

# Ferroelectric photovoltaic devices





## Ferroelectric photovoltaic devices

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### An overview on ferroelectric photovoltaic materials

Therefore to design highly efficient ferroelectric device with enhanced output, ferroelectric device with different styles of electrode configurations should be optimized. Ma et al. suggested that electrode-configuration-design is an attractive route for manipulating the photosensitivity and an enhanced photocurrent was achieved by them on the planar-structured ...

### Applications of ferroelectrics in photovoltaic devices: Special issue

We review the foundations and recent progress in ferroelectric materials for photovoltaic applications, including the physics of ferroelectricity, nature of ferroelectric thin films



### Large ferroelectric-polarization-modulated photovoltaic effects in

Ferroelectrics are appealing candidates for photovoltaic applications. In this study, Bi<sub>5</sub>FeTi<sub>3</sub>O<sub>15</sub> (BFTO) single layer and ZnO/BFTO bilayer films were deposited onto 0.7 wt% Nb-doped SrTiO<sub>3</sub> (NSTO) electrically conducting single-crystal substrates to form Ag/BFTO/NSTO and Ag/ZnO/BFTO/NSTO photovoltaic devices.

### Photon upconversion assisted ferroelectric photovoltaics: Device

This work presents a novel paradigm for upconversion-assisted ferroelectric photovoltaic



devices. The system comprises a ferroelectric active layer (BiFeO<sub>3</sub>), an upconverter layer (Yb; Er-doped ZnO), a conductive ITO-coated glass substrate, and a reflective coating (Al) at the rear end of the glass substrate.



### Ferroelectric Photovoltaic Materials and Devices

?: Ferroelectric materials have been a focus of much research over the last few decades for their unique piezoelectric and optoelectronic properties. Conventional solar cells have been devised based on the photovoltaic effect of semiconductor p-n junctions, with

### Arising applications of ferroelectric materials in photovoltaic ...

The ferroelectric-photovoltaic (FE-PV) device, in which a homogeneous ferroelectric material is used as a light absorbing layer, has been investigated during the past several decades with ...



### Insights into the relationship between ferroelectric and photovoltaic

Devices based on ferroelectric photovoltaic materials yield an open-circuit voltage that is much higher than the band gap of the corresponding active material owing to a strong internal electric field. Their efficiency has been proposed to exceed the Shockley In this



## Ferroelectric Photovoltaic Materials and Devices

This paper reviews a variety of ferroelectric photovoltaic materials, the mechanism of ferroelectric photovoltaics, approaches for improving ferroelectric photovoltaic performance, and the applications and future ...



### An overview on ferroelectric photovoltaic materials

Most of the ferroelectric PV devices have been designed in sandwiched structure, and their output has been limited by the thickness of fabricated ferroelectric films. Therefore to ...

## Ferroelectric Photovoltaic Materials and Devices

Ferroelectric materials have been a focus of much research over the last few decades for their unique piezoelectric and optoelectronic properties. Conventional solar cells have been devised based on the photovoltaic effect of semiconductor p-n junctions, with their



### Electrospun bismuth ferrite nanofibers for potential applications in

T1 - Electrospun bismuth ferrite nanofibers for potential applications in ferroelectric photovoltaic devices AU - Fei, Linfeng AU - Hu, Yongming AU - Li, Xing AU - Song, Ruobing AU - Sun, Li AU - Huang, Haitao AU - Gu, Haoshuang AU - Chan, Helen L.W.



[\(PDF\) Ferroelectric Photovoltaics](#)

Above-Bandgap Voltages From Ferroelectric Photovoltaic Devices Article Full-text available Feb 2010 Nat. Nanotech. S. Y. Yang Jan Seidel Steven Byrnes Rubika Ramesh In conventional solid-state



**Photovoltaic Devices and Photodetectors , SpringerLink**

The ferroelectric-photovoltaic devices have a great potential in future application as solar cells [5, 25, 26], optically triggered memories [17, 27, 28], and optical transistors []. Fig. 5.1 A diagram presenting a photocurrent generation a and energy band diagram b

**Ferroelectric Photovoltaic Materials and Devices**

Researchers have shown that the photogenerated current of ferroelectric photovoltaic devices can be significantly improved by cation doping and heterostructure construction, reigniting the



**Multifactorial coupling to greatly enhance photocurrent density of**

2 ???· The ferroelectric photovoltaic effect in BiFeO3 has attracted much attention recently. However, the potential of BiFeO3 as a photovoltaic material is limited due to its low photocurrent density and consequently low power conversion efficiency. Herein, a novel ferroelectric photovoltaic architecture based on the (Pr, Ni) gradient-doped BiFeO3-based thin film coupled ...



### Ferroelectric Photovoltaic Materials and Devices

Ferroelectric materials have been a focus of much research over the last few decades for their unique piezoelectric and optoelectronic properties. Conventional solar cells have been devised based on the photovoltaic effect of semiconductor p-n junctions, with their



### Ferroelectric ZnSnS3 thin films: growth and measurement of photovoltaic

Thus, comparing the ferroelectric photovoltaic properties, LN-ZnSnS 3 would be highly effective to overcome the major limitations of the conventional ferroelectric PV devices. In addition, the constituent elements in LN-ZnSnS 3 are non-toxic, earth-abundant, and relatively cheaper, making this material an ideal candidate for photovoltaic device fabrication.

### Enhancing ferroelectric photovoltaic effect by polar ...

Ferroelectric materials for photovoltaics have sparked great interest because of their switchable photoelectric responses and above-bandgap photovoltages that violate conventional photovoltaic theo



### Above-bandgap voltages from ferroelectric photovoltaic devices

In this paper, we describe a new mechanism of charge separation and photovoltage generation that occurs exclusively at nanometre-scale ferroelectric domain walls ...



### Enhanced photovoltaic and piezo-photovoltaic effects in flexible ...

The ferroelectric photovoltaic (FePV) devices have attracted renewed attention. Flexibility is one of the development directions, which can be of vital importance in both industrial production (with the roll-to-roll speedy process) and applications (easy installation on



### Switchable Bulk Photovoltaic Effect in Intrinsically Ferroelectric 3D

Ferroelectric all-inorganic halide perovskite nanocrystals with both spontaneous polarization and visible light absorption are promising candidates for designing ferroelectric ...



### Above-bandgap voltages from ferroelectric photovoltaic devices.

DOI: 10.1038/nnano.2009.451 Corpus ID: 16970573 Above-bandgap voltages from ferroelectric photovoltaic devices. @article{Yang2010AbovebandgapVF, title={Above-bandgap voltages from ferroelectric photovoltaic devices.}, author={Sui Yang and Jan Seidel and Jan Seidel and Steven J. Byrnes and Steven J. Byrnes and Padraic Shafer and Chan-Ho Yang and Marta D. Rossell ...



### Understanding the efficacy of electron and hole transport layers in

DOI: 10.1016/j.solener.2020.07.032 Corpus ID: 225257215 Understanding the efficacy of electron and hole transport layers in realizing efficient chromium doped BiFeO3 ferroelectric photovoltaic devices @article{Renuka2020UnderstandingTE, title={Understanding



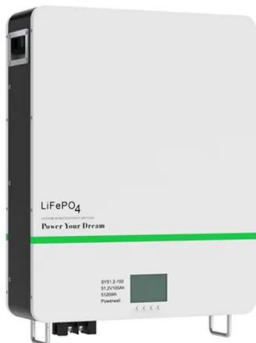
### Enhanced bulk photovoltaic effect in two-dimensional ferroelectric

Here we report the bulk photovoltaic effect in two-dimensional ferroelectric  $\text{CuInP2S6}$  with enhanced photocurrent density by two orders of magnitude higher than ...



### Non-volatile memory based on the ferroelectric photovoltaic effect ...

Prototype device characterization To assess the scalability of the photovoltaic effect-based FeRAM, we have prepared and tested a prototype memory using the cross-bar architecture. The bottom La 0



### Applications of ferroelectrics in photovoltaic devices

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### Perovskite oxides for visible-light-absorbing ferroelectric and

Ferroelectrics have recently attracted attention as a candidate class of materials for use in photovoltaic devices, and for the coupling of light absorption with other functional properties 1,2,3



### Efficient molecular ferroelectric photovoltaic device with high

In summary, a high current density of ferroelectric photovoltaic device has been fabricated by one type of organic-inorganic hybrid ferroelectric thin film with a band gap of 2.3 eV smaller than that of traditional inorganic oxide ferroelectric materials.



### Metal-free chiral molecular ferroelectric photovoltaics

Ferroelectric semiconductors have gained significant attraction for designing photovoltaic devices. However, their wide bandgap results in poor absorption of visible light. Herein, we report a pair of chiral metal-free molecular ferroelectric semiconductors (1R,4R/1S,4S-C 5 H 10 NO)I 3 (R/S-OABHI; (1R,4R/1S,4S-C 5 H 10 NO) + = 1R,4R/1S,4S-2-oxa-5 ...



### Bulk photovoltaic effect in ferroelectrics

The bulk photovoltaic (PV) effect in ferroelectric materials has attracted worldwide attention for novel optoelectronic applications utilizing above-bandgap photovoltages, light-polarization-dependent photocurrents, ...

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Perovskite solar cells with ferroelectricity

As a matter of fact, the ferroelectricity of photovoltaic devices has long been reported before perovskite solar cells. It has been demonstrated that the polarization-induced electric field intensity of ferroelectric materials is approximately 1-2 orders of magnitude

**Reaching the Potential of Ferroelectric Photovoltaics**

Developing ferroelectric materials with low bandgaps, engineering electrodes to optimize charge extraction, and advancing FePv device architectures are the next steps needed to reach the full potential of ferroelectric photovoltaics.



**Reaching the Potential of Ferroelectric Photovoltaics**

Single layer ferroelectric photovoltaics (FePvs) were originally predicted to have a maximum power conversion efficiency (PCE) less than 0.01% based on calculations of the theoretical lifetimes of thermalized and nonthermalized electrons. The current PCE record



**Dual polarization-enabled ultrafast bulk photovoltaic response in ...**

The bulk photovoltaic effect (BPVE) has potential for the realization of high conversion efficiency optoelectronic devices. Here, the authors show that combined in-plane and out-of-plane charge

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