

**Highly Porous Polymeric Foam of Maleimide-Terminated Poly(arylene ether sulfone) Oligomers via High Internal Phase Emulsions**

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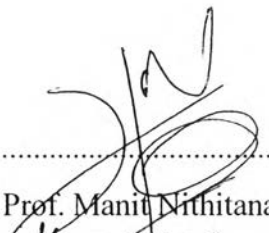
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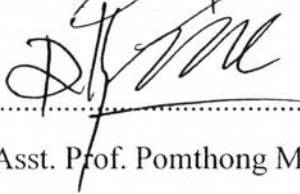
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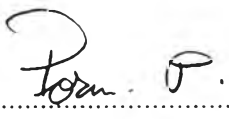
  
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## ABSTRACT

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Khemchart Thanamongkollit: Highly Porous Polymeric Foam of Maleimide-Terminated Poly(arylene ether sulfone) Oligomers via High Internal Phase Emulsions.

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PolyHIPEs are highly porous polymers which can be synthesized through emulsion templating by polymerizing the continuous phase of high internal phase emulsions (HIPEs). Poly(arylene ether sulfone) oligomers were synthesized via nucleophilic aromatic substitution reaction of bisphenol A, 1-(4-hydroxy-phenyl)-pyrrole-2,5-dione (HPMI), and Bis-(4-chlorophenyl)-sulfone were introduced to copolymerize with divinylbenzene (DVB) to improve CO<sub>2</sub> adsorption and the mechanical properties of obtained materials. A maleimide-terminated aryl ether sulfone oligomer(MAPES) was copolymerized with DVB in the continuous phase by using mixed surfactants system (sorbitan monooleate (Span80), cetyltrimethylammonium bromide (CTAB), dodecylbenzenesulfonic acid sodium salt (DDBSs)) and peroxide initiator. PolyHIPEs was prepared by two types of mixed surfactants ratios (SPAN80, DDBSs, and CTAB; 6.3, 0.4, and 0.3 wt%)(7s) and (SPAN80, DDBSS, and CTAB; 11.3, 0.4, and 0.3 wt%)(12s). A maleimide-terminated aryl ether sulfone oligomer was used 0, 2.5, 5, 10, 20, and 30 wt% as a copolymer. The porosities and structures of materials were characterized by SEM and Brunauer-Emmett-Teller (BET) nitrogen gas adsorption. The obtained PolyHIPEs showed an open cell and a secondary pore structure with surface areas of approximately 400m<sup>2</sup>/g. CO<sub>2</sub> adsorption tests were characterized by pilot gasification unit and the obtained materials showed higher adsorption than neat poly(DVB) without MAPES. Compressive modulus test of the materials showed a higher modulus than for poly(DVB) PolyHIPEs.

## บทคัดย่อ

เขมชาติ ธนมงคฤทธิ : พอลิเมอร์ที่มีโครงสร้างรูพรุนสูงของพอลิ(อัลลีสีนอีเทอร์ซัลโฟน) ปลายมาเลอิมิด (Highly Porous Polymeric Foam of Maleimide-Terminated Poly(arylene ether sulfone) Oligomers via High Internal Phase Emulsions) อ. ที่ปรึกษา : ผู้ช่วยศาสตราจารย์ ดร. มานิตช์ นิธิธนากุล และ ผู้ช่วยศาสตราจารย์ ดร. ปมทอง มาลากุล ณ อุรุขยา 46 หน้า

พอลิเมอร์ที่มีโครงสร้างรูพรุนสูงสามารถสังเคราะห์ด้วยวิธีการสร้างโครงสร้างร่างแหจากวัฏภาคภายในของอิมัลชันที่เชื่อมต่อกัน พอลิ(อัลลีสีนอีเทอร์ซัลโฟน)ปลายมาเลอิมิดถูกสังเคราะห์ได้โดยปฏิกิริยาการแทนที่ของหมู่นิวคลีโอฟิลิกอโรมาติกของ บิสฟีนอล-เอ, 1-4(ไฮดรอกซี-ฟีนิล)-ไพโรล-2,5 ไดโอน (HPMI) และบิส-(4-คลอโรฟีนิล)ซัลโฟน ซึ่งโคพอลิเมอร์ซัลโฟนไคโวนิลเบนซีน (DVB) เพื่อเพิ่มการดูดซับก๊าซคาร์บอนไดออกไซด์และคุณสมบัติเชิงกลของวัสดุพอลิเมอร์ พอลิ(อัลลีสีนอีเทอร์ซัลโฟน)ปลายมาเลอิมิดที่โคพอลิเมอร์ซัลโฟนไคโวนิลเบนซีนในปฏิกิริยาต่อเนื่องของอิมัลชันซึ่งใช้สารลดแรงตึงผิวแบบผสมที่ประกอบด้วย สเปน80, ดีดีบีเอสเอส, และซีแทป โดยมีสารประกอบเปอร์ออกไซด์เป็นตัวเริ่มปฏิกิริยา การทดสอบโครงสร้างและความเป็นรูพรุนของวัสดุพอลิเมอร์นี้วิเคราะห์โดย แสกนนิ่งอิเล็กตรอนไมโครสโคป และเครื่องวัดการดูดซับก๊าซในโครเจน วัสดุพอลิเมอร์นี้แสดงโครงสร้างเปิดและมีโครงสร้างรูพรุนแบบทุติยภูมิที่มีพื้นที่ผิวประมาณ 400  $\text{m}^2/\text{กรัม}$  และมีค่ามอดูลัสการกดที่มากกว่าวัสดุที่มีไคโวนิลเบนซีนเพียงอย่างเดียว

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