Vanadium nitride energy storage mechanism

Why is vanadium nitride important?
The extremely high theoretical capacity,electronic conductivity,and wide voltage range endow vanadium nitride good electrochemical performance,while there are still great difficulties in fabricating vanadium nitride in nanoscale with dramatically improved energy storage ability.

Is vanadium nitride a promising anode material for supercapacitors?
As a promising anode material in supercapacitors,vanadium nitride has been widely concerneddue to its ultra-high theoretical specific capacitance. However,its routine test capacitance value is still far from the theoretical value and its energy storage mechanism is controversial.

Can vanadium nitride be used as a harmful electrode material?
Among these materials,vanadium nitride (VN) has become an up-and-coming candidatefor use as a harmful electrode material due to its high theoretical capacitance (1,350 F g - 1),good electronic conductivity (about 1.6 × 10 6 S m -1),and wide voltage window (~1.2 V) .

Does vanadium nitride exhibit a high-rate pseudocapacitive response in aqueous electrolytes?
Vanadium nitride (VN) electrode displays high-rate,pseudocapacitive responses in aqueous electrolytes,however,it remains largely unclear in nonaqueous,Na +-based electrolytes.

Are transition metal nitrides a good electrode material for energy storage?
The advantageous propertiesof transition metal nitrides (TMNs) as electrode materials in energy storage systems can be attributed to several key factors.

Can vanadium be used as a supercapacitor electrode?
Vanadium-based materials have attracted considerable attentionamong those investigated as electrodes in supercapacitors due to their diverse range of valence states.

It has been suggested that these redox peaks result from successive reductions of vanadium cation from V 5+ to V 2+ at the surface of vanadium nitride [15], [16] and more ...

An arsenal of advanced techniques has been deployed to investigate the pseudocapacitive behavior of sputtered vanadium nitride films in aqueous ...

In this study, we are able to show that the vanadium oxidation state at the surface and the accompanying redox reactions determine the ...

As a promising anode material in supercapacitors, vanadium nitride has been widely concerned due to its

ultra-high theoretical specific capacitance. However, its routine test capacitance ...

PDF | On Apr 10, 2023, Qiulong Wei and others published High-rate sodium-ion storage of vanadium nitride via surface-redox pseudocapacitance | Find, read ...

Unfortunately, the specific capacity of current vanadium-based electrodes is intrinsically limited by zinc site density in crystal structures, probably attributing to the ignore of ...

Exploration of modification mechanism: Despite the promising prospects of nano-VN composites in energy storage, the synergistic mechanism underlying these composites still ...

Therefore, it is particularly important to study its energy storage mechanism to further improve its capacitance in practical applications.

This review summarizes the latest progress and challenges in the applications of vanadium-based cathode materials in aqueous zinc-ion batteries, and systematically analyzes ...

This work supplements the mechanism of vanadium-based rechargeable ZIBs and points out a highway to high capacity aqueous batteries, making it one of the most ...

These outstanding comprehensive performances fully support our hypothesis that unique charging mechanism of MPs VN as anion storage electrode to realize high-performance ...

The extremely high theoretical capacity, electronic conductivity, and wide voltage range endow vanadium nitride good electrochemical performance, while there are still great ...

Abstract Vanadium-based compounds have earned incremental attention as cathode for aqueous zinc ion batteries (AZIBs) due to their ideal electrical conductivity, rich ...

Vanadium nitride (VN) anode follows the surface-redox pseudocapacitive mechanism in the nonaqueous sodium-based electrolyte, ...

High-surface-area early transition metal nitrides such as vanadium nitride (VN) have promising properties for use in energy storage devices, especially supercapacitors, due ...

Vanadium nitride (VN) shows promising electrochemical properties as an energy storage devices electrode, specifically in supercapacitors. However, the pseudocapacitive charge storage in ...

Vanadium nitride (VN) electrode displays high-rate, pseudocapacitive responses in aqueous electrolytes, however, it remains largely unclear in nonaqueous, Na + -based ...

Vanadium nitride energy storage mechanism

In traditional dual-ion systems, the cathode usually is employed as anion-storage materials. Herein, we propose a new dual-ion hybrid supercapacitor with reverse anion/cation-storage ...

The oxygen-free vanadium-based nanomaterials, including vanadium sulfide, vanadium nitride, vanadium carbide, and so forth, have been widely investigated for ...

Ying Liu, Lingyang Liu, Long Kang, and Fen Ran* As a promising anode material in supercapacitors, vanadium nitride has been widely concerned due to its ultra-high ...

This review describes some recent developments of our group in research of transition metal nitride nanocomposites in application of energy storage, especially for lithium ...

As a promising anode material in supercapacitors, vanadium nitride has been widely concerned due to its ultra-high theoretical specific capacitance. However, its routine test capacitance ...

This study not only elucidates the failure mechanism of VN supercapacitor electrodes in alkaline electrolytes, but also provides new insights into enhancing pseudocapacitive energy storage of ...

The major aim of this work is to get some insights in the different redox reactions involved in the charge storage mechanism and to determine the suitable conditions for utilization of VN as ...

In this review, we focus on fi vanadium nitride based anode materials and carefully summary their energy storage mechanisms, applications, advantages and disadvantages, and future ...

Two-dimensional (2D) transition metal nitride MXenes have been explored as promising alternatives to the widely used titanium carbide MXene for electronic and energy ...

The dual energy storage mechanism present in VOVN composites facilitates highly reversible Zn 2+ storage processes within the material structure. Therefore, optimizing ...

Ying Liu, Lingyang Liu, Long Kang, and Fen Ran* As a promising anode material in supercapacitors, vanadium nitride has been widely concerned due to its ultra-high theoretical ...

Abstract Lithium-ion capacitors (LICs) have attracted wide attention due to their potential of achieving merits of high-power output as well as high energy density. However, the ...

As a promising anode material in supercapacitors, vanadium nitride has been widely concerned due to its ultra-high theoretical specific capacitance. ...

Vanadium nitride energy storage mechanism

The obtained vanadium nitride reaches a higher specific capacitance; and further, through ex situ X-Ray diffraction and in situ Raman, the charge storage of vanadium nitride is contributed by ...

Electrochemistry; Energy application; Energy materialsIn traditional dual-ion systems, the cathode usually is employed as anion-storage ...

Furthermore, both of the first principle calculation and extended experiments support this idea. We believe that such detailed research on the energy storage mechanism ...

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