WALMER ENERGY

High-performance zinc-based flow battery

Overview

What is a zinc-based flow battery?

The history of zinc-based flow batteries is longer than that of the vanadium flow battery but has only a handful of demonstration systems. The currently available demo and application for zinc-based flow batteries are zinc-bromine flow batteries, alkaline zinc-iron flow batteries, and alkaline zinc-nickel flow batteries.

What are the advantages of zinc-based flow batteries?

Benefiting from the uniform zinc plating and materials optimization, the areal capacity of zinc-based flow batteries has been remarkably improved, e.g., 435 mAh cm-2 for a single alkaline zinc-iron flow battery, 240 mAh cm -2 for an alkaline zinc-iron flow battery cell stack , 240 mAh cm -2 for a single zinc-iodine flow battery .

Are neutral zinc–iron flow batteries a good choice?

Neutral zinc–iron flow batteries (ZIFBs) remain attractive due to features of low cost, abundant reserves, and mild operating medium. However, the ZIFBs based on Fe (CN) 63– /Fe (CN) 64– catholyte suffer from Zn 2 Fe (CN) 6 precipitation due to the Zn 2+ crossover from the anolyte.

How much does a zinc flow battery cost?

In addition to the energy density, the low cost of zinc-based flow batteries and electrolyte cost in particular provides them a very competitive capital cost. Taking the zinc-iron flow battery as an example, a capital cost of $95 per kWh can be achieved based on a 0.1 MW/0.8 MWh system that works at the current density of 100 mA cm-2 .

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A Neutral Zinc-Iron Flow Battery with Long ...
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Perspectives on zinc-based flow batteries
Jun 17, 2024 · We hope this perspective can help researchers and the community to recognize and understand the status of currently developed zinc-based flow batteries and their limitations ...

High-performance alkaline zinc flow batteries enabled by
May 15, 2025 · Alkaline zinc-based flow batteries (AZFBs) are considered one of the most promising candidates for large-scale energy storage owing to Zn abundance, cost ...

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Progress on zinc-based flow batteries
Mar 12, 2024 · In addition to the aforementioned challenges, different kinds of zinc-based flow batteries also encounter many issues individuality, such as the corrosion of bromine in zinc ...

High-voltage and dendrite-free zinc-iodine flow battery
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A High Voltage Aqueous Zinc-Vanadium Redox Flow Battery ...
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A Neutral Zinc-Iron Flow Battery with Long Lifespan and High ...

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Download Citation , On Aug 1, 2025, Haoran Hu and others published High-performance alkaline zinc flow batteries enabled by functional electrolyte additive containing nucleophilic groups , ...

Zincophilic CuO as electron sponge to facilitate dendrite-free zinc

Jan 20, 2025 · This unique strategy is pivotal in mitigating dendritic growth, fostering dendrite-free zinc-based flow batteries with enhanced rate performance and cyclability.

High-performance alkaline zinc flow batteries enabled by ...

Aug 10, 2025 · 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 ...

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