

Additive effect on redox reactivity of quinone based redox couple for performance enhancement of redox flow battery

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So far, vanadium has been used as active materials for redox flow battery. However, organic materials recently have been studied as active materials for redox flow battery because of expensive cost and scarcity of vanadium materials. In this study, quinone-based organic materials were used as active materials for redox flow battery. Quinone redox reaction is faster than vanadium redox reaction because quinone redox reaction involves two-electron reaction, as opposed to vanadium redox reaction involves one-electron reaction, leading to high charge efficiency (~99%). Cyclic voltammetry experiments for calculating kinetic values have been performed to find optimum supporting electrolyte. However, the solubility had to improved because the solubility of alloxazine for aqueous solution is very low. Therefore, the study of adding additives such as potassium sulfate or potassium acetate to sulfuric acid which is basic supporting electrolyte has been performed to enhance solubility of quinones.