

Preparation of ultra-thin Nafion film for vanadium redox flow battery membrane

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Membrane, a key component of a vanadium redox flow battery (VRB), is employed to separate positive and negative redox species while still transfer ions to complete an electrical circuit. The membrane of VRB is supposed to possess a good ion conductivity, high ion selectivity, and chemical stability. Because of these requirements, Nafion which is one of perfluorosulfonated acid (PFSA) polymer, is common used for membrane. But even though they have both high proton conductivity and chemical stability, their high cost and low ion selectivity are limitation of VRB commercialization. In this work, we propose a new method to make the ultra-thin Nafion film by utilizing the surface activity of Nafion. The ultra-thin Nafion layer is introduced on the surface of the supporting porous membrane for application of the VRB membrane. The ion conductivity and vanadium ion permeability of the composite membrane are investigated. From these results, we suggest that this new method has potential in the VRB application.