

European Solar Energy Storage

Antiferroelectric energy storage film



Overview

Antiferroelectric (AFE) HfO₂/ZrO₂-based thin films have recently emerged as a potential candidate for high-performance energy storage capacitors in miniaturized power electronics. Do anti-ferroelectric thin films have high energy storage performance?

Zuhuang Chen; Exploring anti-ferroelectric thin films with high energy storage performance by moderating phase transition. 1 December 2024; 11 (4): 041410.

Are antiferroelectric films suitable for dielectric capacitors?

Antiferroelectric materials represented by PbZrO₃ (PZO) have excellent energy storage performance and are expected to be candidates for dielectric capacitors. It remains a challenge to further enhance the effective energy storage density and efficiency of PZO-based antiferroelectric films through domain engineering.

What are anti-ferroelectric thin films?

Anti-ferroelectric thin films are renowned for their signature double hysteresis loops and sheds light on the distinguished energy storage capabilities of dielectric capacitors in modern electronic devices.

Can antiferroelectric thin films be used in miniaturized power electronics?

Antiferroelectric (AFE) HfO₂/ZrO₂-based thin films have recently emerged as a potential candidate for high-performance energy storage capacitors in miniaturized power electronics.

How does nanoscale heterogeneity affect the energy storage performance of antiferroelectric?

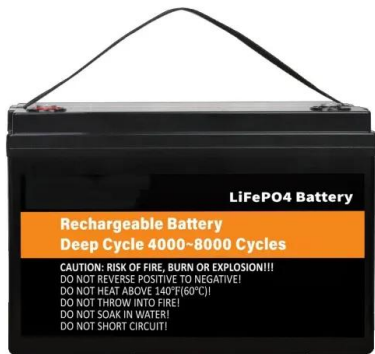
Herein, by engineering the nanoscale heterogeneity to mitigate hysteresis and controlling orientation to enhance the polarization, the exceptional energy storage performance of antiferroelectric (Pb_{0.97}La_{0.02})(Zr_{0.55}Sn_{0.45})O₃

epitaxial thin films is demonstrated.

Are antiferroelectric materials suitable for energy storage applications?

Antiferroelectric materials with double hysteresis loops are attractive for energy storage applications, which are becoming increasingly important for power electronics nowadays. Among them, AgNbO₃ based lead-free ceramics have attracted intensive interest as one of promising environmental-friendly candidates.

Antiferroelectric energy storage film



Superior and ultrafast energy storage performance of

As for thin film applications, dielectric thin film-based energy storage enables the application for flexible and miniaturized electronic devices such as sensors and actuators. ...

Energy storage performance and dielectric tunability of AgNbO

The recoverable energy storage density of AgNbO₃ films indicates good temperature stability with a variation of < 10% between 30 °C and 150 °C and good frequency ...



High energy storage performance of (Pb,La)ZrO₃ thin films on ...

PbZrO₃ (PZO) demonstrates outstanding energy storage properties due to its characteristic electric field-induced antiferroelectric-to-ferroelectric (AFE-FE) phase transition. ...

Effect of Sn⁴⁺ doping on antiferroelectric and energy storage

Effect of Sn⁴⁺ doping on antiferroelectric and energy storage properties of PbHfO₃ thin films prepared by a sol-gel process



Giant enhancement and quick stabilization of capacitance in

The realization of energy storage and release of AFE capacitors is based on the reversible phase transition between antiferroelectric state and ferroelectric (FE) state 12, 13.

Tunable antiferroelectric-like polarization behavior and enhanced

In a summary, this work provides an effective strategy to boost the energy storage performances of dielectric capacitors by constructing an antiferroelectric-like tri-layer ...

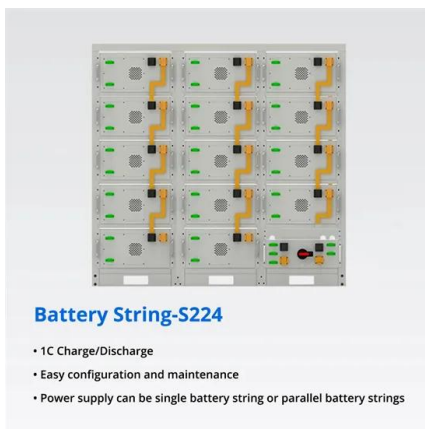


Room-temperature stabilizing strongly competing ferroelectric and

Here, we successfully achieve the room-temperature construction of the strongly competing ferroelectric and antiferroelectric state by strain-mediated phase separation in ...

Tailoring energy-storage performance in antiferroelectric PbHfO₃ thin films

Among all dielectrics, antiferroelectric (AFE) materials have attracted wide attention due to the excellent energy-storage performance. In this paper, PbHfO₃ (PHO) AFE ...



AgNbO₃ antiferroelectric film with high energy storage

Antiferroelectric thin-film capacitors with high energy-storage densities, low energy losses, and fast discharge times. ACS Appl Mater Interfaces 2015;7 (48):26381-6.

Antiferroelectric nano-heterostructures filler for improving energy

Antiferroelectric nano-heterostructures filler for improving energy storage performance of PVDF-based composite films Huayang Zhu a, Xiaohui Liu a, Hairui Bai a, ...



AgNbO₃ antiferroelectric film with high energy storage performance

A recoverable energy density of 5.8 J/cm³ and an energy efficiency of 55.8% are obtained at 600 kV/cm, which demonstrates the great promise of the AgNbO₃ film for energy ...



Tailoring high-energy storage NaNbO3-based materials from

Reversible field-induced phase transitions define antiferroelectric perovskite oxides and lay the foundation for high-energy storage density materials, required for future ...



Large Energy Storage Density and High Thermal Stability in a

...

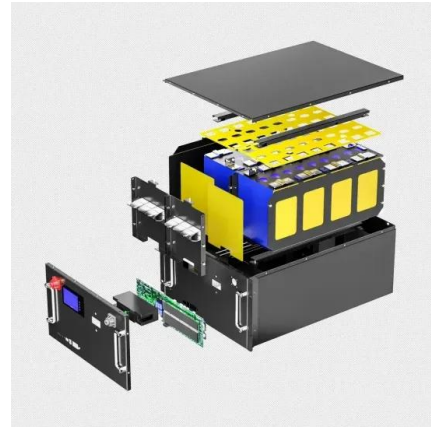
A highly textured (111)-oriented $\text{Pb}_{0.8}\text{Ba}_{0.2}\text{ZrO}_3$ (PBZ) relaxor thin film with the coexistence of antiferroelectric (AFE) and ferroelectric (FE) phases was prepared on a $\text{Pt}/\text{TiO}_x/\text{SiO}_2/\text{Si}(100)$

...



High Energy Storage Performance of All-Inorganic ...

With the increasingly high requirements for wearable and flexible devices, traditional inorganic capacitors cannot meet the flexible demand of next-generation electronic devices. In this work, the energy ...



Self-polarization and energy storage performance in antiferroelectric

The values of recoverable energy storage density of 32.6 J/cm³ and efficiency of 88.1% are obtained for trilayer films annealed at 550 °C, meaning that the design of ...



Superior Energy Storage Performance in ...

A synergistic approach is proposed to achieve state-of-the-art energy storage performance in antiferroelectric thin films, involving the engineering of nanoscale structural heterogeneity to minimize hysteresis ...

Lithium battery parameters

Product capacity: 100Ah

Product size: 135*197*35mm

Product weight: 1.82kg

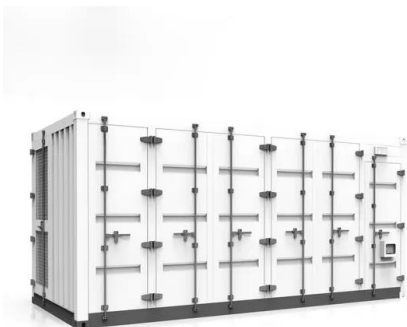
Product voltage: 3.2V

internal resistance: within 0.5



Ultra-high energy storage density and scale-up of antiferroelectric

Antiferroelectric (AFE) HfO₂/ZrO₂-based thin films have recently emerged as a potential candidate for high-performance energy storage capacitors in miniaturized power electronics. ...



Giant energy storage and power density negative capacitance

First, to increase intrinsic energy storage, atomic-layer-deposited antiferroelectric HfO₂-ZrO₂ films are engineered near a field-driven ferroelectric phase transition to exhibit ...



1075KWHH ESS



Antiferroelectric Anisotropy of Epitaxial PbHfO₃ Films for Flexible

In this study, epitaxial antiferroelectric PbHfO₃ films with different orientations are fabricated, in which remarkable anisotropies of polarization and energy storage properties ...

Dielectric properties and energy storage capability of

Dielectric properties and energy storage capability of antiferroelectric Pb_{0.92}La_{0.08}Zr_{0.95}Ti_{0.05}O₃ film-on-foil capacitors - Volume 24 Issue 9



High Energy Storage Performance of All-Inorganic ...

In this work, the energy storage property of all-inorganic flexible films has been systematically studied. PbZrO₃ (PZO) and Al₂O₃ (AO) are selected as the antiferroelectric layer and insulating layer, ...



Ultrahigh energy storage density and efficiency of antiferroelectric

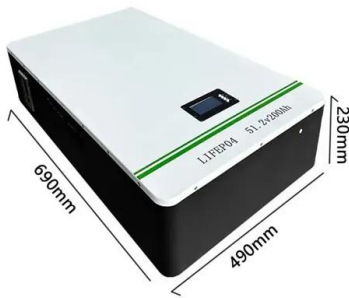
However, low energy-storage density for dielectric capacitors, inferior to other energy storage devices, such as batteries and electrochemical capacitors, has impeded their ...



Significantly improved energy storage properties and cycling

...

Significantly improved energy storage properties and cycling stability in La-doped PbZrO3 antiferroelectric thin films by chemical pressure tailoring



Ferroelectric/paraelectric superlattices for energy ...

The energy density required to charge the system (W_{in}) is equal to the recovered energy density upon discharge (W_{out}) plus the loss (L). Energy densities are proportional to areas in P - e diagrams. In the ...





Enhancement of energy storage density in ...

Moreover, the recoverable energy density was 10.8 J/cm³ at 600 kV/cm, which is 42% higher than that of the pure PZO films. The results demonstrate that adding an appropriate amount of noble metal ...

Antiferroelectric domain modulation enhancing energy storage

Antiferroelectric materials represented by PbZrO₃ (PZO) have excellent energy storage performance and are expected to be candidates for dielectric capacitors. It remains a challenge ...



Antiferroelectric Thin-Film Capacitors with High ...

We demonstrate a capacitor with high energy densities, low energy losses, fast discharge times, and high temperature stabilities, based on Pb_{0.97}Y_{0.02}[(Zr_{0.6}Sn_{0.4})_{0.925}Ti_{0.075}]₃O₃ (PYZST) ...

Ferroelectric/paraelectric superlattices for energy storage

The energy density required to charge the system (W_{in}) is equal to the recovered energy density upon discharge (W_{out}) plus the loss (L). Energy densities are proportional to ...



Enhanced energy storage properties in PbZrO₃ thin films via the

In this work, we try to increase the energy storage performance of PZO antiferroelectric films by adding NiO. The NiO-PZO composite thin films were deposited on ...



Deye Official Store

10 years warranty

Ultra-high energy storage density and scale-up of antiferroelectric

Antiferroelectric (AFE) HfO₂/ZrO₂-based thin films have recently emerged as a potential candidate for high-performance energy storage capacitors in miniaturized power electronics.



Antiferroelectric oxide thin-films: Fundamentals, properties, and

Antiferroelectrics have received blooming interests because of a wide range of potential applications in energy storage, solid-state cooling, thermal ...



Enhancement of energy storage and efficiency in antiferroelectric

Enhancement of energy storage and efficiency in antiferroelectric HfxZr1-xO2 supercapacitors through tailored phase engineering by oxygen vacancy Abstract: In this letter, the ...



Enhanced energy storage in antiferroelectrics via antipolar

This strategy presents new opportunities to manipulate polarization profiles and enhance energy storage performances in antiferroelectrics.

Temperature-dependent antiferroelectric properties ...

Antiferroelectric thin films have attracted blooming interest due to their potential application in energy storage areas. Pb (1-3x/2) La x HfO 3 (PLHO- x, x = 0-0.05) thin films were fabricated on Pt (111)/TiO 2 ...



Contact Us

For catalog requests, pricing, or partnerships, please visit:
<https://bialydom.kolobrzeg.pl>