

Sulfonation Properties of Polyphenylsulfone

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Introduction

PPSU (Polyphenylsulfone) is a sulfone polymer consisting of phenylene bonded to sulfonyl ($-\text{SO}_2-$) and ether ($-\text{O}-$) chains in the building blocks. Compared to commercially available high-temperature engineering resins, PPSU has superior hydrolytic stability and toughness, and is used as an advanced material in a variety of fields, including automotive, medical equipment, food service, and membrane technology¹⁾. In particular, sulfonated PPSU electrolyte materials have been actively studied as an alternative to fluorinated ion exchange resins²⁾. In this paper, we report on the synthesis and properties of sulfonated PPSU.

Results and Discussion

Figure 1 shows the chemical structure of SPPSU with two sulfonyl groups introduced per repeating unit of PPSU. Table 1 also shows the properties of PPSU sulfonated with different acid types. Sulfonation of PPSU is accomplished by aromatic nucleophilic substitution reactions, introducing a sulfonyl group into the electron-rich biphenyl group. Since the performance of the ion exchange resin depends on the ion exchange capacity of the polymer, sulfonation was performed by changing the acid type in order to introduce more sulfonyl groups into PPSU (Table 1). Although the ion exchange capacity can

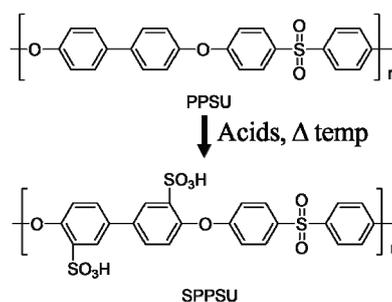


Figure 1. Chemical structure of PPSU and SPPSU.

Table 1. Properties of sulfonated PPSU using different acids.

	PPSU Radel® R-5000 NT	H ₂ SO ₄ / PPSU	ClSO ₃ H / PPSU	Oleum (30%) / PPSU
Sulfo. Temp.	-	80°C, 6h	Rt, 20h	Rt, 24h
IEC (meq/g)	-	3.60	3.88	5.15
Mw	50,000	165,314	151,143	211,110
Mz	-	222,168	224,678	318,426
Mn	26,000	111,065	93,371	128,517
Mw/Mn	1.9	1.5	1.6	1.6
Mz/Mw	-	1.3	1.5	1.5

be increased by changing the acid type and temperature conditions, the optimum conditions are required because degradation of the polymer structure also occurs at the same time. At the conference, we will report on the sulfonation of PPSU and its properties in detail.

References

- 1) www.solve.com
- 2) Kim, J. et al. membranes **2020**, 10, 31; Kim, J. et al. membranes **2021**, 11, 861.

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