

What is a bulk photovoltaic effect?

The combination of high carrier mobility and the non-centrosymmetric crystal structure results in a strong intrinsic bulk photovoltaic effect; under local excitation at normal incidence at 532 nm, short circuit currents exceed 8 mA/cm² at 20.6 W/cm².

Can two-photon microscopy measure the bulk carrier lifetime of photovoltaic semiconductors?

Thus with two-photon microscopy we probe the bulk minority carrier lifetime of photovoltaic semiconductors. We demonstrate how the traditional one-photon technique can underestimate the bulk lifetime in a CdTe crystal by 10⁵; and show that two-photon excitation more accurately measures the bulk lifetime.

What is bulk photovoltaic effect (bpve)?

Provided by the Springer Nature SharedIt content-sharing initiative The bulk photovoltaic effect (BPVE) originating from spontaneous charge polarizations can reach high conversion efficiency exceeding the Shockley-Queisser limit.

Does bulk photovoltaic effect improve conversion efficiency of optoelectronic devices?

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 polarizations in MoS₂/black phosphorus heterostructures can enhance the BPVE and reduce the extrinsic response times down to 2.2 ns.

How can we use Ga₂O₃ enabled bulk photovoltaic effect?

New opportunities will arise by exploiting the Ga₂O₃ enabled bulk photovoltaic effect in innovative energy harvesting arrangements like sun-powered electronic converters [15] and buffering thin-film solar cells [75,76], solaristors [21] and water splitting systems [77]. 4.

What is the power conversion efficiency of bulk heterojunction organic photovoltaics (OPV)?

In the past few years, bulk heterojunction organic photovoltaics (OPV) have achieved dramatic progress and power conversion efficiency (PCE) of single-junction OPV has reached 18.2% [1,2,3,4,5,6]. However, PCE of organic photovoltaics is still much lower than theoretical value [7,8].

The bulk photovoltaic effect (BPE) ... observed in these nanoengineered systems may not be due to a nanoscale electrode effect per se or to the changes to the bulk carrier separation mechanism, but rather to the reduction of the Schottky barrier. ... The authors also acknowledge support at Bar-Ilan, Drexel, and the University of California at ...

When a module efficiency of 23% is considered, the possible CO₂ emissions reduction is shown in the figure 13 below: Figure 13: Potential annual CO₂ emissions reduction due to PV application on the bulk carriers As

power ...

The solar blindness of the electrode enables a record-breaking bulk photovoltaic effect (BPE) with white light illumination (general use indoor light). This work opens up the ...

The illumination wavelength is therefore critically important; while bulk photovoltaic effects are relatively common under near ultraviolet light (see e.g. the review in Ref. [26]) there are, to the best of the author knowledge, no demonstration in sandwiched photovoltaic structures under broad wavelength illumination such as white light or (simulated) sun light. A ...

Perovskite/organic bulk heterojunction (BHJ) integrated solar cells have tremendous development potential to exceed the Shockley-Queisser limit efficiency of single-junction photovoltaics, due to ...

The difference in work functions of the top and bottom electrodes created an internal or so-called built-in electric field in the OPV device, which facilitated the transfer of the respective charge ...

We investigate the photovoltaic characteristics of organic solar cells (OSCs) for two distinctly different nanostructures, by comparing the charge carrier dynamics for bilayer- and bulk-heterojunction OSCs. Most interestingly, both architectures exhibit fairly similar power conversion efficiencies (...

between carrier separated by the internal field and the loss of photogenerated carriers through recombination must be quantified to increase the efficiency of BHJ OPV devices.

The combination of high carrier mobility and the non-centrosymmetric crystal structure results in a strong intrinsic bulk photovoltaic effect; under local excitation at normal incidence at 532 nm, short circuit ...

The voltage generated in a noncentrosymmetric crystal due to the bulk photovoltaic effect (BPE) can greatly exceed the energy gap, however, the light energy conversion efficiency is extremely low.

Correlation between the bulk photovoltaic effect and light-induced piezoelectricity enhancement. a) The Voc from the photo I-V curves (inset) under illumination with increasing the photon flux.

Efficient energy conversion in organic photovoltaic (OPV) requires the combination of high generation and collection of carriers. The bulk heterojunction (BHJ) structure consisting of percolated domains of electron donor and electron acceptor with characteristic domain size comparable to the exciton diffusion length is used to facilitate exciton dissociation ...

The technology group Wärtilä has completed the installation and commissioning of a unique hybrid power system combined with a PV solar energy system in collaboration with Marfin Management and Solbian, onboard ...

Bulk carrier internal photovoltaic support

The bulk photovoltaic wavelength in Te spans a wide range from the ultraviolet (390 nm) to the mid-infrared (3.8 μm). ... Data that support the findings of this study are available from the ...

Experimentally, a large bulk photovoltaic response is anticipated with the maximum photovoltage $V_{OC} = 16$ mV and a positive signal of the $I_{SC} = 60$ μA (400 nm, 90.4 Wcm^{-2}) in the absence of an ...

The bulk photovoltaic effect of ferroelectric semiconductors is increasingly being studied for potential applications in solar energy harvesting thanks to their unique charge separation mechanism ...

1 Introduction. BiFeO_3 (BFO) has remained arguably one of the most promising functional materials with several intriguing properties such as room temperature multiferroism, [] magnetoelectric coupling, [] domain wall ...

Solar energy is an environmentally friendly energy source which can be converted to; electrical energy using solar cell or photovoltaic (PV), thermal with solar collector, or both electrical and ...

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The bulk photovoltaic effect (BPE) leads to the generation of a photocurrent from an asymmetric material. Despite drawing much attention due to its ability to generate photovoltages above the band ...

This chapter discusses the measurement of parameters that express this recombination activity: the effective minority carrier lifetime (τ_{eff}), the surface recombination velocity (S) and the emitter recombination current J_{0e} . Two time-resolved contact-less probing techniques are commonly used to measure minority carrier lifetimes in solar cells.

The bulk photovoltaic effect (BPVE) refers to the generation of a steady photocurrent and above-bandgap photovoltage in a single-phase homogeneous material lacking inversion symmetry.

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Abstract: After the discovery of bulk photovoltaic effect more than half a century ago, ferro-electrical and magneto-optical experiments have provided insights into various related topics ...

The bulk photovoltaic effect (BPVE), sometimes also called the photogalvanic effect (PGE), refers to the electric current generation in a homogeneous material under light illumination, in contrast to the traditional ...

We demonstrate how the traditional one-photon technique can underestimate the bulk lifetime in a CdTe crystal by 10% and show that two-photon excitation more accurately ...

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