

Preparation and Performance of Polyphenylene Oxide-Based Anion Exchange Membrane for Vanadium Redox Flow Battery

Authors : Mi-Jung Park, Min-Hwa Lim, Ho-Young Jung

Abstract : A polyphenylene oxide (PPO)-based anion exchange membrane based on the functionalization of bromomethylated PPO using 1-methylimidazole was fabricated for vanadium redox flow application. The imidazolium-bromomethylated PPO (Im-bPPO) showed lower permeability VO₂⁺ ions (2.9×10^{-14} m²/sec), compared to Nafion 212 (2.3×10^{-12} m²/sec) and FAP-450 (7.9×10^{-14} m²/sec). Even though the Im-bPPO membrane has higher permeability, the energy efficiency of the VRFB with the Im-bPPO membrane was slightly lower than that of Nafion and FAP-450. The Im-bPPO membrane exhibits good voltage efficiency compared to FAP-450 and Nafion 212 because of its better ion conductivity. The Im-bPPO membrane showed up good performance, but a decline in performance at later cycles was observed.

Keywords : anion exchange membranes, vanadium redox flow battery, polyphenylene oxide, energy efficiency (EE)

Conference Title : ICCET 2016 : International Conference on Chemical Engineering and Technology

Conference Location : Tokyo, Japan

Conference Dates : May 26-27, 2016