

Improvement of performance of organic redox flow battery using transition metal oxide powder

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Recently, there have been a great demand in energy storage systems (ESS) to fulfill the power crisis growing around the world. Redox flow battery (RFB), one of the variety of energy storage systems, has the advantages of high energy and power volume with long lifetime and good temperature stability. Among the RFB, organic materials based redox flow battery have wide operating voltage range and reported to shown enhanced performance than that of aqueous redox flow batteries. However, the solubility of the organic redox material is very low leads to have lower energy density. In this study, an attempt has been made to increase the energy density of the organic redox flow battery using the redox reaction between the organic redox material and the transition metal oxide. 2-phenyl-4,4,5,5-tetramethylimidazoline-1-oxyl-3-oxide (PTIO) is used as an organic redox material, while MnO₂ (transition metal oxide) and Na⁺ ion are used as an electrolyte and supporting electrolyte respectively.