

What is bulk photovoltaic effect (bpve)?

The bulk photovoltaic effect (BPVE) rectifies light into the dc current in a single-phase material and attracts the interest to design high-efficiency solar cells beyond the pn junction paradigm. Because it is a hot electron effect, the BPVE surpasses the thermodynamic Shockley-Queisser limit to generate above-band-gap photovoltage.

Does a magnetic photogalvanic effect induce a giant bpve?

While the guiding principle for BPVE materials is to break the crystal centrosymmetry, here we propose a magnetic photogalvanic effect (MPGE) that introduces the magnetism as a key ingredient and induces a giant BPVE. The MPGE emerges from the magnetism-induced asymmetry of the carrier velocity in the band structure.

Can a magnetic photogalvanic effect generate a photocurrent?

This phenomenon, called magnetic photogalvanic effect (MPGE), can generate a photocurrent even upon the linearly polarized light. But it cannot be described by the shift current that applies to non-magnetic systems.

Can bpve be used for solar energy conversion in ferroelectric perovskites?

The induced open-circuit voltages can be much larger than the band gap. Thus, the BPVE displayed a promising potential in the solar energy conversion in ferroelectric perovskites 8,9,10 and triggered the interest for the application of solar cells 11 beyond the p - n junction design and more recently also the application of photodetectors 12.

How does MPGe emerge in a layered magnetic insulator?

The MPGE emerges from the magnetism-induced asymmetry of the carrier velocity in the band structure. We demonstrate the MPGE in a layered magnetic insulator CrI₃, with much larger photoconductivity than any previously reported results. The photocurrent can be reversed and switched by controllable magnetic transitions.

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