Defect engineering induces ultra-high energy storage characteristics

How do dielectric energy storage films work?
The dielectric energy storage films must effectively integrate strong relaxor characteristics with high polarization propertiesin order to achieve superior energy storage performance at low electric fields.

How strong is energy storage under a low electric field?
Finally, the Bi 5-x Sm x Mg 0.5 Ti 3.5 O 15 (x = 0.25) film exhibited exceptional Ure (64 J/cm 3), ? (81.1 %), and energy storage response (0.1824 J·cm/kV) under a low electric field of 1856 kV/cm. Energy storage response, denoted as W, which characterizes the strength of energy storage under a unit electric field.

Do defects in carbons affect energy storage and electrocatalytic performance?
Therefore,carbons have broadly been studied and utilized in SCs,rechargeable batteries,and electrocatalytic reactions. [20 - 23]Form the surface structure viewpoint,the introduction of defects in carbons could largelyinfluence their energy storage and electrocatalytic performances.

How does defect engineering affect electrochemical properties?
Defect engineering could modulate the structures of carbon materials, thereby affecting their electronic properties. The presence of defects on carbons may lead to asymmetric charge distribution, change in geometrical configuration, and distortion of the electronic structure that may result in unexpected electrochemical performances.

What is defect engineering?
"Defect engineering" refers to the goal-directed control of the type, concentration, configuration, and spatial distribution of defect to tailor the electrochemical properties of carbon materials. The incorporation of defects on carbons allows for tuning their surface structures and intrinsic properties.

How does defect engineering improve electrochemical performance?
Defect engineering was employed as an effective strategy to modify the composition and structure of carbon materialsfor enhanced electrochemical performances. The presence of defects on carbons yielded changes in their charge/spin redistribution and altered their local electronic structures.

Abstract Ensuring reliable and safe operation of high-power electronic devices necessitates the development of high-quality dielectric nano-capacitors with high recoverable ...

The lead-free BL x TMN (x = 1.0) film demonstrates exceptional energy storage characteristics, offering valuable insights for enhancing energy storage properties and ...

The ultrafast charge/discharge rate and environmentally friendly properties of dielectric ceramics have

garnered significant attention; however, their limited energy storage ...

P d significantly promotes the transformation of polar nano regions to ferroelectric domains during strain-electric field (S-E) cycles, resulting in ultra-high electrostrain. This work proposes a ...

An enhanced energy storage performance has been achieved in BCTZ- x BN ceramics by a novel strategy combining morphology, structure, and A-site defect engineering.

The design of NiMo-LDH/MOF with MOF template forming defect structure provides a new idea for improving electrode performance in energy storage and conversion ...

Request PDF | On Jul 1, 2025, Yuanhao Wang and others published Superparaelectric engineering that induces ultra-wide temperature stability in BNT based dielectric energy ...

In this paper, sintering atmosphere modulated defect engineering was adopted in Na 0.4 K 0.1 Bi 0.5 TiO 3 -based relaxor ceramics, so as to manipulate the defect form and their content ...

Achieving high energy storage performance and ultrafast discharge speed in SrTiO 3 -based ceramics via a synergistic effect of chemical modification and defect chemistry

In this review, we highlight the cutting-edge advances in defect engineering in 2D materials as well as their considerable effects in energy ...

Request PDF | On Mar 23, 2025, Yifeng Xia and others published Enhanced Energy Storage Performance in Mn-Doped SrBi5Ti4FeO18 Thin Films via Defect Engineering | Find, read and ...

Ultra-high energy storage performance in Bi5Mg0.5Ti3.5O15 film via a low temperature-induced ergodic relaxation state Good low-temperature energy storage characteristics are conducive to ...

The sol-gel method was used to fabricate lead-free Bi5-xSmxMg0.5Ti3.5O15 (BSxMTO, x = 0.25) relaxor ferroelectric film, which exhibited a recoverable energy storage density of 64 J/cm3 and ...

Ultra-high energy storage characteristics under low electric field in Sm-doped Bi5Mg0.5Ti3.5O15 films through defect dipole engineering Chemical Engineering Journal (IF 13.2) Pub Date : ...

The authors make multi-oriented nanodomain in BiFeO3-based ceramics via the strategic design of a dipolar region with high resilience to electric fields, achieving high energy ...

An ultra-high recoverable energy storage density of 159.7 J/cm3 and high storage efficiency of 70 % are obtained in such PNP-type heterostructural films, which are ...

Defect engineering induces ultra-high energy storage characteristics

This ultra-high energy storage performance can be attributed to the incorporation of C 6 H 5 O 7 Na 3, which effectively reduces the concentration of VO oo defects generated during the ...

Request PDF | On Jun 1, 2024, Qinpeng Dong and others published Mechanism and simulation analysis of high electric field of NaNbO3 - based energy storage ceramics based on defect ...

Download Citation | On Apr 1, 2025, Yutao Luo and others published Ultrahigh energy storage performance via defect engineering in Sr0.7Bi0.2TiO3 lead-free relaxor ferroelectrics | Find, ...

Article: Ultra-high energy storage characteristics under low electric field in Sm-doped Bi5Mg0.5Ti3.5O15 films through defect dipole engineering

In this review, recent advances in defects of carbons used for energy conversion and storage were examined in terms of types, regulation strategies, and fine ...

Request PDF | On Nov 1, 2024, Dong-Xu Li and others published Defect engineering induced phase competition in BNT-based relaxor ferroelectrics for dielectric energy storage | Find, read ...

Ultra-high energy storage performance in Bi5Ti3Mg2/3Nb1/3O15 film induced by defect dipole engineering Journal of Power Sources (IF 7.9) Pub Date : 2024-02-21, DOI: ...

Ultra-high energy storage characteristics under low electric field in Sm-doped Bi5Mg0.5Ti3.5O15 films through defect dipole engineering Sm ...

Dielectric capacitors are independent in advanced electronics and pulse power systems as an energy storage and conversion medium. However, achieving high energy ...

Zhang, Perovskite Sr1-x (Na0.5Bi0.5)xTi0.99Mn0.01O3 thin films with defect dipoles for high energy-storage and electrocaloric performance, ACS Appl. Mater. Interfaces, No 11, ?. 37947

Defects in nanomaterials have emerged as a pivotal aspect influencing their properties and diverse applications across numerous industries. This compr...

High energy density (Wrec) dielectrics with excellent efficiency (?) and thermal stability are crucial in high-power energy storage applications. ...

Download Citation | On Apr 1, 2025, Quanlong Liu and others published Enhanced low-electric field energy storage characteristics in Mn3+-doped Bi4.75Sm0.25Mg0.5Ti3.5O15 films | Find, ...

Therefore, the BNST-0.08 ceramic is promising candidate environment-friendly materials for advanced pulsed power capacitor applications and the energy storage properties ...

Dielectric energy storage, achieved through the polarization of electric dipoles, exhibits high power density and a moderate level of energy storage density. This capability allows for swift ...

The effects of Bi, Ni and La ion doping on the electrical properties and energy storage properties of the films were studied. When x = 0.04, the film can produce an ultra-high ...

High-performance dielectric energy-storage ceramics are beneficial for electrostatic capacitors used in various electronic systems.