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# Chemical Stability and Characterization of Ion Exchange Membranes for Vanadium Redox Flow Batteries

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

**Abstract :** Imidazolium-brominated polyphenylene oxide (Im-bPPO) is based on the functionalization of bromomethylated poly(2,6-dimethyl-1,4-phenylene oxide) (BPPO) using 1-Methylimdazole. For the purpose of long cycle life of vanadium redox battery (VRB), the chemical stability of Im-bPPO, sPPO (sulfonated 2,6-dimethyl-1,4-phenylene oxide) and Fumatech membranes were evaluated firstly in the 0.1M vanadium (V) solution dissolved in 3M sulfuric acid (H2SO4) for 72h, and UV analyses of the degradation products proved that ether bond in PPO backbone was vulnerable to be attacked by vanadium (V) ion. It was found that the membranes had slightly weight loss after soaking in 2 ml distilled water included in STS pressure vessel for 1 day at 200◦C. ATR-FT-IR data indicated before and after the degradation of the membranes. Further evaluation on the degradation mechanism of the menbranes were carried out in Fenton's reagent solution for 72 h at 50 ◦C and analyses of the membranes before and after degradation confirmed the weight loss of the membranes. The Fumatech membranes exhibited better performance than AEM and CEM, but Nafion 212 still suffers chemical degradation.

**Keywords :** vanadium redox flow battery, ion exchange membrane, permeability, degradation, chemical stability
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