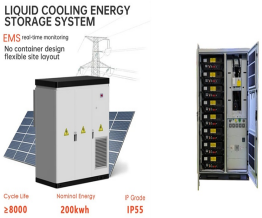
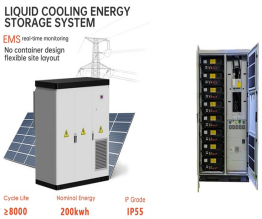
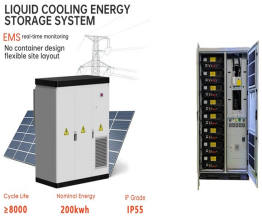
METAL NITROGEN ENERGY STORAGE



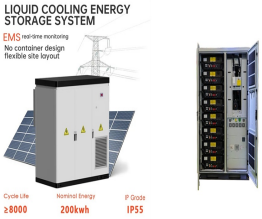
Are transition metal carbides and nitrides suitable for energy storage? High-performance electrode materials are the key to advances in the areas of energy conversion and storage (e.g., fuel cells and batteries). In this Review, recent progress in the synthesis and electrochemical application of transition metal carbides (TMCs) and nitrides (TMNs) for energy storage and conversion is summarized.



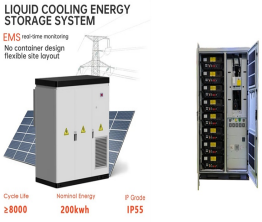
What are metal nitride-based electrochemical energy storage devices? Metal nitride-based electrochemical energy storage devices can also be used with other energy collecting devices such as solar and thermoelectric cells in an electronic circuit to form integrated systems.



Are stable metal nitrides active electrode materials for electrochemical energy storage? Stable metal nitrides as active electrode materials for electrochemical energy storage. A qualitative discussion of electrochemical charge storage mechanism and associated parameters. The strategy of electrode synthesis-process and design of a novel assembly configuration for the supercapacitor device.



Can metal nitrides be used in energy related fields? As a result,metal nitrides show great potentialin energy related fields such as heterogeneous catalysis,photocatalytic induced pollutant removal and energy storage/conversion [,,,]. Fig. 1.



What are electrochemical energy storage devices? On the heels of the rapid development of portable electronics, electric vehicles, and renewable energy, electrochemical energy storage (EES) devices have become more prevalent. Electrode materials are key components for EES devices and largely determine their energy storage performance.

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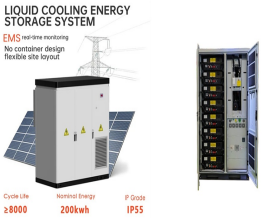
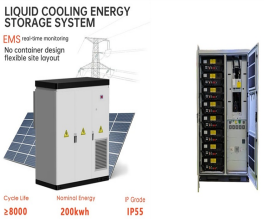


Do metal nitrides affect electro-catalytic properties of TMN? The crystal structures of metal nitrides have great effecton the electro-catalytic properties of TMN. To Fig. out the influence,Yang et al. prepared several cobalt nitrides with different atomic ratio and crystal structure from the same precursor and investigated their ORR catalytic activity.



Historically, transition metal nitrides were synthesized by the metals reacting with flowing nitrogen at high temperature [22, 23].But this route is limited to only certain kinds of nitrides due to the unbreakable nonpolar bond and insurmountable activation barrier of the triple bond in nitrogen (bond energy 940.95 kJ mol ???1) [24].With the advancement of science and ???

Since the 1960s, research has been conducted in the field of metal hydrides [2].So far, the main research lines focus on the identification and optimal combination of possible storage materials (e.g., reactive hydride composites) to achieve the highest possible gravimetric energy storage density (e.g., [3]) addition, there are only few specific examples of ???

According to the bonding strength of metal and nitrogen in the formed metal nitride, the final stable binary nitride possesses unique properties that can be utilized in energy storage applications. Furthermore, several energy storage devices can be designed to fully harness the quality of metal nitrides, such as electrochemical capacitors

Because of accelerating global energy consumption and growing environmental concerns, the need to develop clean and sustainable energy conversion and storage systems, such as fuel cells, dye-sensitized solar cells, metal-air batteries, and Li-CO 2 batteries, is of great importance [1,2,3].These renewable energy technologies rely on several important reactions, ???

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Li metal is an indispensable anode material for realizing high-energy rechargeable batteries owing to its high capacity and low reduction potential [1], [2], [3].However, the nonuniform Li plating and stripping that accompanies extreme volume changes harms the durability of Li metal anodes, resulting in irreparable structural degradation of the solid ???

Transition metal phosphides (TMPs)/carbonaceous matrices have gradually attracted attention in the field of energy storage. In this study, we presented nickel phosphide (Ni 2 P) nanoparticles anchored to nitrogen-doped carbon porous spheres (Ni 2 P/NC) by using metal-organic framework-Ni as the template. The comprehensive encapsulation architecture ???

Originated from the most urgent problem of energy storage and transfer, the wind and solar energy have been considered as the renewable sources that provide energy for human life with an environmental-friendly and economical way. For example, 2D MOFs constructed by metal-nitrogen interaction are well-noted for their stability in both acidic

The activity of many heterogeneous catalysts is limited by strong correlations between activation energies and adsorption energies of reaction intermediates. Although the reaction is thermodynamically favourable at ambient temperature and pressure, the catalytic synthesis of ammonia (NH3), a fertilizer and c Global Energy Challenges: Hydrogen Energy ???

1 Introduction. Nowadays, energy storage devices (ESDs) are playing a crucial role in smart electronics and wearable textiles. Rechargeable batteries (including Li, Na, K, Zn-ions) as well as supercapacitors are being considered as promising energy storage devices for sustainable development of smart electronics. 1-7 While batteries are known for their high energy density, ???

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In recent years, transition metal-nitrogen-carbon (M???N-C) composites are expected to be an alternative to platinum group metal (PGM) among various non-precious metal catalysts investigated. (2018) Functionalization of graphene materials by heteroatom-doping for energy conversion and storage. Prog Nat Sci 28(2):121???132. https://doi

Also, their applications in adsorption, removal and separation mechanisms were reviewed. Further, advances of metal nitride nanostructures in energy storage applications are briefly summarized. At last, after reviewing the literature individual perspectives are shared to explore these novel metal nitride nanostructures for numerous applications.

A facile strategy to enhance the electrochemical energy storage property of sodium was proposed through in situ growth of MoSe 2 on ZIF-8 derived nitrogen-doped porous carbon dodecahedron [110]. For hydrothermal process, the prepared precursors were added in autoclave and maintained at 200 ?C for 24 h.

As an alternative to this energy-consuming and environmentally unfavorable Haber???Bosch process, van Tamelen and Seeley first introduced the electrochemical approach for NH 3 synthesis in early 1969 [12].Later, between 1970 and 2015, only a small number of experiments were conducted to further investigate the electrochemical N 2 fixation process ???

Metal???organic frameworks (MOFs) are the crucial materials for electrochemical energy storage utilization, but their sustainability is questionable due to inaccessible pores, the poor electrical conductivity and limited chemical stability. Carbon and/or nitrogen are donated by X, A represents metal from group 12 (Cd), 13 (Al, Ga, In, Tl

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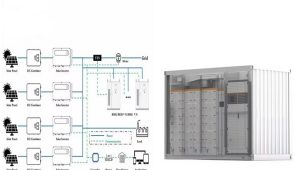
CNT-based metal composites have been an attractive choice for energy storage and conversions [10], [11]. CNTs, prepared by using expensive and complicated instruments at high temperature (>800 ?C), have been used to integrate metallic nanostructures which usually suffer from aggregation and hence, low surface area, hindering the performance in

Energy crisis and environmental problems have become the most pressing challenge of the sustainable development of human society. Rechargeable Zn-air battery has been regarded as one of the promising renewable green energy conversion and storage technology to address the challenges [[1], [2], [3]].

Porous carbons are widely used in the field of electrochemical energy storage due to their light weight, large specific surface area, high electronic conductivity and structural stability. As shown in the previous work, the nitrogen-containing graphene anode material prepared by pyrolysis had a three-dimensional porous structure and

Metal-organic frameworks (MOFs) are a novel class of porous materials with intriguing properties such as high stability, high inner surface areas and tuneable pore sizes. MOFs have also been utilized in adsorption thermal energy storage (ATES) applications; however, very limited information is available from the literature on the performance of



Group IVB-VIB TMNs are interstitial compounds because the atomic size of transition metals is very large having voids and nitrogen being a small atom trapped inside the interstitial sites of the metals [].TMNs are normally of cubic, simple hexagonal and hexagonal close-packed structures with the non-metal atoms haphazardly distributed at the interstitial sites.

Energy Storage Materials. Volume 17, February 2019, Pages 46-61. Tailor-made metal-nitrogen-carbon bifunctional electrocatalysts for rechargeable Zn-air batteries via controllable MOF units. Author links open overlay panel Xuan Zhang a, Jiangshui Luo a b, Heng-Fu Lin c d, Pengyi

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In recent years, supercapacitors have gained importance as electrochemical energy storage devices. Those are attracting a lot of attention because of their excellent properties, such as fast charge/discharge, excellent cycle stability, and high energy/power density, which are suitable for many applications. Further development and innovation of these devices ???

Nitrogen redox chemistry is ubiquitous in the environment and critical to all life, but its applications in electrochemical energy storage are poorly understood. In water, nitrogen is commonly found as nitrate (NO 3 ???), nitrite (NO 2 ???) or ammonium ion (NH 4 ???

1 Introduction Energy, in all of its appearances, is the driving force behind all life on earth and the many activities that keep it functioning. 1 For decades, the search for efficient, sustainable, and reliable energy storage devices has been a key focus in the scientific community. 2 The field of energy storage has been a focal point of research in recent years due to the increasing ???

Hydrogen is a key element in the energy transition. Hydrogen???metal systems have been studied for various energy-related applications, e.g., for their use in reversible hydrogen storage

Ammonia is a promising energy carrier to store and transport renewable energy because of its high energy density and facile storage and transportation 1,2,3.To this end, photon-4,5,6 and electron

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1 ? Fabrication of Liquid Metal-Based Electrode and Energy Storage Device. The stretchable conductive matrix was prepared by dissolving the TPU (0.3 g) with the conductive fillers, ???

Metal???organic frameworks (MOFs), a novel type of porous crystalline materials, have attracted increasing attention in clean energy applications due to their high surface area, permanent porosity

To meet the increasing demand for advanced energy storage systems, it is necessary to exploit new-type batteries with low-cost and high energy density. Sodium-metal groups exhibit relatively larger binding energies (pyridinic N of -3.108 eV, pyrrolic N of 3.01 eV). The main nitrogen-containing functional groups of the NCF are pyridinic N

Instead of generating energy from the breakdown of lithium nitride (Li 3 N) into lithium and nitrogen gas, the researchers'' battery prototype runs on atmospheric nitrogen in ambient conditions and reacts with lithium to form lithium nitride. Its energy output is brief but comparable to that of other lithium-metal batteries.

Electrode materials are key components for EES devices and largely determine their energy storage performance. Transition metal nitrides (TMNs) are promising electrode materials ???

Developing advanced energy devices with long-term operation characteristics has attracted much attention in energy storage and conversion. It proposes new demands for electrode and catalyst

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Keywords: N-doping, mesopore, synthesis, catalysis, energy storage.
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Recent research has witnessed rapid advances in metal-air batteries and recognized Zn-air batteries (ZABs) as one of the most promising energy storage devices. ZABs carry a set of compelling attributes, including high theoretical energy density (1084 Wh kg ???1), inherent safety, low cost, and environmental-friendliness.