Quasi-crystal energy storage

What is a quasicrystal?

fixed degree of order in its structure, the discovered material was dubbed a quasicrystal.Japan is world leader in quasicrystal research, and has made significant contributions to the area. This a ticle provides an overview of the work being done in quasicrystal research and development. It serves as a follow-up to the discussi

Are quasicrystalline structures true ground states?

Traditionally,density functional theory could not describe quasicrystals as they lack translational symmetry. An ab initio approach now establishes that the quasicrystalline structures of ScZn7.33 and YbCd5.7 are true ground states.

Are quasicrystals thermodynamic or kinetic?

Central to the mystery of quasicrystals are the mechanisms governing their existence and synthesizability. Although over 100 intermetallic quasicrystals have been experimentally characterized 12,13,the thermodynamic and kinetic factors driving quasicrystal formation remain unresolved.

Are quasicrystals a new type of solid?

nce; thus,the validity of quasicrystals as a new type of solid became a subject of debate.

Is the sczn 733 quasicrystal thermodynamically stable?

Although we found the ScZn 7.33 quasicrystal to be thermodynamically stable,we show on a mixed thermodynamic and kinetic phase diagram that its solidification from the melt is limited by nucleation,which illustrates why even stable materials may be kinetically challenging to grow.

Can quasicrystal nanoparticles of increasing size be extrapolated?

Here,we perform first-principles calculations on quasicrystal nanoparticles of increasing size,from which we can directly extrapolate their bulk and surface energies.

Metal-based quasicrystals with unique quasi-periodic atomic arrangements are known to store a large amount of hydrogen under reasonable pressure and temperature for ...

Hydrogen storage in Ti-based quasicrystal powders produced by mechanical alloying :A TAKASAKI,K KELTON,International Journal of Hydrogen Energy,:2006, :72 .

In recent years, the studies of hydrogen storage performance for Ti-based quasicrystal alloys mostly focus on their gaseous hydrogen absorption and desorption ...

Quasicrystals are considered as a new class of intermetallics with the long-range quasiperiodic ordering, and have attracted research interest over the last 3 decades due to ...

6 · Advanced energy management for a Quasi-Z-Source Inverter-based photovoltaic power plant with battery storage using a hybrid LEO-QCGNN approach

The aim of this project is to investigate computationally the main physical properties that nanometre size quasi-crystals (QCs) inherit from the absence of periodicity and to investigate ...

Hydrogen storage properties of these alloys are discussed briefly and pressure composition isotherm measurements are presented and analyzed. A new Ti-Hf-Ni crystal approximant that ...

The Ti-Zr-Ni quasicrystal alloys have prospected to be one of the promising materials for hydrogen storage. This is because this type of quasicrystal contains 140 ...

Quasicrystal Evolution The evolution of quasicrystals in the context of energy-efficient systems has been a fascinating journey since their discovery in 1982 by Dan ...

Traditionally, density functional theory could not describe quasicrystals as they lack translational symmetry. An ab initio approach now establishes that the quasicrystalline ...

Are quasicrystals stable or metastable? Density functional theory (DFT) is often used to evaluate thermodynamic stability, but quasicrystals are long-range aperiodic and their ...

To satisfy different applications (portable electronics, electric vehicles, and large-scale energy storage) and scenarios (hot/cold climate, mountains/sky, and deep sea), the ...

This study marks another step in the development of computing systems of the future, such as quantum supercomputers and energy-efficient data storage technologies.

Another significant trend is the exploration of quasicrystal-inspired materials for energy storage and conversion applications. The unique electronic and thermal properties of ...

Quasicrystals may have important applications as new technological materials. In particular, work in our laboratory has shown that some quasicrystals may be useful as hydrogen-storage ...

3D printing high-efficiency energy storage electrode provides new possibilities for the application of portable and micro devices. This paper reports the preparation of quasi-solid ...

Key market segments for quasicrystal-based energy storage include grid-scale energy storage, electric vehicle batteries, and portable electronic devices. Each of these ...

Nowadays, with the development of new energy vehicles and renewable energy technology, the demand of

energy storage systems has become the sharp focus. However, ...

With increased development and electricity generation, great care to energy storage systems is crucial to overcome the discontinuity in the renewable production. ...

Enhanced electrochemical hydrogen storage performance of Ti49Zr26Ni25 quasicrystal alloy by coating with ZIF-8 derived porous carbon/MoS2 composite

Publications that cite this publication Research progress and development tendency on storage mechanism of multi-principal element alloys for hydrogen/tritium storage

The state of the art of quasicrystal research is critically reviewed. Fundamental questions that are still unanswered are discussed and experimental limitations are considered. Keywords: ...

Project description The aim of this project is to investigate computationally the main physical properties that nanometre size quasi-crystals (QCs) inherit from the absence of periodicity and ...

This uncomplicated and direct device fabrication method, combined with quasi-solid-sate electrolytes featuring high ionic conductivity, holds promise for a variety of ...

This study shows that high-entropy QLD engineering is an applicable tactic for the design of new dielectrics with giant comprehensive energy-storage performance.

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