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Aqueous Intercalation-type Electrode Materials for Grid-level Energy Storage: Beyond the Limits of Lithium and Sodium

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Abstract

Intermittent, fluctuational, and unpredictable features of renewable energy require grid-level energy storage (GES). Among various types of GES, aqueous electrochemical storage is undoubtedly the most promising method due to its high round-trip efficiency, long cycle life, low cost and high safety. As the most encouraging candidate for aqueous electrochemical storage, aqueous rocking-chair batteries have been heavily investigated. Recently, intercalation-type aqueous batteries beyond the limits of Li^+ and Na^+ have caught researchers' attention due to potentially higher capacity and better cyclability, and the number of publications in this nascent field since 2015 has dramatically increased. Therefore, it is highly demanded to summarize what have been learned in this field. In this first comprehensive review paper, we summarize these novel intercalation-type electrode materials and provide perspectives of opportunities and challenges for future research.

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