Ferroelectric energy storagenature

Energy harvesting by utilizing optical control has emerged as a promising solution to alleviate energy and environmental crisis. However, it is challenging to realise nano-scale ...

Fig. 1 | Sketch of energy storage in dielectrics. a, P-E loops in dielectrics with linear, relaxor ferroelectric and high-entropy superparaelectric phases, the recoverable energy density

The findings reveal novel mechanisms of the relationship between energy storage and microstructures, that may be used to propose effective creation strategies or to design ...

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

Ferroelectric polymers are attractive candidates as dielectric materials for electrical energy storage applications, but suffer from large dielectric loss. Here, the authors ...

This study provides evidence that developing high-entropy relaxor ferroelectric material via equimolar-ratio element design is an effective strategy for achieving ultrahigh ...

Electric field induced antiferroelectric-ferroelectric phase transition is a double-edged sword for energy storage properties, which not only offers a congenital superiority with ...

Second, according to the order from the cathode side, the separator membrane to the anode side, the improved performance, the role of ferroelectric polarization and ...

4 · The authors significantly enhance the high-temperature energy storage performance of bismuth sodium titanate-based relaxor ferroelectric multilayer ceramic capacitors via entropy ...

The authors utilize a high-entropy design strategy to enhance the high-temperature energy storage capabilities of BaTiO3-based ceramic capacitors, realizing energy ...

The Nature Index 2025 Research Leaders -- previously known as Annual Tables -- reveal the leading institutions and countries/territories in the natural and health ...

The Nature Index 2024 Research Leaders -- previously known as Annual Tables -- reveal the leading institutions and countries/territories in the natural and health ...

This review addresses the working principles of different types of ferroelectric high power density energy

storage and power generation systems and the ferroelectric materials for ...

High-entropy superparaelectrics with locally diverse ferroic distortion simultaneously achieve ultrahigh energy density and ultrahigh energy storage efficiency under ...

To optimize energy-storage performance, polar nanoregions (PNRs) with low energy barriers for polarization switching are typically constructed through relaxor design, resulting in slim P-E ...

Our experiments and ab initio calculations demonstrate that a defect dipole (udef) composed of Cu3+ and oxygen vacancy in a ferroelectric BaTiO3 ceramic is coupled ...

Antiferroelectric capacitors hold great promise for high-power energy storage. Here, through a first-principles-based computational approach, authors find high theoretical ...

The authors propose a strategy for designing chemical short-range ordering in high-entropy ferroelectric ceramics, where elements with chemical short-range order exhibit ...

Here, we design high-entropy dielectrics starting from the ferroelectric Bi 4 Ti 3 O 12 by introducing equimolar-ratio Zr, Hf and Sn elements into the Ti sites, and La into the Bi ...

However, thus far, the huge challenge of realizing ultrahigh recoverable energy storage density (Wrec) accompanied by ultrahigh efficiency (?) still existed and has become a ...

The authors realize high energy storage performance in polymer-based composites by integrating two-dimensional bismuth layer-structured Na0.5Bi4.5Ti4O15 ...

Dielectric capacitors based on relaxor ferroelectrics are a promising energy storage technology, and an efficient design of relaxors is useful to enhance the storage ...

It is a challenge to control composition gradient of ferroelectric films. Here, the authors develop a solution epitaxy strategy to produce compositionally-graded ferroelectric ...

Application of elascocaloric materials for compact cooling devices at elevated temperature is challenging. This study introduces a ferroelectric polymer which shows rapid ...

The Review discusses the state-of-the-art polymer nanocomposites from three key aspects: dipole activity, breakdown resistance and heat tolerance for capacitive energy ...

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