# Bulk heterojunction solar cell

Are organic solar cells based on bulk heterojunction better?
In the last few years,the performance of organic solar cells (OSCs) based on bulk heterojunction (BHJ) structure has remarkably improved. However,for a large scale roll to roll (R2R) manufacturing of this technology and precise device fabrication,further improvements are critical.

Can bulk heterojunction solar cells be used in large-scale applications?
During the last years the performance of bulk heterojunction solar cells has been improved significantly. For a large-scale application of this technology further improvements are required. This article reviews the basic working principles and the state of the art device design of bulk heterojunction solar cells.

Do bulk heterojunction solar cells have high power conversion efficiencies?
The importance of high power conversion efficiencies for the commercial exploitation is outlined and different efficiency models for bulk heterojunction solar cells are discussed. Assuming state of the art materials and device architectures several models predict power conversion efficiencies in the range of 10-15%.

What is LD in a bulk heterojunction solar cell?
Recent measurements  indicate that LD is in the range of 10 nmfor several prototype conjugated polymers used in bulk heterojunction solar cells,which means that an intermixing of the donor and the acceptor moieties on the nanometer scale is required.

Are heterojunction solar cells efficient?
Ordinary heterojunction solar cells are high efficiencyif the carrier mobility and electrical conductivity of the D and A layers are high. However,only the excitons generated near the D/A interface contribute to the photocurrent.

What is the absorber layer of a bulk heterojunction solar cell?
The absorber layer of an efficient state of the art bulk heterojunction solar cell is made of so-called donor and acceptor molecules. As donors usually conjugated polymers,oligomers or conjugated pigments,as acceptors frequently fullerene derivatives are applied (Fig. 2). Often these materials are classified as organic semiconductors .

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In this work, we present our findings with respect to the recent development of bulk heterojunctions made from conjugated polymer-quantum dot blends, list the ongoing strategies being attempted to improve performance, ...

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The fundamental of BHJ, working mechanism, characteristics, architecture and recent breakthroughs of this technology for solar cells, photocatalytic applications and photodetectors are highlighted in this article. The approaches to advance the stability, including the control over morphology, absorption coefficient, charge carrier mobility and ...

Bulk-heterojunction (BHJ) solar cells are an emerging technology for solar energy conversion alongside dye-sensitized solar cells (DSSCs) and perovskite solar cells.

Controlling the Morphology and Performance of Bulk Heterojunctions in Solar Cells. Lessons Learned from the Benchmark Poly(3-hexylthiophene):[6,6]-Phenyl-C 61-Butyric Acid Methyl Ester System. Chemical Reviews 2013; 113 (5) 3734-3765. 21. Huang Y, Kramer EJ, Heeger AJ, Bazan GC. Bulk Heterojunction Solar Cells: Morphology and Performance ...

Essentially, the photoinduced bulk polarization in non-fullerene Y6 molecules through intramolecular dipoles provides the necessary condition to enable the self-stimulated dissociation in non-fullerene bulk-heterojunction solar cells ...

We design an optically resonant bulk heterojunction solar cell to study optoelectronic properties of nanostructured p-n junctions. The nanostructures yield strong light-matter interaction as well as distinct charge-carrier extraction behavior, which together improve the overall power conversion efficiency. We demonstrate high-resolution substrate ...

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6 ???· The improvement of the power conversion efficiency (PCE) of polymer bulk heterojunction (BHJ) solar cells has generally been achieved through synthetic design to ...

Graded bulk-heterojunction (G-BHJ) with well-defined vertical phase separation has potential to surpass classical BHJ in organic solar cells (OSCs). In this work, an effective G-BHJ...

Transient Electron Spin Polarization Imaging of Heterogeneous Charge-Separation Geometries at Bulk-Heterojunction Interfaces in Organic Solar Cells. The Journal of Physical Chemistry C 2019, 123 (22), 13472-13481.

Early heterojunction-based solar cells were limited to relatively modest efficiencies (<4%) owing to limitations such as poor exciton dissociation, limited photon harvesting, and high recombination losses. The development of the bulk heterojunction (BHJ) has significantly overcome these issues, resulting in dramatic improvements in organic ...

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