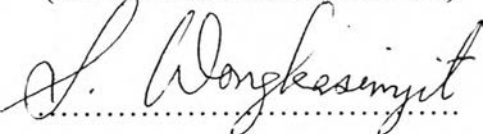
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## ABSTRACT

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KEY WORDS: Silylbenzoxazine / Ion extraction/ Silica surface modified benzoxazine

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A series of silylbenzoxazines with different bulky group on benzene ring, i.e., 3-triethoxysilyl-n-propyl-3,4-dihydro-2H-1,3-benzoxazine (1), 3-triethoxysilyl-n-propyl-3,4-dihydro-6-methyl-2H-1,3-benzoxazine(2), and 3-triethoxysilyl-n-propyl-3,4-dihydro-6,8-dimethyl-2H-1,3-benzoxazine(3), were prepared. Silica surface modified benzoxazine was successfully achieved via silylbenzoxazine derivatives coupling onto silica gel in solventless system. The subtracted FTIR spectra between the silica surface modified silylbenzoxazine derivatives show two bands near 1050 and 770  $\text{cm}^{-1}$  which are assigned to the formation of Si-O-Si linkages. Elemental analysis shows that almost all alkoxy silanes are coupled onto silica surface. The ion extraction studies of various alkali and alkaline earth metal ions by the column chromatography packed with silica-benzoxazine resin show that 3-triethoxysilyl-n-propyl-3,4-dihydro-6,8-dimethyl-2H-1,3-benzoxazine coupled with silica(6) exhibits ion extraction efficiency at 82-95% while 3-triethoxysilyl-n-propyl-3,4-dihydro-2H-1,3-benzoxazine coupled with silica(4) performs only 65-83%.

## บทคัดย่อ

หนังสือ ขสวพัฒนานนท์ : การศึกษาวัสดุจำแนกไอออนประเภทใหม่โดยอาศัยสมบัติการรับรู้ระหว่างโมเลกุลโดยโครงสร้างที่ได้จากการปรับพื้นผิวซิลิกาด้วยเบนซอกซาซีน (A Novel Ion Extraction Materials Derived from Molecular Recognition Properties of Silica Surface Modified Benzoxazine Local Structure) อ. ที่ปรึกษา : ศ. ฮัทสึโอะ อิชิดะ (Prof. Hatsuo Ishida) และ ดร. สุวบุญ จิราญชัย 36 หน้า ISBN 974-331-930-1

อนุพันธ์ของไซลิลเบนซอกซาซีนที่มีความแตกต่างของหมู่เกาะบนวงเบนซีน ได้แก่ 3-ไตรเอททอกซีไซลิล-เอ็น-โพรพิล-3,4-ไดไฮโดร-2เอช-1,3-เบนซอกซาซีน (1), 3-ไตรเอททอกซีไซลิล-เอ็น-โพรพิล-3,4-ไดไฮโดร-6-เมทิล-2เอช-1,3-เบนซอกซาซีน(2), และ 3-ไตรเอททอกซีไซลิล-เอ็น-โพรพิล-3,4-ไดไฮโดร-6,8-ไดเมทิล-2เอช-1,3-เบนซอกซาซีน(3) ได้ถูกสังเคราะห์ขึ้น การพัฒนาโครงสร้างเบนซอกซาซีนบนพื้นผิวซิลิกาได้เตรียมขึ้นโดยผ่านอนุพันธ์ของไซลิลเบนซอกซาซีนในระบบที่ไม่ใช้ตัวทำละลาย ผลจากฟูเรียร์ทรานส์ฟอร์มอินฟราเรดสเปกโทรสโคปี (FTIR) โดยวิธีการขจัดฟีก พบฟีก 2 ช่วงที่ 1050 และ 770 เลขคลื่น ซึ่งแสดงถึงการเกิดพันธะระหว่าง Si-O-Si ผลจากเครื่องมือวิเคราะห์ธาตุ พบว่า เกือบทุกหมู่ของแอลคอกซีไซเลนถูกตรึงบนพื้นผิวซิลิกา การศึกษาการจับไอออนทั้งหมู่ 1 และ หมู่ 2 โดยวิธีคอลัมโครมาโตกราฟี ซึ่งมีสารที่เตรียมได้ บรรจุเป็นเรซิน พบว่า เรซิน 3-ไตรเอททอกซีไซลิล-เอ็น-โพรพิล-3,4-ไดไฮโดร-6,8-ไดเมทิล-2เอช-1,3-เบนซอกซาซีนที่เชื่อมบนพื้นผิวซิลิกา(๕) แสดงประสิทธิภาพในการจับไอออนเท่ากับ 82-95 เปอร์เซ็นต์ ในขณะที่เรซิน 3-ไตรเอททอกซีไซลิล-เอ็น-โพรพิล-3,4-ไดไฮโดร-2เอช-1,3-เบนซอกซาซีนที่เชื่อมบนพื้นผิวซิลิกา(๔) เพียง 65-83 เปอร์เซ็นต์

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