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High sulfonation and membrane properties of polyphenylsulfone (PPSU) for ion exchange device application

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ABSTRACT

Polymer electrolytes for proton exchange are used in a variety of energy device fields such as fuel cells, water electrolysis, RFB, and water treatment. These electrolytes mainly use fluorinated ion exchange resins, but further improvements in proton conductivity, thinner membrane, and durability (mechanical, chemical, and temperature) are required. On the other hand, the development of non-fluorinated ion-exchange polymer electrolyte materials is required within the framework of achieving carbon neutrality. We have been studying the application of polyphenylsulfone (PPSU), a hydrocarbon-based engineering plastic, as a non-fluorinated electrolyte for energy devices. In this presentation, we report on sulfonation and cross-linking of PPSU, scale-up, and physical and chemical properties of uniform and large-area electrolyte membranes.

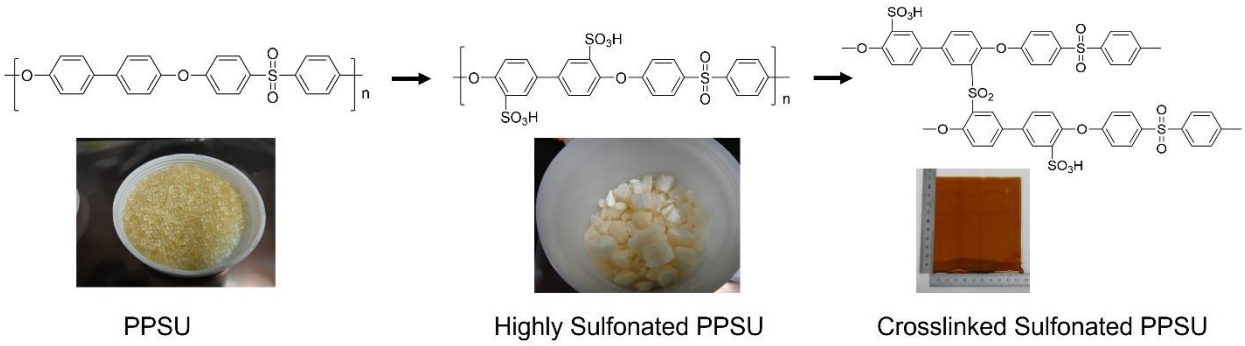

Fig. 1 Chemical structure and appearances of PPSU, SPPSU, and CSPPSU polymers

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