

Hybrid composite proton exchange membranes (PEM) for VRFB applications

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Vanadium redox flow batteries (VRFBs) are one of the most well-established redox-flow battery types due to their robust cell chemistry with only one active species (vanadium), allowing for simple and complete electrolyte recovery. A desirable PEM is supposed to conduct only protons and block vanadium ions crossover on both the sides. The certified membrane should possess high proton conductivity, low vanadium ions permeability, good chemical stability and low cost. The goal of this study is to prepare the high-performance PEM for vanadium redox flow batteries using a novel and low-cost functionalized polymer. The morphological structural & chemical features of the membrane confirmed by SEM, FTIR, XRD & XPS analysis. Further, the additional obtained results demonstrate that the membrane proved with IC of 0.086S/cm & IEC 1.147meq/g respectively. Notably, the resultant membranes in the VRFB unit cell displayed EE 80% which is closely comparable with that of Nafion membranes.