

Crossover effect and cell performance of iron-based organometallic active materials in aqueous all-iron redox flow battery

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Redox Flow Battery (RFB) is a device that stores energy by using two electrolyte tanks and is one of the most competitive candidates for the energy storage system. Vanadium Redox Flow Battery (VRFB) is one of the most studied RFB. However, due to the high price of vanadium, many studies have been conducted to replace vanadium. Among them, the organometallic materials have advantages in that relatively inexpensive metals can be used. Also, the chemical and physical properties of the active material can be controlled by utilizing various ligands and metals. One of the most studied iron organometallic complexes is the iron-triethanolamine (TEA) complex (Fe(TEA)). Fe(TEA) can be used as a catholyte active material. Also, the TEA chemical used as a ligand of the complex is relatively inexpensive than other ligands. Despite that, the effect of the crossover of complexes on the performance of RFBs is hardly reported. The actual crossover of complexes and Fe ions is analyzed and compared to elucidate the crossover effect of Fe-ligand complexes. We used spectroscopic and electrochemical methods to evaluate the crossover effects. Also, the actual crossover effect on the RFB cell is evaluated.