Field-effect photovoltaic cells

Is a magnetic field a donor-acceptor model for organic photovoltaic cells?
Here we propose a donor-acceptor model for a generic organic photovoltaic cell in which the process of charge separation is modulated by a magnetic field which tunes the energy levels. The impact of a magnetic field is to intensify the generation of charge transfer states with triplet character via inter-system crossing.

How does a local built-in electric field induce photovoltaic polarization?
A local built-in electric field induces in the active layer byincorporating ferroelectric additives. The Ferroelectric polarization induced by cosolvent recrystallization without a poling process,resulting in enhanced photovoltaic property is demonstrated.

How does induced electric field affect photogenerated carrier generation?
Hence, IPCE continuously increases with the controlled gate voltage. As well, free-carrier generation is enhanced by increasing dissociation, and the induced electric field is also expected to increase the photogenerated-carrier collection by extending the charge bimolecular-recombination lifetime and increasing the drift length of carriers.

Does a magnetic field affect organic solar cells?
Previous studies of the effect that a magnetic field has in organic solar cells are based on long time (u s) OPV dynamic models,with mostly negative magnetic field effects in photocurrent generation11,30.

Can ferroelectric polymers improve power-conversion efficiency in organic solar cells?
Inspired by the ever-increasing demand for advanced energy technologies, there have been recent attempts to utilise the built-in electric field generated by the electric polarization of ferroelectric polymers to improve the power-conversion efficiency (PCE) in organic solar cells (OSCs) [3, 13, , , ,].

Does the morphology of pdic5 molecule affect photovoltaic response?
4. Conclusion: In summary,the results demonstrated that OSC produced with PDIC5 molecule as electron acceptor have photovoltaic response influencedby the morphology of PTB7-Th:PDIC5 active layer. The use of 0.5 % (v/v) CN as additive changed significantly the morphology,resulting in increased power conversion efficiency.

Photovoltaic cells, commonly known as solar cells, comprise multiple layers that work together to convert sunlight into electricity.The primary layers include: The top layer, or the anti-reflective coating, maximizes light absorption and minimizes reflection, ensuring that as much sunlight as possible enters the cell.

Although the macroscopic effect of applying the magnetic field is an increase in generated photocurrent, and therefore an increase in power conversion efficiency of the solar cell, its usefulness ...

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Here, vertical field-effect organic photovoltaic (VFEOPV) by integrating an bulk-heterojunction (BHJ) organic photovoltaic (OPV) with vertical field effect transistor (VFET) is invented, in...

Solar cells are the electrical devices that directly convert solar energy (sunlight) into electric energy. This conversion is based on the principle of photovoltaic effect in which DC voltage is generated due to flow of electric current between two layers of semiconducting materials (having opposite conductivities) upon exposure to the sunlight [].

This model takes into count the experimental values of refractive index n and extinction coefficient k acquired from the D:A film to simulate the spatial distribution of the ...

Our findings reveal that electric and magnetic fields significantly influence the energy levels of electrons and holes, optical transition energies, open-circuit voltages, short-circuit currents, and overall photovoltaic conversion performances of IBSCs.

In principle, an electric field via ferroelectric materials can affect the photovoltaic properties, although there is not yet a complete mechanistic understanding. Herein, a built-in electric field without a poling processing step was established by introducing developed PVDF-based ferroelectric additives within active-layer matrices ...

We have developed a new kind of field-effect ferroelectric semiconductor solar cells. Prototype cells have been demonstrated successfully. Substantial photovoltaic effect and rectifying behavior were experimentally observed. In addition, simulation study was conducted to indicate that the induced electric field due to the bound ...

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