

การสังเคราะห์และการตรวจสอบสมบัติของพอลิเมอร์ที่ประกอบด้วยออกซาโซล

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SYNTHESIS AND CHARACTERIZATION OF POLYMER CONTAINING OXAZOLE

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สุรัตน์ สุขขาว : การสังเคราะห์และการตรวจสอบสมบัติของพอลิเมอร์ที่ประกอบด้วยออกซาโซล (SYNTHESIS AND CHARACTERIZATION OF POLYMER CONTAINING OXAZOLE) อ.ที่ปรึกษา : รศ.ดร.ศุภวรรณ ตันตยานนท์, 67 หน้า.

ได้สังเคราะห์ 4-โบรโม-2,5-ไดเฟนิลออกซาโซล โดยปฏิกิริยาการปิดวงของเบนโซอิลไฮยาไนด์ และเบนซาลดีไฮด์ในไฮโดรเจนโบรไมด์ในอีเทอร์ จากนั้นใช้ปฏิกิริยาสติลคัลฟลิ่งโดยให้ทำปฏิกิริยากับไตรบิวทิลไวนิลทิน และ ทริสไดเบนซิลดีนแอสีโทนไดแพลเลเดียม(0) เป็นตัวเร่งปฏิกิริยา ได้ 2,5-ไดเฟนิล-4-ไวนิลออกซาโซล โคพอลิเมอร์สองชนิดของ 2,5-ไดเฟนิล-4-ไวนิลออกซาโซล เตรียมโดยทำโคพอลิเมอร์ไรเซชันกับเมทิลเมทาคริเลต และ สไตรีนที่ 5% โดยน้ำหนักของมอนอเมอร์ โคพอลิเมอร์ของเมทิลเมทาคริเลตแสดงสมบัติทนความร้อนที่ 169 องศาเซลเซียสและอุณหภูมิสถานะการหลอมเหลวคล้ายแก้วที่ 104 องศาเซลเซียส ขณะที่โคพอลิเมอร์ของสไตรีนแสดงสมบัติทนความร้อนสูงกว่าถึง 365 องศาเซลเซียส และมีอุณหภูมิสถานะการหลอมเหลวคล้ายแก้วต่ำกว่าที่ 96 องศาเซลเซียส พอลิเมอร์ทั้งสองชนิดนี้ให้การเปล่งแสงที่ชัดเจนซึ่งเป็นลักษณะเฉพาะของ 2,5-ไดเฟนิลออกซาโซลโครโมฟอร์

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4-Bromo-2,5-diphenyloxazole was successfully synthesized with reasonable yield via a cyclization of benzoyl cyanide and benzaldehyde in the presence of hydrogen bromide in ether. It was then subjected to Stille coupling reaction by reacting with tributyl(vinyl)tin using tris(dibenzylideneacetone)dipalladium(0) as a catalyst to yield 2,5-diphenyl-4-vinyloxazole. Two copolymers of 2,5-diphenyl-4-vinyloxazole were prepared by copolymerization with methyl methacrylate and styrene at 5% by weight of monomer. Methyl methacrylate copolymer showed thermal stability at 169 °C and had the glass transition temperature 104 °C. The styrene copolymer showed higher thermal stability at 365 °C and had lower glass transition temperature 96 °C. Both polymers exhibited the distinct fluorescence of the characteristic 2,5-diphenyloxazole chromophore..

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**List of Abbreviation and Signs**

$\text{cm}^{-1}$	Unit of Wavelength
m.p.	Melting Point
b.p.	Boiling Point
$^{\circ}\text{C}$	Degree Celsius
m/z	Mass per Charge
NMR	Nuclear Magnetic Resonance
<i>J</i>	Coupling Constant
Hz	Herzt
ppm	Parts Per Millon
$\delta$	Chemical Shift
s	Singlet (NMR)
d	Doublet (NMR)
dd	Doublet of Doublets (NMR)
m	Multiplet (NMR)
$\epsilon$	Molar Absorption Coefficient
M	Molar
mmol	Millimole
mL	Mililiter
THF	Tetrahydrofuran
PPO	2,5-Diphenyloxazole
GPC	Gel Permeation Chromatography
<i>M<sub>n</sub></i>	Number Average Molecular Weight
<i>M<sub>w</sub></i>	Weight Average Molecular Weight
PDI	Polydispersity Index
DSC	Differential scanning calorimetry
TGA	Thermogravimetric Analysis
<i>T<sub>g</sub></i>	Glass Transition Temperature
<i>T<sub>d</sub></i>	Decomposition Temperature

**List of Numbered Compounds**

- [1] Benzoyl chloride
- [2] Benzoyl cyanide
- [3] Benzaldehyde
- [4] 4-Bromo-2,5-diphenyloxazole
- [5] 2,5-Diphenyl-4-vinyloxazole
- [6] 2,5-Diphenyl-4-vinyloxazole-*co*-methyl methacrylate polymer
- [7] 2,5-Diphenyl-4-vinyloxazole-*co*-styrene polymer