Do switchable ferroelectric diode & photovoltaic effects exist in epitaxial bifeo 3 thin films?

Switchable ferroelectric diode and photovoltaic effects in epitaxial BiFeO 3 (BFO) thin films have drawn intense attention for its potential applications in resistive memory and solar cell. However,both of these two effects were observed almost entirely in epitaxial BFO thin films or bulk crystal.

Does a switchable photovoltaic effect exist in ferroelectric materials?

They believed that the inhomogeneous spatial distribution of oxygen vacancies would induce a built-in field whose direction is opposite to the external field. It means the switchable photovoltaic effect can not only exist in ferroelectric materials,but also exists in all structures with Schottky junction.

What are the characteristics of ferroelectric photovoltaics (FPV)?

The fundamentally different mechanism endows ferroelectric photovoltaics (FPV) with unique characteristics, such as switchable photovoltaic outputs (4 - 7), above-bandgap photovoltage (2, 3, 8 - 10), and light polarization dependence (3, 4, 10, 11).

Are switchable diode and photovoltaic effects a problem in BFO-based multifunctional devices?

The observation of switchable diode and photovoltaic effects in BFO reveals unusual and intriguing charge conduction behavior in leaky ferroelectrics, and should ad-vance studies of BFO-based multifunctional devices. J. F. Scott, Ferroelectric Memories (Springer, Heidelberg, Germany, 2000).

Can photovoltaic effect and Rs effect coexist in ferroelectric diodes?

It has been reported ferroelectric photovoltaic effect and RS effect can coexistand affect each other in ferroelectric diodes [29,89,94]. According to the conduction mechanism analysis of these two effects,both PV and RS are affected by the interface coupling effect.

Why are ferroelectric materials important in photovoltaic and storage applications?

In recent years,ferroelectric materials attract much attention due to their great potentialin photovoltaic and storage applications,especially the anomalous photovoltaic effect (APVE) and resistive switching (RS) behaviors.

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

Here we report that a popular all-inorganic halide perovskite nanocrystal, CsPbBr 3, exhibits a ferroelectricity-driven photovoltaic effect under visible light in the absence of an external electric field.

We investigated a switchable ferroelectric diode effect and its physical mechanism in Pt/BiFeO 3 /SrRuO 3 thin-film capacitors. Our results of electrical measurements support that, near the Pt/BiFeO 3 interface of as-grown samples, a defective layer (possibly an oxygen-vacancy-rich layer) becomes formed and disturbs carrier injection. We therefore used an ???

The switchable photovoltaic effect in BiFeO3 thin films capacitors has been studied extensively. However, the origin of the photovoltaic response is still under We suggest that the Schottky barrier modulation by ferroelectric polarization at the Pt/BiFeO 3 interface is mainly responsible for the photovoltaic effect,

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

It is found that bulk electric conduction in ferroelectric monodomain BiFeO3 crystals is highly nonlinear and unidirectional. Unidirectional electric current flow, such as that found in a diode, is essential for modern electronics. It usually occurs at asymmetric interfaces such as p-n junctions or metal/semiconductor interfaces with Schottky barriers. We report on a diode effect ???

phenomenon to bulk effects. This switchable ferroelectric-diode effect may enable novel applications, such as ferro-electric resistive memory with a nondestructive readout.4,10 11 Additionally, Jiang et al.15 reported switchable diode effects using BiFeO 3 thin-???lm capacitors, attributing the phenomena to oxygen-vacancy (V

Mechanism of the Switchable Photovoltaic Effect in Ferroelectric BiFeO 3. H. T. Yi, H. T. Yi. Rutgers Center for Emergent Materials, Dept. Physics and Astronomy, Rutgers University, Piscataway, NJ 08854, USA Directions of rectification and photocurrent in a ferroelectric BiFeO 3 crystal can be switched by applying high-voltage pulses at

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

The ferroelectric photovoltaic (PV) effect has gained widespread attention in the past decade 1,2,3,4,5 because of its promising applications in solar energy harvesting 6,7,8, self-powered

Ferroelectric materials are interesting due to their spontaneous polarization which is essential for device applications. 1,2 Moreover, they show an intrinsic photovoltaic (PV) response arising from a strong coupling between light, photocurrents, and atomic-scale degrees of freedom that cause a current-driven modulation of the internal field. 3 PV properties in both ???

polarization when a ferroelectric under continuous light illumination forms a closed circuit. This PV effect in ferroelectrics is distinctly different from the typical PV effect in semiconductor p-n junctions, and was investigated, for example, in Pb-based ferroelectric oxides (9???11) and LiNbO3 (6, 8). However, the observed photocurrent

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

The switchable photovoltaic effect would be ascribed to the reversible Schottky-to-Ohmic interfacial contacts modulated by polarization switching. Both the polarization-electric field (P-E) loops and ferroelectric photovoltaic effect were measured using the TF-Analyser 1000 of aixACCT ferroelectric test system at room temperature. The

Semantic Scholar extracted view of "Switchable ferroelectric diode and photovoltaic effects in polycrystalline BiFeO3 thin films grown on transparent substrates" by Yong Zhou et al. The switchable photovoltaic effect in BiFeO3 thin films capacitors has been studied extensively. However, the origin of the photovoltaic response is still under

This study presents a promising FPV based on hexagonal YbFeO3 (h-YbFO) thin-film heterostructure by exploiting its narrow Eg and demonstrates enhanced FPV effects by suitably exploiting the substrate-induced film strain in these h-YBFO-based photovoltaics. Ferroelectric photovoltaics (FPVs) are being extensively investigated by virtue of switchable ???

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

The switchable nature of the photogenerated voltage and current, as illustrated in Fig. 7 for the poled samples, indicated that the ferroelectric polarization plays a dominant role in the observed bulk photovoltaic effect in ZnSnS 3 thin films deposited by the pyrolysis technique.

Electric-field control over domain structure allows the photovoltaic effect to be reversed in polarity or turned off. Choi, Y. J., Kiryukhin, V. & Cheong, S.-W. Switchable ferroelectric diode

In recent years, ferroelectric materials attract much attention due to their great potential in photovoltaic and storage applications, especially the anomalous photovoltaic effect ???

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

Enhanced photovoltaic effects are demonstrated in an In 2 O 3-SnO 2 /BiFe 0.6 Sc 0.4 O 3 /LaNiO 3 (ITO/BFSO/LNO) ferroelectric thin film heterostructure. The Sc-substitution greatly improves the bulk conductivity of BiFeO 3 (BFO) and modifies the energy band alignment in the ITO/BFSO/LNO capacitor structure, where a tunable Schottky-to-Ohmic contact at the ???

Meanwhile, the internal mechanism for the enhancement of switchable photovoltaic response by ferroelectric polarization was further elucidated. This proposes a simple idea to enhance the switchable ferroelectric photovoltaic effect and provides a promising pathway for the development of photovoltaic devices. 2. Methods2.1.

More importantly, the BFCO devices show switchable ferroelectric photovoltaic effects and diode-like rectification effects. The J SC and V OC of the present films have increased from 1.87 ? 1/4 A/cm 2 and ???0.24 V to 3.40 ? 1/4 A/cm 2 and ???0.42 V, respectively. The present work can promote the application of the BFCO system in the photovoltaic and

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

Recently, ferroelectric semiconductors with strong spin-orbit coupling emerged as theoretically promising candidates for previously unavailable electronic functionalities such as spin-orbitronics, by exploiting the electric field???switchable Rashba-Dresselhaus effect (1???6).The ability to break inversion symmetry in a field-dependent manner is the primary source of this ???

Switchable ferroelectric diode and photovoltaic effects in epitaxial BiFeO 3 (BFO) thin films have drawn intense attention for its potential applications in resistive memory and solar cell. However, both of these two effects were observed almost entirely in ???

The switchable photovoltaic effect contributes to the production of proficient solar cells with high photovoltage in the absence of transparent electrodes, which are in short supply. Moving further to the photovoltaic effect in ferroelectric oxide perovskites, the mechanism is still unclear as the research findings have different degrees of

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

The bulk photovoltaic effect that is intimately associated with crystalline symmetry has been extensively studied in various nonmagnetic materials, especially ferroelectrics with a switchable electric polarization. In order to further engineer the symmetry, one could resort to spin-polarized systems possessing an extra magnetic degree of freedom.

Ferroelectric all-inorganic halide perovskites nanocrystals with both spontaneous polarizations and visible light absorption are promising candidates for designing functional ferroelectric photovoltaic devices. Three dimensional halide perovskite nanocrystals have the potential of being ferroelectric, yet it remains a challenge to realize ferroelectric photovoltaic ???

The bulk photovoltaic effect (BPVE) rectifies light into the dc current in a single-phase material and attracts the interest to design high-efficiency solar cells beyond the pn junction paradigm.

SWITCHABLE FERROELECTRIC PHOTOVOLTAIC EFFECTS

It is noted that the target device produced a negative V OC and positive J SC regardless of the upward-P or downward-P state, which is different from the general ferroelectric PV modulation showing switchable V OC and J SC with reversing poling direction due to the bulk PV effect [33]. This feature is ascribed to the coupling of polarization