229. Sulfonated Poly(phenylene sulfone)s Ionomers

Kim Jedeok [1]

1 - Jedeok KIM (Japan)

Aiming to achieve carbon neutrality by 2050, safe electricity storage and utilization technologies using renewable energy are required. To achieve these technological developments, each component needs to have high performance. In particular, high performance catalysts and ion exchange polymer materials are key for fuel cells, water electrolysis, and redox flow batteries. Fluorine-based electrolytes such as Nafion are used as ion exchange polymer electrolytes, but the development of alternative electrolytes has attracted attention due to PFAS regulations. We are researching hydrocarbon-based SPPSU ionomers as non-fluorine-based electrolytes. Several SPPSU ionomers with high IEC were synthesized from PPSU polymer and monomer. The SPPSU ionomers from PPSU polymer had a high IEC value of 3.6 meq/g. The SPPSU ionomers synthesized from monomers had an even higher IEC value of 5.6 meq/g. These IEC values are higher than the IEC of Nafion ionomer (approximately 1.0 meq/g), and they are expected to be used as hydrocarbon ionomers. The mechanical properties of the SPPSU ionomer synthesized from the polymer (IEC=3.6 meq/g) were more rigid than those of the SPPSU ionomer synthesized from the monomer (IEC=5.6 meq/g). The mechanical properties of the SPPSU ionomer synthesized from the monomer were similar to those of Nafion, but the youngs modulus was two times higher. The conductivity of the SPPSU ionomer synthesized from the monomer at 120°C and RH40% was about four times higher than that of Nafion. In this presentation, we will report on the physicochemical properties of the SPPSU ionomers with high IEC values.

Keywords : Hydrocarbon ionomers, PPSU, Sulfonated poly(phenylene sulfone)s, Electrolytes, High IEC, Membranes, Energy devices