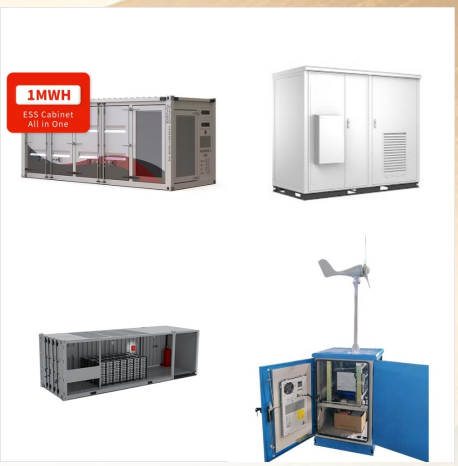
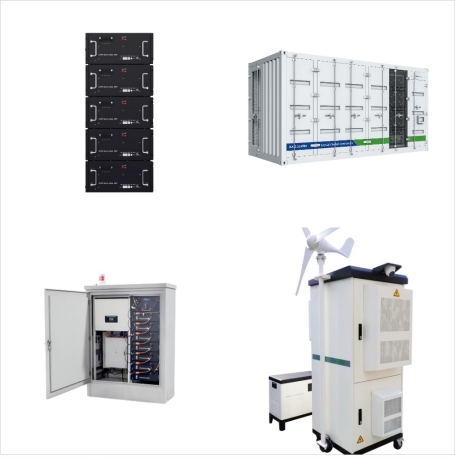


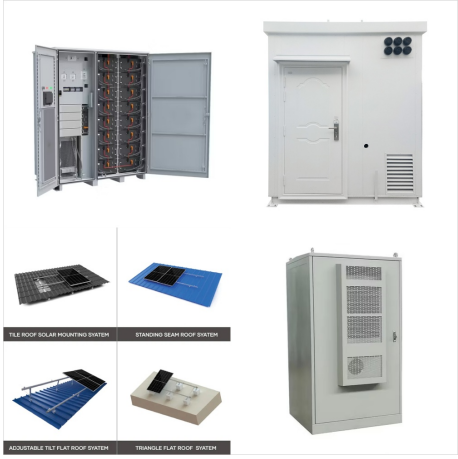
For this purpose, photovoltaic conversion of solar energy into electricity with solar cells is a promising and attracting way in that solar energy is clean and inexhaustible. Nowadays, the bottleneck in the application of solar cells on a large scale to sustainable energy generation still lies in lacking an efficient, stable and low-cost

Despite their potential to exceed the theoretical Shockley-Queisser limit, ferroelectric photovoltaics (FPVs) have performed inefficiently due to their extremely low photocurrents. Incorporating Bi2FeCrO6 (BFCO) as the light absorber in FPVs has recently led to impressively high and record photocurrents [Nechache et al. Nature Photon. 2015, 9, 61], ???

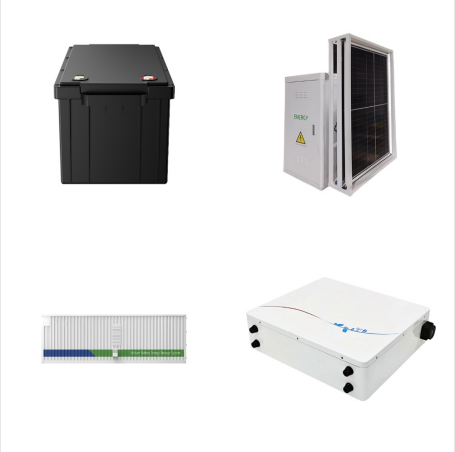


In this work, we report the fabrication of Pt/i-n/ITO, Pt/p-i/ITO, and Pt/p???i???n/ITO heterojunction photovoltaic (PV) devices, where i is the lead-free 2% Cr doped BiFeO 3 (BFCrO) ferroelectric, n is the WS 2 electron transport layer (ETL), p is the NiO hole transport layer (HTL), and Pt and ITO are the top and bottom electrodes, respectively. In the tandem structure, the ???

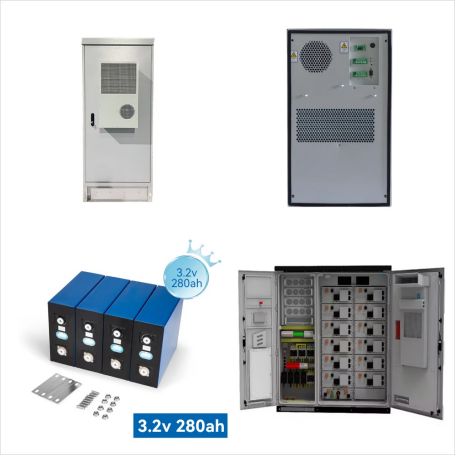
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Solar energy conversion using semiconductors to fabricate photovoltaic devices relies on efficient light absorption, charge separation of electron-hole pair carriers or excitons, and fast

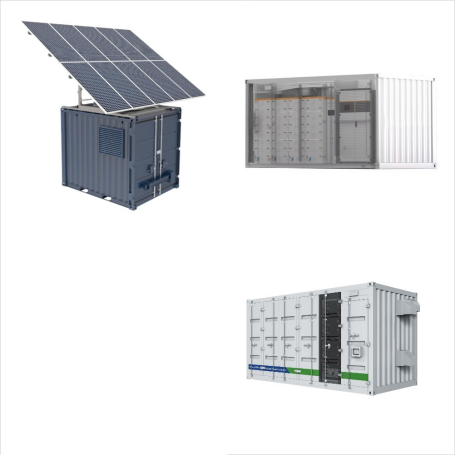


The devices show the unique characteristics of ferroelectric photovoltaic devices with switchable diode polarity and tunable efficiency, which are 10-20% higher than those achieved by other methods, such as morphology and electrode work-function optimization. The recombination of electrons and holes in semiconducting polymer-fullerene blends has been identified as a ???

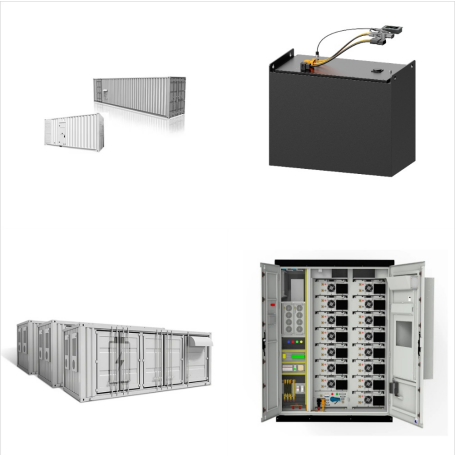


A key requirement for realizing efficient organic photovoltaic (OPV) cells is the dissociation of photogenerated electron-hole pairs (singlet-excitons) in the donor polymer, and charge-transfer-excitons at the donor???acceptor interface. However, in modern OPVs, these excitons are typically not sufficiently harnessed due to their high binding energy. Here, we show that doping the ???

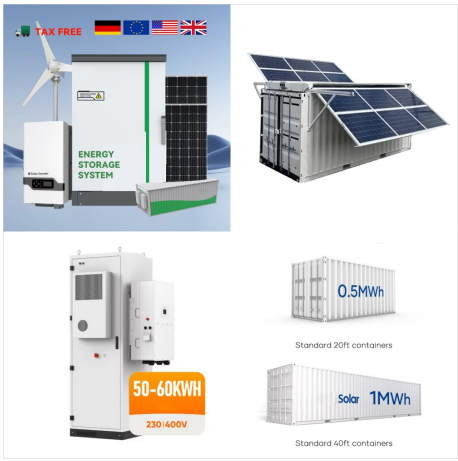
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



The anomalous photovoltaic effect and resistive switching behaviors in ferroelectric materials attract much attention in recent years. Dozens of researches revealed that the two effects coexist and affect each other in electrode/ferroelectric/electrode structures. Therefore, the conductive mechanisms and research progresses of the two effects were discussed in this ???

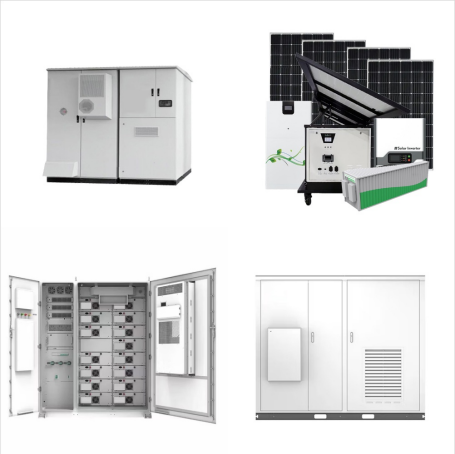


PbTiO3 (PTO) is explored as a versatile and tunable electron???selective layer (ESL) for perovskite solar cells. To demonstrate effectiveness of PTO for electron???hole separation and charge transfer, perovskite solar cells are designed and fabricated in the laboratory with the PTO as the ESL. The cells achieve a power conversion efficiency (PCE) of ???12.28% upon ???

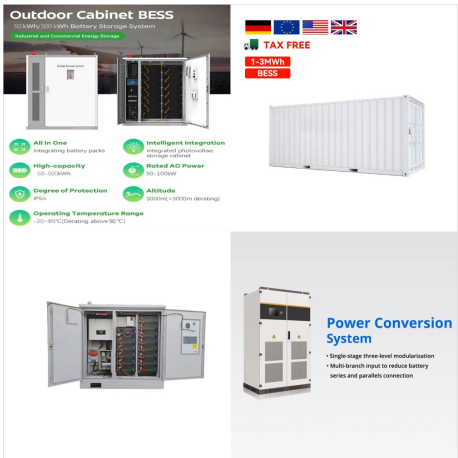


The potential gradient due to the ferroelectric polarization supports the electron-hole separation and a spectroscopic limited maximum efficiency of 27% confirms excellent potential in solar cell

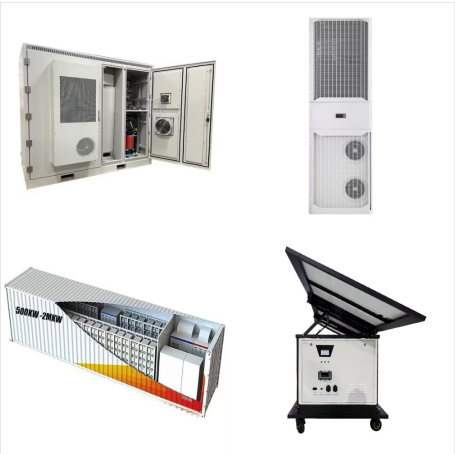
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



We report large photovoltaic enhancement by A-site substitutions in a model ferroelectric photovoltaic an additional degree of freedom to further boost photovoltaic efficiency in ferroelectrics and related materials. absorption within the visible energy range while reducing the electron-hole recombination rate because of the separation

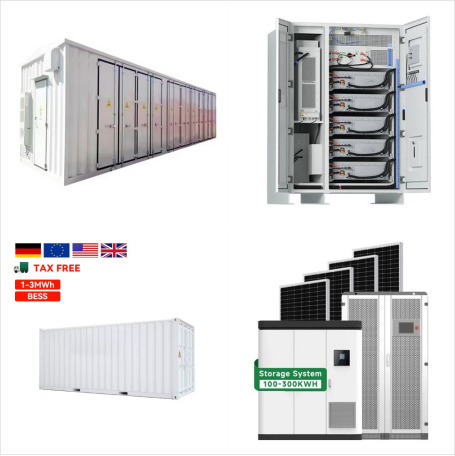


We explore 44 additional Bi-based ferroelectric oxides in a double-perovskite structure and suggest five materials that offer the combined benefits of efficient e-h separations and visible-light absorptions for FPV applications.

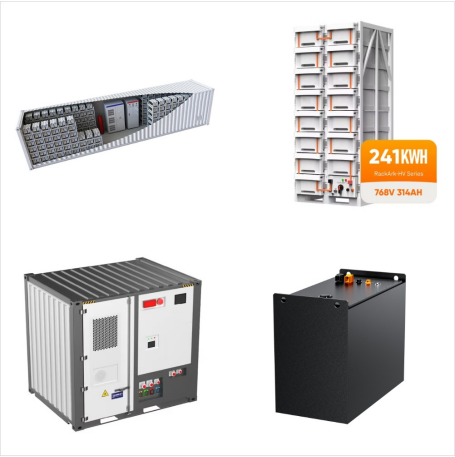


Here, we use first-principles calculations to determine that such excellent performance mainly lies in the efficient separation of electron??? hole (e-h) pairs. We show that photoexcited electrons ???

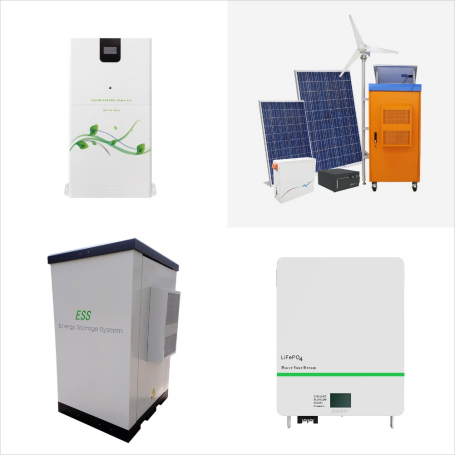
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Here, we use first-principles calculations to determine that such ex-cellent performance mainly lies in the efficient separation of electron ??? hole (e-h) pairs. We show that photoexcited electrons ???

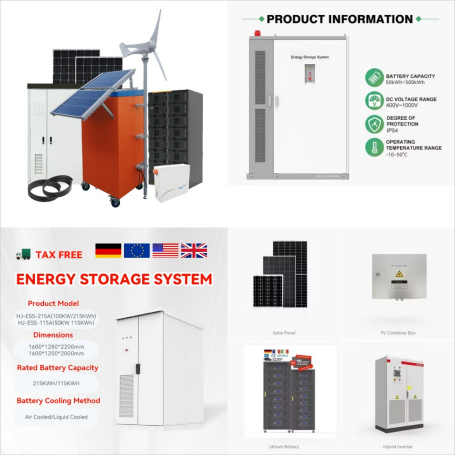


Electron???hole separation in ferroelectric oxides for efficient photovoltaic responses. we use first-principles calculations to determine that such excellent performance mainly lies in the efficient separation of electron??? hole (e-h) pairs. Donghoon et al. "Electron???hole Separation in Ferroelectric Oxides for Efficient

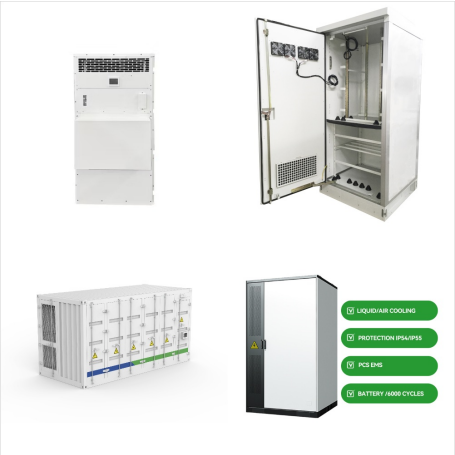


Understanding the efficacy of electron and hole transport layers in realizing efficient chromium doped BiFeO 3 ferroelectric photovoltaic devices Sol. Energy, 207 (2020), pp. 767 - 776, 10.1016/j.solener.2020.07.032

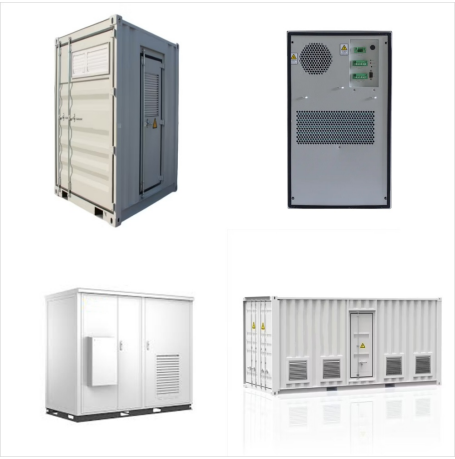
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Solar energy conversion using semiconductors to fabricate photovoltaic devices relies on efficient light absorption, charge separation of electron???hole pair carriers or excitons, and fast transport and charge extraction to counter recombination processes.

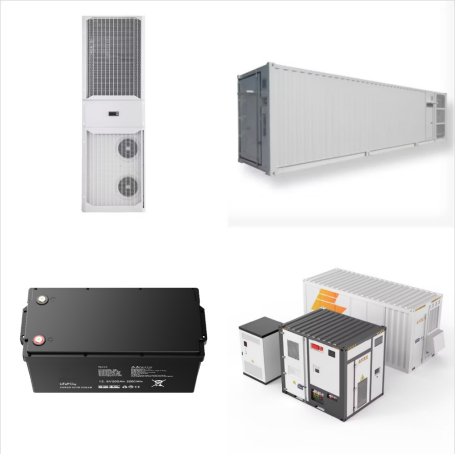


Bulk photovoltaic effect, which arises from crystal symmetry-driven charge carrier separation, is an intriguing physical phenomenon that has attracted extensive interest in photovoltaic application due to its junction-free photovoltaic and potential to surpass Shockley???Queisser limit. Whereas conventional ferroelectric materials mostly suffer

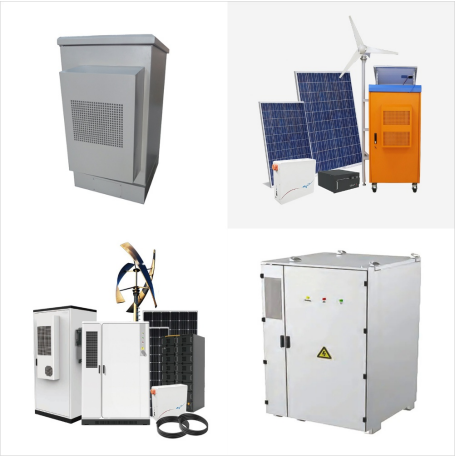


A key requirement for realizing efficient organic photovoltaic (OPV) cells is the dissociation of photogenerated electron-hole pairs (singlet-excitons) in the donor polymer, and charge-transfer

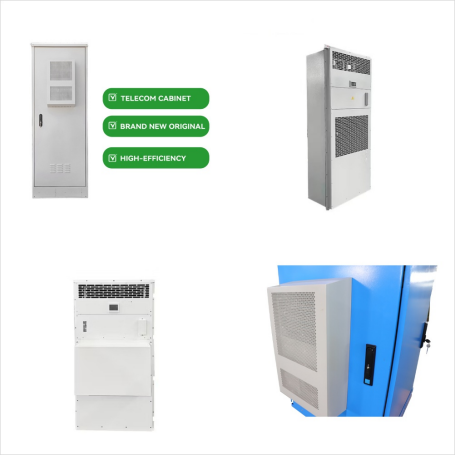
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Multiferroic films are increasingly being studied for applications in solar energy conversion because of their efficient ferroelectric polarization-driven carrier separation and above-bandgap

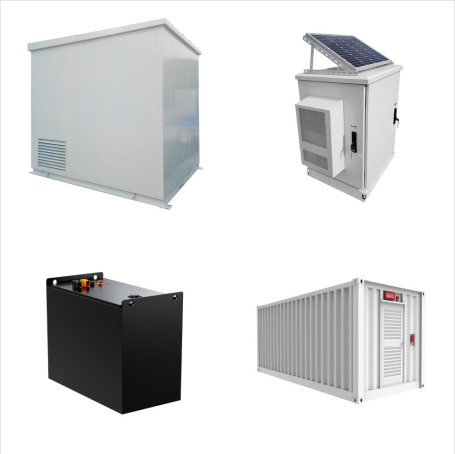


The photovoltaic efficiency of the Au/BFO/ITO/quartz heterostructure at downward polarization is about 5 x 10 ???4 % under the illumination of the 375 nm laser, Electron-hole separation in ferroelectric oxides for efficient photovoltaic responses. Proc. Natl. Acad. Sci. U. S. A., 115 (2018),

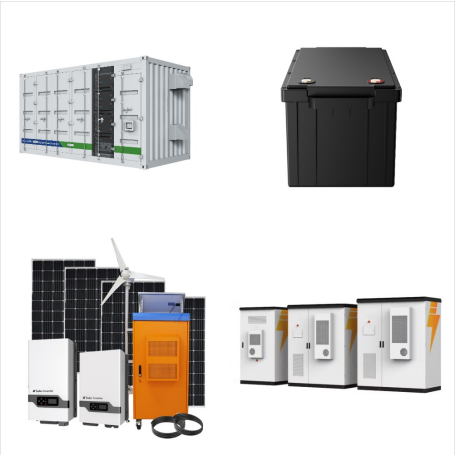


In conventional solid-state photovoltaics, electron???hole pairs are created by light absorption in a semiconductor and separated by the electric field spaning a micrometre-thick depletion region.

EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Herein, we reveal the main origin of the phenomenal performance of BFCO-based FPVs to be efficient electron???hole (e-h) separations.Utilizing ab initio density functional theory (DFT) calculations, we show that the photoexcited e-h pairs in BFCO are spatially separated on Fe and Cr sites, respectively, irrespective of the configuration (spatial arrangement) of the B ???



We propose a recently discovered material, namely, ??-CuGaO2 [T. Omata et al., J. Am. Chem. Soc. 2014, 136, 3378] as a strong candidate material for efficient ferroelectric photovoltaics (FPVs). According to first-principles predictions exploiting hybrid density functional, ??-CuGaO2 is ferroelectric with a remarkably large remanent polarization of 83.80 ? 1/4 C/cm2, even exceeding ???

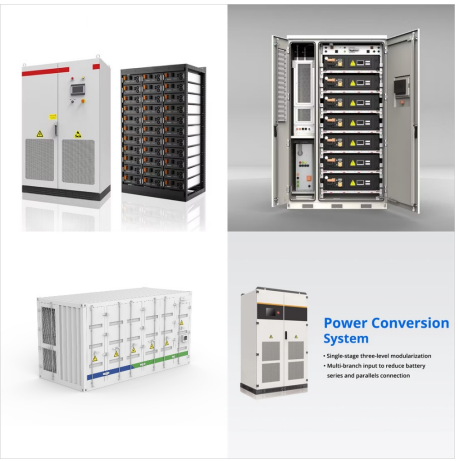
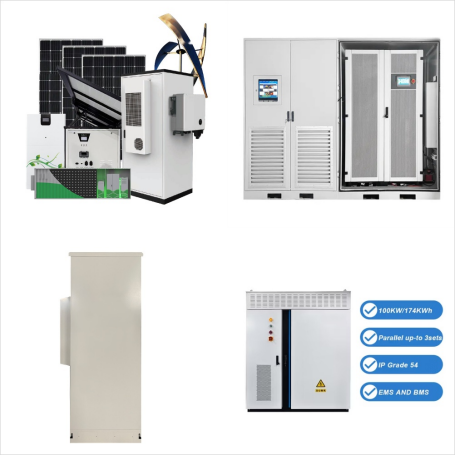
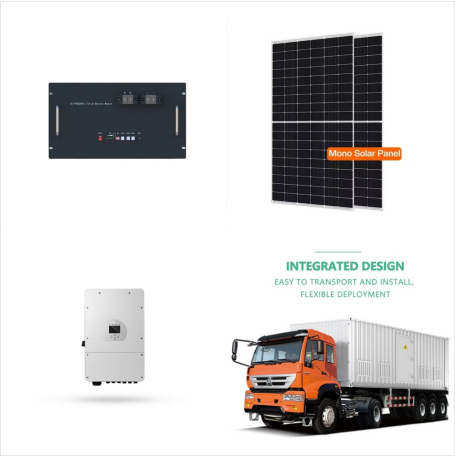


Figure 3. Distinct e-h separation in disordered BFCO on a large scale. a, Schematic of the tested 8x8x2 supercell. b-c, Partial charge densities of the CBM (b, in the red cloud) and VBM (c, in the green cloud) states, showing that the CBM and VBM states are spatially separated on the Fe-rich and Cr-rich domains, respectively. - "Electron???hole separation in ferroelectric oxides for

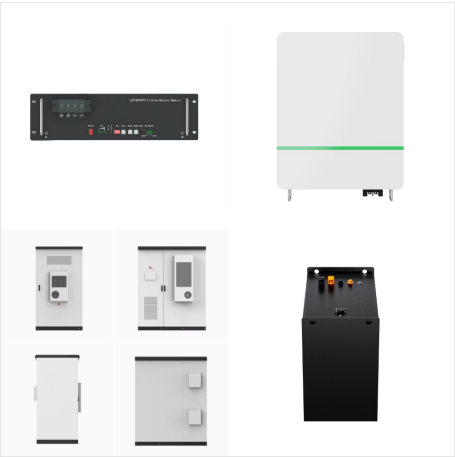
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Solar energy conversion using semiconductors to fabricate photovoltaic devices relies on efficient light absorption, charge separation of electron???hole pair carriers or excitons, ???

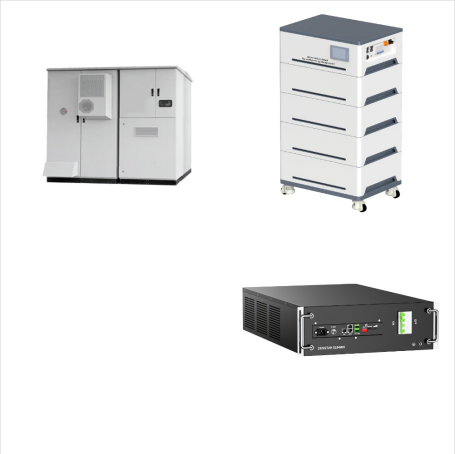


performance mainly lies in the efficient separation of electron-hole (e-h) pairs. We show that photoexcited electrons and holes in BFCO are spatially separated on the Fe and Cr sites, ???

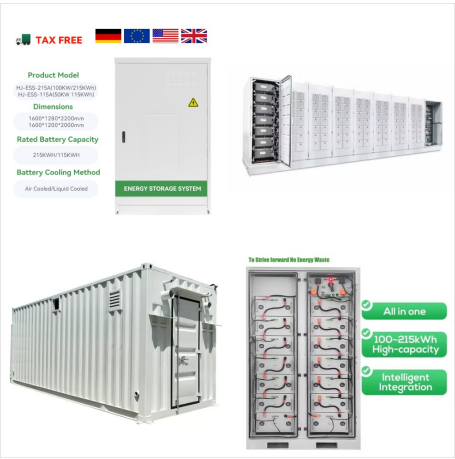


@article{Renuka2020UnderstandingTE, title={Understanding the efficacy of electron and hole transport layers in realizing efficient chromium doped BiFeO3 ferroelectric photovoltaic devices}, author={H Renuka and P. Joshna and Balasubramanian Venkataraman and Kannan Ramaswamy and Souvik Kundu}, journal={Solar Energy}, year={2020}, ???

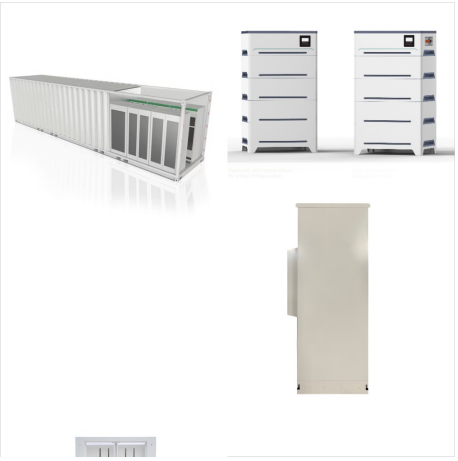
EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Ferroelectric absorbers, which promote carrier separation and exhibit above-gap photovoltages, are attractive candidates for constructing efficient solar cells. Using the ferroelectric insulator BaTiO3 we show how photogeneration and the collection of hot, non-equilibrium electrons through the bulk photovoltaic effect (BPVE) yields a greater-than-unity ???

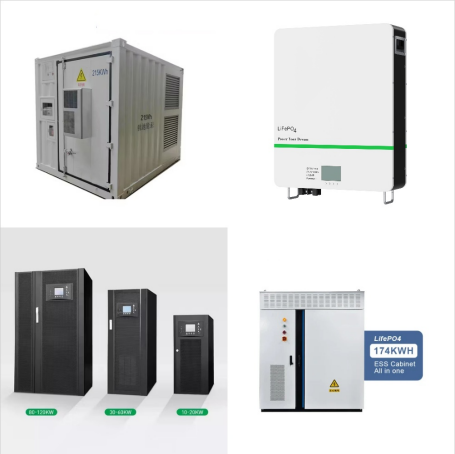


Structures in the yellow-shaded region well represent the disordered BFCO phases observed in experiments. - "Electron???hole separation in ferroelectric oxides for efficient photovoltaic responses" Figure 1. Solar absorption, ion configurations, and band gaps of BFCO materials. a, Absorption coefficients [reproduced from (??E)2 vs. E plots



The potential gradient due to the ferroelectric polarization supports the electron-hole separation and a spectroscopic limited maximum efficiency of 27% confirms excellent potential in solar cell applications.

EFFICIENT ELECTRON HOLE SEPARATION FERROELECTRIC PHOTOVOLTAIC



Ferroelectrics have shown potential as promising materials for future PV applications. Observance of high open circuit voltages in ferroelectric thin films, has generated considerable interest in the field of ferroelectric PV in recent years (Yuan et al., 2013).The field of ferroelectric PV is evolving and not yet completely understood compared to the semiconductor ???