Anode-free zinc new energy battery

Are anode-free zinc batteries a promising energy storage system?
Anode-free zinc batteries (AFZBs) are proposed as promising energy storage systemsdue to their high energy density,inherent safety,low cost,and simplified fabrication process. However,rapid capacity fading caused by the side reactions between the in situ formed zinc metal anode and electrolyte hinders their practical applications.

Are zinc-air batteries anode-free?
The anode-free conceptin zinc-air batteries clearly shows that the deposition from the electrolyte can be preferable to the use of standard metallic zinc anodes.

Are Zn-based batteries anode-free?
However,the Zn-based batteries developed so far utilize an excess amount of Zn (i.e.,thick Zn metal anode),which decreases the energy density of the whole battery. Herein,we demonstrate an anode-free design(i.e.,zero-excess Zn),which is enabled by employing a nanocarbon nucleation layer.

Can aqueous anode-free zinc batteries form a stable interphase?
The work may initiate the research of AFZBs and be useful for the design of high energy, high safety, and low-cost power sources. The authors declare no conflict of interest. Aqueous anode-free zinc batteries (AFZBs) enabled by electrolyte engineering to form a stable interphase are constructed.

What is the charging capacity of an anode-free battery?
As the anode-free battery had no active material in the form of a zinc anode,the electrolytically deposited zinc was determined using Faraday's laws and standardized to the electrode mass. This resulted in a charging capacity of 819 mAh g -1,which corresponded to the theoretical capacity of zinc.

Are Zn-MNO 2 batteries anode-free?
Using this anode-freeconfiguration,we showcase a Zn-MnO 2 battery prototype,showing 68.2% capacity retention after 80 cycles. Our anode-free design opens a new direction for implementing aqueous Zn-based batteries in energy storage systems. To access this article,please review the available access options below. Read this article for 48 hours.

Anode-free zinc batteries (AFZBs) are proposed as promising energy storage systems due to their high energy density, inherent safety, low cost, and simplified fabrication process. However, rapid capacity fading caused by the side reactions between the in situ formed zinc metal anode and electrolyte hinders their practical applications. To ...

Owing to the merits of environmental friendliness and sustainability, aqueous zinc ion battery (AZIB) is considered as a promising energy storage system. Nevertheless, the further application of AZIB is largely

limited by the growth of zinc dendrite and hydrogen evolution reaction of Zn anode. Here, a ?-polyvinylidene fluoride (?-PVDF) nanofiber modified by 1-butyl ...

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Now, scientists have developed a proof-of-concept, rechargeable zinc-ion battery that forgoes a thick anode, giving it a relatively high energy density (Nano Lett. 2021, DOI: 10.1021/acs.nanolett.0c04519). Husam N. Alshareef and Yunpei Zhu of King Abdullah University of Science and Technology and Yi Cui of Stanford University preloaded the ...

Anode-free metal batteries can in principle offer higher energy density, but this requires them to have extraordinary Coulombic efficiency (>99.7%). Although Zn-based metal batteries are promising for stationary storage, the parasitic side reactions make anode-free batteries difficult to achieve in practice. In this work, a salting-in-effect-induced hybrid electrolyte is proposed as an ...

For rechargeable batteries, zinc chemistry presents a low-cost and potentially safer option than lithium and sodium. Those two metals typically use flammable organic electrolytes, while zinc is stable in air and compatible with water-based electrolytes. Now, scientists have developed a proof-of-concept, rechargeable zinc-ion battery that forgoes a thick anode, giving it a relatively ...

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The zinc (Zn) batteries have challenges include uncontrollable dendritic growth, unreasonable negative to positive ratio and limited areal capacity. This highlight presents the latest ...

For the construction of aqueous energy storage devices, metallic zinc has so far remained the most ideal anode candidate due to its high electrical conductivity, easy processability, high compatibility/stability in water, non-flammability, low toxicity, comparatively low price (ca. 2 USD kg -1), and high abundance [20, 21].More importantly, Zn anode possesses ...

Newly-proposed anode-free zinc-ion batteries (ZIBs) are promising to remarkably enhance the energy density of ZIBs, but are restricted by the unfavorable zinc deposition interface that causes poor cycling stability. Herein, we report a Cu-Zn alloy network-modulated zinc deposition interface to achieve stable anode-free ZIBs. The ...

An anode-free Zn-Br2 battery using the Sb/Sb2Zn3-heterostructured interface@Cu anode shows an attractive energy density of 274 Wh kg-1 with a practical ...

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An anode-free Zn-Br2 battery using the Sb/Sb2Zn3-heterostructured interface@Cu anode shows an attractive energy density of 274 Wh kg-1 with a practical pouch cell energy density of 62 Wh...

Anode-free aqueous zinc (Zn) metal batteries (AZMBs) have the advantage of providing higher energy density. However, without excess Zn metal, their cycling life is highly dependent on the reversibility of Zn ...

Thanks to efficient Zn plating-stripping and TFSI - intercalation-deintercalation, an anode-free Zn-graphite dual-ion battery that exhibits impressive cycling stability with 82% capacity retention after 1000 ...

Thanks to efficient Zn plating-stripping and TFSI - intercalation-deintercalation, an anode-free Zn-graphite dual-ion battery that exhibits impressive cycling stability with 82% capacity retention after 1000 cycles is constructed.

Using this anode-free configuration, we showcase a Zn-MnO 2 battery prototype, showing 68.2% capacity retention after 80 cycles. Our anode-free design opens a new direction for implementing aqueous Zn-based batteries in energy storage systems. To access this article, please review the available access options below. Read this article for 48 hours.

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