DEVELOPMENT OF NOVEL NON-AQUEOUS THERMALLY STABLE MEMBRANES FOR THE USE IN POLYMER ELECTROLYTE MEMBRANE FUEL CELL (PEMFC)

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ABSTRACT

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The present project stands on a viewpoint of a synthesized polymeric membrane material having a definite functional group, which an effective proton-transferring pathway is possible for PEM. Compared with water molecule, the imidazole is expected to function not only for providing better thermal stability but also allowing a similarly effective proton transferring via its specific structure. Here, the work originally proposes a series of imidazole functionalized polymeric material, for example, (i) copolymers of acrylic acid and 4-vinylimidazole including temperature dependency and structural relationships, (ii) SPEEK blended with Poly (AA-co-4VIm). (iii) polyamide functionalized with imidazoles, The goal of the project is to achieve a novel polymeric material for high efficiency proton transferring polymer membrane to be used in PEMFC system.

บทคัดย่อ

มานิตา จิตต์หรรษา : พอลิเมอไรเซชั่น: การพัฒนาเมมเบรนแบบใหม่ที่ส่งผ่านโปรตอนแบบปราศจากโมเลกุลน้ำและมีความเสถียรต่อความร้อนสำหรับการใช้ในเซลล์เชื้อเพลิงประเภทพอลิเมอร์อิเลคโทรไลท์ (Development of Novel Non-aqueous Thermally Stable Membranes for the Use in Polymer Electrolyte Membrane Fuel Cell (PEMFC)) อ. ที่ปรึกษา: รศ.ดร. สุวบุญ จิรชาญชัย และศาสตราจารย์โคจิ ทาชิโระ 120 หน้า

วิทยานิพนธ์ฉบับนี้เสนอ 3 วิธีการสังเคราะห์วัสดุพอลิเมอร์เมมเบรนที่มีหมู่ฟังก์ชันเฉพาะที่เอื้อต่อการส่งผ่านโปรตอนสำหรับเมมเบรนแลกเปลี่ยนโปรตอน หมู่ดังกล่าว คือ อิมิดาโซล ซึ่งนอกจากจะให้ค่าคงทนต่อความร้อนที่สูงกว่าโมเลกุลน้ำแล้ว ยังให้คุณสมบัติการส่งผ่านโปรตอนที่มีประสิทธิภาพดีเทียบเท่ากับโมเลกุลน้ำอีกด้วย งานวิจัยฉบับนี้ขอเสนอแนวคิดริเริ่มที่เกี่ยวกับวัสดุพอลิเมอร์เมมเบรนที่มีหมู่อิมิดาโซลสำหรับเซลล์เชื้อเพลิง ตัวอย่างเช่น (1) โคพอลิเมอร์ระหว่างกรดอะคริลิค และ 4-ไวนิลอิมิดาโซล พร้อมทั้งศึกษาการเปลี่ยนแปลงทางอุณหภูมิที่สัมพันธ์กับโครงสร้างเมมเบรน, (2) พอลิเมอร์ผสมระหว่างซัลโฟเนตเตตพอลิอีเทอร์อีเทอร์คีโตน และพอลิ (กรดอะคริลิค-โค-4-ไวนิลอิมิดาโซล), (3) พอลิเอไมด์ที่มีหมู่อิมิดาโซล จุดมุ่งหมายของงานวิจัยฉบับนี้มุ่งเน้นที่จะสังเคราะห์ให้ได้วัสดุพอลิเมอร์คุณสมบัติการส่งผ่านโปรตอนที่มีประสิทธิภาพดีเพื่อใช้ในพอลิเมอร์ประเภทเมมเบรนแลกเปลี่ยนโปรตอน

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