New Active Materials for Aqueous Redox Flow Battery

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Redox Flow Battery (RFB) is one of the Energy Storage System (ESS) that converts electrical energy into chemical energy and stores it and converts chemical energy back into electrical energy. The RFB has the advantages of high stability and design independence of capacity and power. However, Vanadium Redox Flow Battery (VRFB), which is actively studied, has difficulties in commercialization because of the high price of vanadium used as active material.

In order to solve this problem, we have studied the system of Aqueous Redox Flow Battery (ARFB) which uses transition metals as active materials because they are cheaper than vanadium. The metal-ligand complex is then prepared to convert the transition metals into active materials under alkaline electrolyte condition. The complexity of active materials is largely dependent on the ratio of metal to ligand and electrolyte condition. Therefore, this study is conducted to find the optimal electrolyte condition that can maintain the active materials without degradation. The optimal electrolyte condition is evaluated by half-cell test, XPS, H-NMR, while the performance of ARFB using the new active material is investigated.