ELECTRICAL CONDUCTIVITY RESPONSE OF POLY(PHENYLENE VINYLENE)/ZEOLITE COMPOSITES EXPOSED TO AMMONUIM NITRATE

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ABSTRACT

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Poly(*p*-phenylene vinylene) (PPV) was chemically synthesized via the polymerization of p-xylene-bis(tetrahydrothiophenium chloride) monomer and doped with H_2SO_4. In order to improve sensitivity of the sensor, Zeolite Y (Si/Al = 5.1, 30, 60, 80) is added into the conductive polymer matrix. The sensitivity of the sensor increases with increasing Si/Al ratio. The highest electrical conductivity sensitivity is obtained with the doped PPV/Zeolite Y (Si/Al = 80) is slightly higher than those doped of the PPV/Zeolite Y (Si/Al = 5.1). The electrical sensitivity values obtained are equal to 0.201, 1.37, 2.80 and 3.18, respectively. The difference in the interaction between NH_4NO_3 molecules and the sensing material on the electrical sensitivity has been investigated by using doped PPV/Zeolite Y (Si/Al = 5.1, 30, 60, 80, H^+) as a model though the IR measurements.

บทคัดย่อ

จิรารัตน์ กมลสวัสดิ์ : การสร้างคอมโพสิตของพอลิฟีนิลลีน ไวนิลลีนและซีโอไลท์เพื่อใช้ในการตรวจวัดก๊าซแอมโมเนียมไนเตรต (Electrical Conductivity Response of Poly(phenylene vinylene)/Zeolite Composites Exposed to Ammonium Nitrate) อ. ที่ปรึกษา : รศ.ดร. อนุวัฒน์ ศิริวัฒน์ , ดร.พิมพา หอมนิรันดร์ และดร.วลัยพร ปฤษณรุณ

พอลิฟีนิลีนไวนิลลีนเป็นพอลิเมอร์นำไฟฟ้าชนิดหนึ่งที่มีความสามารถใช้เป็นวัสดุที่ใช้สำหรับงานตรวจวัดก๊าซได้เนื่องจากสามารถเปลี่ยนแปลงคุณสมบัติทางแสงและทางไฟฟ้าได้เมื่ออยู่ภายใต้สภาวะของก๊าซชนิดพิเศษ พอลิฟีนิลีนไวนิลลีนถูกสังเคราะห์โดยวิธีพอลิเมอร์ไรเซชันโดยใช้พอลิพาราไซลีนบิสเตตระไฮโดรไทโอฟีนและเพิ่มความสามารถทางการนำไฟฟ้าด้วยสารละลายซัลฟูริกแอซิด จากนั้นได้ศึกษาการตอบสนองทางคุณสมบัติการนำไฟฟ้าของพอลิฟีนิลีนไวนิลลีนเมื่อสัมผัสกับก๊าซแอมโมเนียมไนเตรต เพื่อเพิ่มความว่องไวดังกล่าว จึงผสมซีโอไลท์วายเข้ากับเมทริกซ์ของพอลิฟีนิลีนไวนิลลีน พบว่าความว่องไวในการจับก๊าซแอมโมเนียมไนเตรตเพิ่มขึ้นเมื่อสัดส่วนของซิลิกอนและอลูมิเนียม พบว่าความว่องไวทางคุณสมบัติการนำไฟฟ้าของคอมโพสิตเมื่อผสมซีโอไลท์วายที่มีอัตราส่วนของซิลิกอนและอลูมิเนียมเท่ากับ 80 มีความว่องไวมากที่สุด ซึ่ง สามารถตรวจสอบการเกิดปฏิกิริยาได้โดยใช้ FTIR

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