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Alkaline Flow Battery Introduction

Overview

Low energy densities restrict the widespread applications of redox flow batteries. Herein, we report an alkaline Zn-Mn aqueous redox flow battery (ARFB) based on Zn(OH)42-/Zn and MnO4-/MnO42- redox-pair.

What are alkaline zinc-based flow batteries?

Currently, many alkaline zinc-based flow batteries have been proposed and developed, e.g., the alkaline zinc-iron flow battery and alkaline zinc—nickel flow battery. Their development and application are closely related to advanced materials and battery configurations.

Are alkaline flow batteries safe?

We report an alkaline flow battery based on redox-active organic molecules that are composed entirely of Earth-abundant elements and are nontoxic, nonflammable, and safe for use in residential and commercial environments. The battery operates efficiently with high power density near room temperature.

Can redox-active organic molecules be used in alkaline flow batteries?

The battery operates efficiently with high power density near room temperature. These results demonstrate the stability and performance of redox-active organic molecules in alkaline flow batteries, potentially enabling cost-effective stationary storage of renewable energy.

Are alkaline Zn-Fe flow batteries suitable for large-scale energy storage?

The alkaline Zn-Fe flow battery stably operated for over 500 h, achieving an EE of 86.3 % at 80 mA cm −2. Alkaline zinc-based flow batteries (AZFBs) are considered one of the most promising candidates for large-scale energy storage owing to Zn abundance, cost effectiveness, intrinsic safety and eco-friendliness.

Can quinone-based flow batteries be adapted to alkaline solutions?

We demonstrate that quinone-based flow batteries can be adapted to alkaline

solutions, where hydroxylated anthraquinones are highly soluble and bromine can be replaced with the nontoxic ferricyanide ion (8, 9)—a food additive (10).

What are tin-based redox flow batteries?

High-capacity, low-cost alkaline metal aqueous redox flow batteries (ARFBs) are of great significance for large-scale energy storage. Among them, tin-based flow batteries have attracted increasing interest in recent years due to their high solubility of active materials and the advantages of less dendrite formation.

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