

Anion exchange membrane based on Imidazolium grafted poly (arylene ether ketone) with reduced vanadium ion permeability for vanadium redox flow battery

안연호, 김덕준[†]

성균관대학교

(djkim@skku.edu[†])

VRFB is considered as attractive energy storage system. For the operation of VRFB, ion exchange membrane plays important role. Nafion membrane is used for commercial ion exchange membrane for VRFB. Although Nafion has high proton conductivity and good chemical stability, high vanadium ion permeability is major defect to be used in VRFB. In this study, the anion exchange membrane is synthesized from poly(arylene ether ketone) with pendant imidazolium groups for vanadium redox flow battery. PAEK is one kind of the hydrocarbon based polymer which has good mechanical and chemical stability. Imidazolium group is one kind of positively charged functional groups, which can reduce permeability of vanadium ion by Donnan exclusion phenomena. As the content of imidazolium group increases, the ion exchange capacity of membrane increases, showing higher value than Nafion117 membranes. All of the prepared membranes show significantly low vanadium ion permeability compared to Nafion117 membranes. In addition, During the 100 cycling test, PAEK-AP2.0 membrane shows higher coulombic and energy efficiencies than Nafion117 membrane without any degradation.