
High-performance zinc-based flow battery

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.

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.

Are zinc-based flow batteries a good choice for scaled energy storage?

In addition to the fully soluble ARFBs mentioned above, zinc-based flow batteries have also made great strides in scaled energy storage due to the inexpensive zinc electrolyte, which can now reach the MW/MWh level 12.

Among them, zinc-based flow batteries show great prospects because of the unique features of zinc electrode including earth abundance, low cost, low electrochemical potential ...

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 ...

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 ...

Benefitting from PST additives, the zinc-iodine flow battery demonstrates a remarkable combination of improved power density (616 mW cm⁻²), enhanced energy ...

As global demand for renewable energy continues to grow, developing efficient, sustainable, and long-term energy storage systems becomes increasingly critical. Zinc-based ...

Researchers reported a 1.6 V dendrite-free zinc-iodine flow battery using a chelated Zn(PPi)₂₆-negolyte. The battery demonstrated stable operation at 200 mA cm⁻² over 250 ...

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

Abstract 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 ...

In addition to the aforementioned challenges, different kinds of zinc-based flow batteries also encounter many issues individually, such as the corrosion of bromine in zinc ...

Abstract Alkaline zinc-iron flow battery (AZIFB) is emerged as one of the cost-effective technologies for electrochemical energy storage application. A cost-effective ion ...

Alkaline zinc-based flow batteries (AZFBs) are considered one of the most promising candidates for large-scale energy storage owing to Zn abundance, cost ...

Zinc-based flow batteries are promising for sustainable energy storage owing to their high energy density and eco-friendliness. When coupling with Mn^{2+}/MnO_2 posolyte, the zinc-manganese ...

The development of cost-effective, safe, and low-corrosion alkaline aqueous redox flow batteries, such as alkaline zinc-iron flow batteries, has motivated the research of ...

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