

Recent Research on Vanadium Redox Flow Batteries: A review on Electrolyte Preparation, Mass Transfer and Charge Transfer for Electrolyte Performance Enhancement

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Abstract

Vanadium electrolyte is one of the most critical materials for vanadium redox flow batteries (VRB). Reducing the cost of vanadium electrolyte and improving its performance are ongoing research priorities for VRB. Currently, the control of the cost of vanadium electrolyte mainly relies on the development of new processes and optimization of traditional processes. Improving the performance of electrolytes mainly involves two aspects: mass transfer and charge transfer, such as introducing additives, optimizing supporting electrolytes, and developing new electrode catalysts. This article reviews the progress in improving the performance of VRB in the past 10 years, including three main aspects: the preparation of electrolytes, the influence of mass transfer on battery performance, and the influence of charge transfer on battery performance. Further discussed the impact of different factors on the improvement of VRB performance. Finally, summarized the challenges faced by VRB in performance improvement and commercial applications, and made suggestions for future research and development of VRB.

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