

Can zinc-iron flow batteries become mainstream





Overview

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 $\text{Fe}(\text{CN})_6^{3-}/\text{Fe}(\text{CN})_6^{4-}$ catholyte suffer from Zn^{2+} $\text{Fe}(\text{CN})_6$ precipitation due to the Zn^{2+} crossover from the anolyte.

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?

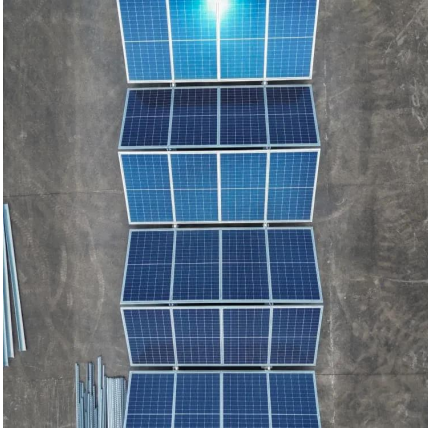
Benefiting from the uniform zinc plating and materials optimization, the areal capacity of zinc-based flow batteries has been remarkably improved, e.g., 435 mAh cm^{-2} for a single alkaline zinc-iron flow battery, 240 mAh cm^{-2} for an alkaline zinc-iron flow battery cell stack, 240 mAh cm^{-2} for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



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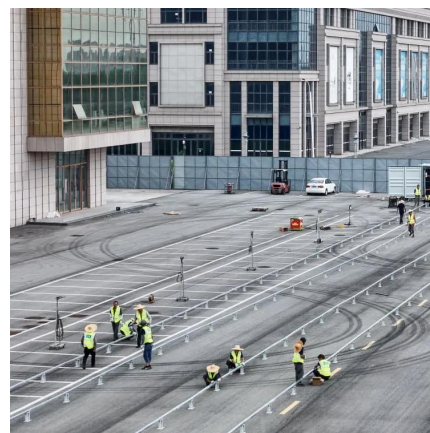
Current situations and prospects of zinc-iron flow battery

However, all kinds of zinc-iron flow battery suffer from zinc dendrite and low areal capacity, which hinders its commercial development. Some prospects for developing new electrolyte, ...



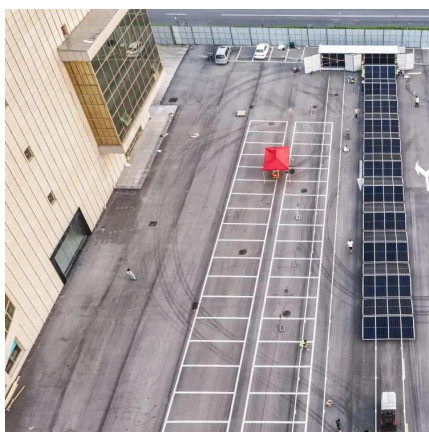
The Application and Prospects of Zinc-Iron Flow Batteries in ...

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Zinc-iron (Zn-Fe) redox flow battery single to stack cells: a

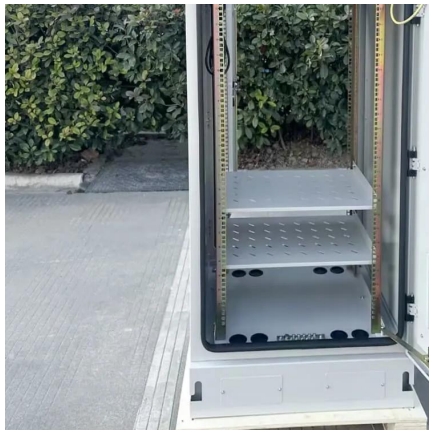
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