Isotope energy storage

Why are hydrogen isotope storage materials important?
Hydrogen isotope storage materials are of great significance for controlled nuclear fusion,which is promising to provide unlimited clean and dense energy. Conventional storage materials of microme...

What is a hydrogen-isotope storage material?
Hydrogen-isotope storage material is an essential component of the system and controls the delivery of fuels9,10,11. Depleted uranium has long been used for hydrogen-isotope storage,but the drawbacks such as spontaneous combustion,radioactivity,scarcity,and high cost limit its application 12,13,14,15,16.

Are hydrogen-isotope storage materials necessary for controlled nuclear fusion?
Nature Communications 14,Article number: 7966 (2023) Cite this article Hydrogen-isotope storage materials are essentialfor the controlled nuclear fusion. However,the currently used smelting-ZrCo alloy suffers from rapid degradation of performance due to severe disproportionation.

How will Isotope electrochemistry affect interstellar travel?
The emergence of isotope electrochemistry is expected to stimulate isotope separation technology and thereby lower the cost of isotope compounds. Furthermore,hydrogen accounts for 75% of total cosmic abundance and makes it a future source of energy for interstellar travel.

Why should we explore Isotope electrochemistry?
We believe that the exploration of isotope electrochemistry will help us to understand the basic laws of subatomic systems and create a better rechargeable world. Y.-G. Guo checked the final manuscript. S. Xin co-supervised the projects and proposed the concepts with X.-T. Li. X.-T. Li proposed the essay structure and viewpoints.

How to reduce the isotope effect during desorption?
To alleviate the isotope effect during desorption,a local coordination design strategystriking a balance between thermodynamic stability and isotope effect is established and validated by a series of ZrCo-based alloys.

As radioactive isotopes decay, their nuclei spontaneously release energy in the form of radiation. The energy can be captured, converted into electricity, and stored, creating a ...

This work provides insights into the interaction between alloy and hydrogen isotopes, thus opening up feasible approaches to support high-performance fusion reactors.

Graphene-based membranes have got significant attention in wastewater treatment, desalination, gas separation, pervaporation, fuel cell, energy storage applications due to their supreme ...

ZrCo, a promising hydrogen isotope storage material, has poor cyclic storage capacity. Here author reveal a defect-derived disproportionation mechanism and report a nano ...

Heavy ion storage rings are powerful tools to store and observe key nuclear properties of rare radioactive isotopes. Recent developments in ring physics and enhanced ...

In brief Water-mediated corrosion remains a critical challenge for aqueous batteries, yet an isotope interface design offers a transformative solution. By strategically overlapping H218O ...

Solid state storage of hydrogen isotopes (H, D and T) in the form of metal hydrides/deuterides/tritides are being considered as the safest and the most advantageous ...

6 · This strategy enables manganese-based Prussian blue cathodes, traditionally incompatible with acid, to achieve 10,000 cycles in strongly acidic solutions. Our findings ...

This perspective paper has reviewed the recent developments in aqueous Li/Na-ion batteries that show promise for achieving safer and more sustainable energy storage.

The invention provides methods, devices and systems for excimer fluorescence energy conversion from isotopes. Unprocessed spent nuclear fuel can be used as an isotope, and ...

Aqueous rechargeable Li/Na-ion batteries have shown promise for sustainable large-scale energy storage due to their safety, low cost, and environmenta...

Introduction Isotope batteries use radioisotope power converters to transform radiation into a useful form of electrical energy. One such radioisotope power converter is the SiC Schottky ...

Aqueous rechargeable Li/Na-ion batteries have shown promise for sustainable large-scale energy storage due to their safety, low cost, and environmental ...

Hydrogen-isotope storage materials are essential for the controlled nuclear fusion. However, the currently used smelting-ZrCo alloy suffers from rapid degradation of performance due to severe ...

Abstract Hydrogen isotope storage materials are of great significance for controlled nuclear fusion, which is promising to provide unlimited clean and ...

The thermoelectric and piezoelectric properties of carbon-based cementitious composites hold significant potential for fulfilling energy storage and harvesting functions in ...

The "National Hydrogen Energy Roadmap" promulgated by the US Department of Energy explains the preparation, storage, transportation, and application of hydrogen energy ...

Isotope energy storage

Fusion energy based on the international thermonuclear experimental reactor (ITER) is considered as one of the most promising energy sources because of tremendous net ...

In the face of global challenges such as energy shortages and environmental pollution, coupled with the widespread adoption of mobile devices, the development of high-performance ...

ZrCo alloy has been considered as one of most promising materials for handling hydrogen isotopes in International Thermonuclear Experimental Reactor (ITER), due to its ...

This review, by experts of Task 40 "Energy Storage and Conversion based on Hydrogen" of the Hydrogen Technology Collaboration Programme of the International Energy ...

Abstract: The invention provides methods, devices and systems for excimer fluorescence energy conversion from isotopes. Unprocessed spent nuclear fuel can be used as an isotope, and ...

This work reveals both fundamental insights and practical guidance for nanoporous materials design and fabrication, which can be applied in hydrogen isotope ...

Zirconium cobalt alloy (ZrCo) is a promising candidate for tritium storage in fusion reactor, but the surface poisoning caused by trace impurities gre...

Scientists are creating tiny, long-lasting nuclear batteries using radiocarbon. These betavoltaic cells could outlast lithium ones and power devices for decades without ...

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