Energy storage properties of antiferroelectric films

Are antiferroelectric films suitable for dielectric capacitors?
Antiferroelectric materials represented by PbZrO 3 (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.

Can antiferroelectric materials be used as energy storage capacitors?
In recent years, antiferroelectric materials have been attracting considerable attention as energy storage capacitors due to their potential applications in pulsed power systems. In this work, antiferroelectric Pb 0.88 Ca 0.12 ZrO 3 (PCZ) thin films were prepared via chemical solution deposition and annealed using rapid thermal annealing.

How can antiferroelectric and relaxor properties improve energy storage performance?
This shows that the combination of antiferroelectric properties and relaxor properties is an effective way to improve the energy storage performance. And it is easier to obtain a higher energy storage density by forming a composite film than by replacing elements. Fig. 5.

What is a relaxor antiferroelectric film?
This film shows obvious relaxor antiferroelectric behavior under about 1000 kV/cm. The combination of antiferroelectric properties and relaxor properties enables this film to obtain high energy storage density of 66.7 J/cm 3, which is higher than that of BBT films and all PZ-based films as much as we can found.

What is a high energy storage density film?
The combination of antiferroelectric properties and relaxor properties enables this film to obtain high energy storage density of 66.7 J/cm 3, which is higher than that of BBT films and all PZ-based films as much as we can found. The variation of both Wrec and i were less than 4% after 5 × 10 7 cycles.

What factors affect the energy storage performance of PZO-based antiferroelectric materials?
In this work,the effects of three variables,misfit strain between the thin film and substrate,defect dipoles doping,and film thickness,on the domain structure and energy storage performance of PZO-based antiferroelectric materials are comprehensively investigated via phase-field simulations.

This material also exhibits good thermal, frequency, and fatigue stability. These results suggest that the energy storage performance of PbHfO 3 -based films can be enhanced through the phase structure design, presenting ...

In this work, AgNbO 3 thin films were deposited on the (001)SrTiO 3 substrates. The crystallographic structure and ferroelectric properties were investigated. It reveals that the ...

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Here, we use first-principles-based simulation methods to investigate the energy-storage properties of a lead-free material, that is, Bi 1-x Nd x FeO 3 (BNFO), which is ...

Antiferroelectric (AFE) films have received a lot of attention for their high energy storage density and temperature stability, giving them potential in electrostatic energy storage devices. In this work, La-doped PZT AFE films ...

Electrostatic energy-storage capacitors, with their ultrahigh storage density and high temperature stability, have been receiving increasing attention of late for their ability to ...

Significantly improved energy storage properties and cycling stability in La-doped PbZrO 3 antiferroelectric thin films by chemical pressure tailoring Journal of the European ...

There are, however, limited reports for the energy storage properties of NNO thin films ... Energy storage properties of antiferroelectric 0.92NaNbO 3-0.08SrZrO 3 film on (001) ...

Energy storage properties of nano-grained antiferroelectric (Pb,La)(Zr,Ti)O 3 films prepared by aerosol-deposition method Abstract: Antiferroelectric films of Sn doped Lead ...

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

We report the energy-storage performance and electric breakdown field of antiferroelectric PbZrO 3 (PZ) and relaxor ferroelectric Pb 0.9 La 0.1 (Zr 0.52 Ti 0.48)O 3 ...

Antiferroelectric materials represented by PbZrO 3 (PZO) have excellent energy storage performance and are expected to be candidates for dielectric capacitors. It remains a ...

In recent years, antiferroelectric materials have been attracting considerable attention as energy storage capacitors due to their potential applications in pulsed power ...

In this work, antiferroelectric Au-PbZrO 3 (Au-PZO) nanocomposite thin films were prepared by chemical solution deposition (CSD), and the effects of Au concentration on ...

With the development of miniaturization, integration and increasing safety demand of energy storage devices, energy storage properties embracing energy storage density, ...

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 ...

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The energy storage properties of antiferroelectric (AFE) Pb0.96La0.04Zr0.98Ti0.02O3 (PLZT 4/98/2) thin films were investigated as a function of ...

In this study, it is aimed to investigate the differences in energy storage properties of Pb 0.925 La 0.05 Zr 1-x Ti x O 3 thin films with different Zr/Ti ratios in the Zr-rich region. The ...

Obviously, the PLZT films exhibiting AFE demonstrate superior energy storage performance, and achieving the highest W rec of 30.8 J/cm 3 and i of 71.5 % are obtained for ...

The energy storage properties of antiferroelectric (AFE) Pb 0.96La 0.04Zr 0.98Ti 0.02O 3 (PLZT 4/98/2) thin films were investigated as a function of temperature and applied electric field. ...

Here, typical relaxor ferroelectric Ba 2 Bi 4 Ti 5 O 18 (BBT) and antiferroelectric PbZrO 3 (PZ) were selected to form BBT/PZ/BBT composite films for high energy storage ...

Antiferroelectric (Pb 0.87 Sr 0.05 Ba 0.05 La 0.02)(Zr 0.52 Sn 0.40 Ti 0.08)O 3 thin film capacitors were fabricated for dielectric energy storage. Thin films with excellent crystal quality (FWHM 0.021°) were prepared on (100) ...

The energy-storage performance and dielectric properties of tape-cast (Pb 0.92 Ba 0.05 La 0.02)(Zr 0.68 Sn 0.27 Ti 0.05)O 3 (PBLZST) antiferroelectric (AFE) thick films with ...

A huge recoverable energy-storage density of 56 J/cm 3 was obtained in antiferroelectric thick films with x = 0.40. Moreover, a good temperature-dependent stability of the energy storage was obtained in the all ...

The properties of the independent relaxor ferroelectric (RFE denoted as R) and antiferroelectric (AFE denoted as A) thin films were compared with their various stack ...

In PbZrO3-based films, we hence realized a record high energy density among all antiferroelectrics of 189 J cm-3 along with a high efficiency of 81% at an electric field of 5.51 ...

The Pb 1-1.5x La x Zr 0.95 Ti 0.05 O 3 films with different La 3+ contents were successfully prepared on the LaNiO 3 /SiO 2 /Si substrates by sol-gel method. The effect of La ...

The present study demonstrates the fabrication of an antiferroelectric 0.92NaNbO 3-0.08SrZrO 3 film deposited on a SrRuO 3 coated (001)SrTiO 3 single crystal substrate by ...

This is not unusual, since energy storage density is a field-dependent parameter and thus the higher the electric field, the greater the energy storage density. However, it is ...

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Antiferroelectric film capacitors have attracted increasing attention due to their excellent energy storage properties. In this work, PbZrO 3 (PZO) antiferroelectric films have ...

In recent years, antiferroelectric materials have been attracting considerable attention as energy storage capacitors due to their potential applications in ...

AgNbO 3-based antiferroelectric materials have attracted extensive attention in energy storage due to their double polarization-electric field hysteresis loops, but they always ...

Here we present a simple and effective method to enhance the energy storage properties of PbZrO 3 antiferroelectric through ionic pair (with small ionic radius) doping. Li + ...

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