

Building aqueous k-ion batteries for energy storage

Aqueous sodium-ion batteries show promise for large-scale energy storage, yet face challenges due to water decomposition, limiting their energy density and lifespan. Here, the authors report a cathode surface coating strategy in an alkaline electrolyte to enhance the stability of both electrolyte and battery. Aqueous sodium-ion batteries are practically promising for ...

A new aqueous battery system, differing from traditional ASIBs based on near neutral electrolyte, is presented with a fluorine-free alkaline electrolyte to suppress H₂ evolution on the anode and a Ni/C coating to alleviate both O₂ evolution and electrode dissolution on the cathode. This system achieves long cycling stability (13,000 cycles) and high energy density ...

Building aqueous K-ion batteries for energy storage. ... (AKIBs) are promising candidates for grid-scale energy storage due to their inherent safety and low cost. However, full AKIBs have not yet been reported due to the limited availability of suitable electrodes and electrolytes. Here we propose an AKIB system consisting of an Fe-substituted ...

Potassium-ion batteries (PIBs) have captured rapidly growing attention due to chemical and economic benefits. Chemically, the potential of K⁺/K was proven to be low (-2.88 V vs. standard hydrogen electrode) in carbonate ester electrolytes, which implies a high energy density using K-ion as the charge carrier and a low risk of K plating.

Aqueous electrolytes are praised for their inherent safety, cost-effectiveness, and minimal environmental impact, making aqueous potassium-ion batteries (APIBs) a viable alternative for sustainable and eco-friendly energy solutions. Researchers have endeavored to anode materials that align with the unique requirements of aqueous electrolytes, and some ...

Aqueous batteries are considered as promising alternative power sources due to their eco-friendly, cost-effective, and nonflammable attributes. Employing organic-based electrode materials offers further advantages toward building greener and sustainable systems, owing to their tunability and environmental friendliness. In order to enhance the energy and power ...

A full aqueous K-ion battery system with a Fe-substituted Mn-rich Prussian blue cathode, a PTCDI anode and a 22 M KCF₃SO₃ electrolyte is proposed. The battery exhibits a high energy ...

The inherent short-term transience of solar and wind sources cause significant challenges for the electricity grid. Energy storage systems that can simultaneously provide high power, long cycle life, and high energy efficiency are required to accommodate the fast-changing output fluctuations. Here, an ultrafast aqueous K-ion battery based on the potassium-rich ...

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Building stabilized Cu_{0.17}Mn_{0.03}V₂O₅ ... 2 Li-ion batteries have been widely used as superior energy storage devices with high energy density; ... aqueous metal-ion batteries (AMIBs, metal-ions are Li⁺, 4 Na⁺, 5 K⁺, 6 Mg²⁺, 7 Al³⁺, 8 or Zn²⁺, 9 etc.) with intrinsic safety, higher ionic conductivity, and lower cost have emerged as ...

Two-dimensional (2D) MXenes have garnered considerable critical acclaim in the realm of energy storage [1-6] ene electrodes typically exhibit a capacitive electrochemical characteristic in aqueous environments, where non-Faradaic absorption and pseudo-capacitive behaviors dominate [7-10]. Limited by the sluggish redox of transition metal layers and ...

Aqueous rechargeable metal-ion batteries (ARMBs) hold intrinsic advantages of high safety, low cost and environmental benignity for large scale energy storage technologies. However, the research on aqueous K-ion batteries (AKIBs) was hindered by limited materials.

Aqueous potassium-ion batteries (AKIBs) are promising low-cost and high-safety candidates for large-scale energy storage applications. However, most AKIBs can only operate above -20 °C with a short lifespan at low ...

Aqueous K-ion batteries (AKIBs) are promising candidates for grid-scale energy storage due to their inherent safety and low cost. However, full AKIBs have not yet been reported due to the limited availability of suitable electrodes and electrolytes.

a, The aqueous KIB with a PTCDI anode (left) and a K_{1.85}Fe_{0.33}Mn_{0.67}[Fe(CN)₆]_{0.98}·0.77H₂O Prussian-blue-analogue cathode (right). b, Expanded view of the WISE -- 22 m KCF₃SO₃ salt ...

Rechargeable aqueous batteries are considered to be one of the most effective energy storage technologies to balance the cost-efficiency, safety, and energy/power demands. The further progress of aqueous batteries with high energy density is needed to meet the ever-increasing energy-storage demands.

The aqueous K-ion battery is one of the most promising large-scale energy storage devices. In recent years, although aqueous K-ion batteries have displayed significant achievements, more effort is still required to achieve further progress before practical application. ... Shui M, Cui Y and Shu J 2019 An overview and future perspectives of ...

3 days ago; In pursuing efficient energy storage systems, extensive research has focused on novel materials and composites. Metal-organic frameworks (MOFs), particularly UiO-66, have ...

The first “rocking-chair” NH₄⁺-ion battery of the full-cell configuration is reported by employing an ammonium Prussian white analogue, employing an organic solid, 3,4,9,10-perylenetetracarboxylic diimide, as the anode and 1.0 m aqueous (NH₄)₂SO₄ as the electrolyte. Aqueous rechargeable batteries are promising

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solutions for large-scale energy storage.

Obtaining stable aqueous K-ion capacitors is still challenging due to the cathode materials tended to structurally collapse after long-term cycling during large-radius K-ion insertion/extraction. In this work, three different typical MXene electrodes, i.e., Nb₂C, Ti₂C, and Ti₃C₂ were individually investigated upon their electrochemical behaviors for potassium-ion (K-ion) storage.

Aqueous sodium-ion batteries (ASIBs) are practically promising for large-scale energy storage, but their energy density and lifespan are hindered by water decomposition.

Introduction. The growing demand for large-scale energy storage has boosted the development of batteries that prioritize safety, low environmental impact and cost-effectiveness 1 - 3 cause of abundant sodium resources and compatibility with commercial industrial systems 4, aqueous sodium-ion batteries (ASIBs) are practically promising for affordable, sustainable ...

Energy storage systems that can simultaneously provide high power, long cycle life, and high energy efficiency are required to accommodate the fast-changing output fluctuations. Here, an ultrafast aqueous K-ion battery based on the potassium-rich mesoporous nickel ferrocyanide (II) (K₂NiFe(CN)₆ · 1.2H₂O) is developed.

Today's commercial aqueous batteries lack the energy density and cycle life required to compete in the fast-growing transportation and grid storage sectors, but this will ...

Aqueous full K-ion batteries (AFKIBs) featuring high safety, low cost, and environmental friendliness represent the future of advanced energy storage technologies. However, current AFKIB systems are still in need of suitable electrolytes and electrode materials, not to mention durability. Here, we report a "

Aqueous potassium-ion batteries (AKIBs) are promising low-cost and high-safety candidates for large-scale energy storage applications. However, most AKIBs can only ...

Currently, the major challenge in terms of research on K-ion batteries is to ensure that they possess satisfactory cycle stability and specific capacity, especially in terms of the intrinsically sluggish kinetics induced by the large radius of K⁺ ions. Here, we explore high-performance K-ion half/full batteries with high rate capability, high specific capacity, and ...

High-safety and low-cost aqueous rechargeable batteries are competitive candidates in the energy storage field. Here, we report the outstanding performance of commercial Prussian blue (Fe^{III}₄[Fe^{II}(CN)₆]₃ · 3.4H₂O) in aqueous K-ion batteries. In the half cells, the charge/discharge curves show the quite flat voltage plateaus with ultra-small ...

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A research team from China reports a full aqueous K-ion battery system with high energy density, rate capability and cycling stability. The battery uses a Fe-substituted Prussian blue cathode, a ...

Aqueous K-ion batteries (AKIBs) are promising candidates for grid-scale energy storage due to their inherent safety and low cost. However, full AKIBs have not yet been reported due to the limited availability of suitable electrodes and electrolytes. Here we propose an AKIB system consisting of an Fe-substituted Mn-rich Prussian blue $K_xFe_yMn_{1-y}[Fe(CN)_6]_w \cdot zH_2O$...

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Potassium-ion batteries (PIBs) are a promising alternative given its chemical and economic benefits, making a strong competitor to LIBs and sodium-ion batteries for different applications.

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