ContainerPower Energy Solutions

Overall reaction of zinc-bromine flow battery

Overview

What are zinc-bromine flow batteries?

In particular, zinc-bromine flow batteries (ZBFBs) have attracted considerable interest due to the high theoretical energy density of up to 440 Wh kg−1 and use of low-cost and abundant active materials [10, 11].

Are zinc-bromine flow batteries suitable for large-scale energy storage?

Zinc-bromine flow batteries (ZBFBs) offer great potential for large-scale energy storage owing to the inherent high energy density and low cost. However, practical applications of this technology are hindered by low power density and short cycle life, mainly due to large polarization and non-uniform zinc deposition.

Why does zinc bromide decrease after charging a battery?

Zinc bromide in the electrolyte is confirmed to be depleted, and the actual SoC gradually increases with the progress of battery operation. The decline in the zinc bromide concentration can be explained by the residual zinc on the negative electrode surface after discharging.

Is there a non flow Zinc Bromine battery without a membrane?

Lee et al. demonstrated a non-flow zinc bromine battery without a membrane. The nitrogen (N)-doped microporous graphene felt (NGF) was used as the positive electrode (Figure 11A,B).

Does PNSC increase ion diffusion rate in zinc–bromine flow batteries?

In addition, the highly porous (~2085 m 2 /g) PNSC substantially increased the ion diffusion rate within the electrode framework which led the voltage efficiency of 83 % and energy efficiency of 82 % at 80 mA cm −2. TABLE 2. Comparison of carbon-based electrode materials for Zinc–bromine flow batteries.

How does zinc deposition affect battery performance?

Due to the non-uniform deposition of the zinc, the electric field in this region becomes higher and consumes more Zn 2+ to form dendrite. As the dendrites continue to grow, they can penetrate the membrane and cause short circuiting. Dendrite formation also decreases battery efficiency and potentially causes flow channel blockage.

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