

Buckminsterfullerene and photovoltaics





Overview

Is buckminsterfullerene a superconductor?

“The molecule, buckminsterfullerene, is beautiful physically and intellectually. Its qualities, and even some of its properties, can be appreciated instantly and intuitively by nonscientists. Its uniqueness is bound to lead to novel applications – superconductivity is the leading contender at the moment”.

What is buckminsterfullerene?

Derived from the soccer-ball-shaped ‘buckminsterfullerene’ molecule, fullerene-based nanomaterials are a key ingredient in some of the first commercial, high-performance, organic photovoltaic (OPV) solar cells.

Can fullerene be used in photovoltaics?

To conclude this chapter, we discuss the current challenges and prospects of applying fullerene in the photovoltaic industry. In the past three decades, fullerene chemistry and materials science have rapidly advanced and so has the application of fullerene materials in photovoltaics.

Are fullerenes the future of organic photovoltaics?

Fullerenes have been extensively used for more than two decades for the development of organic photovoltaics (OPV). While OPV seems to be a technology almost ready for the market, in the last few years fullerenes are attracting a big interest for the improvement they afford on the already well-performing perovskite solar cells (PSCs).

Why do we use fullerenes as electron acceptors in organic solar cells?

Use of fullerenes as electron acceptors in organic solar cells (OSCs) allowed writing an entire chapter in the history of optoelectronics, as a key milestone in materials science, located at the real intersection between chemistry, physics and engineering .



Can fullerene improve the performance of organic solar cells?

Tremendous effort has been devoted to developing various fullerene materials in order to improve the performance of both organic solar cells (OSCs) and perovskite solar cells (PSCs), the latter of which has seen remarkable progress in recent years.



Buckminsterfullerene and photovoltaics



Targeted Molecular Design of Functionalized Fullerenes for High

functionalized fullerenes play crucial roles as charge transport layers, interfacial layers, and additives in perovskite photovoltaics, dramatically contributing to the promotion of ...

[\(PDF\) Fullerene and its applications: A review](#)

The fullerenes can be utilized in organic photovoltaic (OPV), portable power, medical purpose, antioxidants, and biopharmaceuticals and dentistry. Discover the world's research 25+ million members



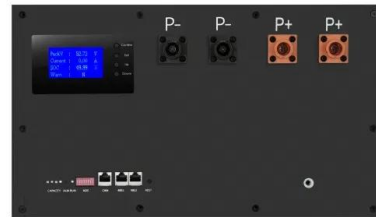
Fullerenes (Buckyballs): Nanotechnology Definition, Uses, ...

Photovoltaics: Fullerenes are integral to the development of organic photovoltaic cells (OPVs). They serve as electron acceptors, enhancing the efficiency of OPVs by facilitating electron transfer and increasing the absorption of light. This application showcases



The Renaissance of fullerenes with perovskite solar cells

Fullerenes in photovoltaics before perovskites. Use of fullerenes as electron acceptors in organic solar cells (OSCs) allowed writing an entire chapter in the history of ...



Phthalocyanines and Subphthalocyanines: Perfect Partners for Fullerenes

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Fullerenes in Photovoltaics

"The molecule, buckminsterfullerene, is beautiful physically and intellectually. Its qualities, and even some of its properties, can be appreciated instantly and intuitively by nonscientists. Its ...



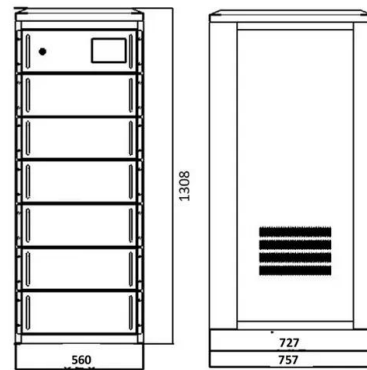
Fullerenes: Historical background, novel biological activities ...

Moreover, molecules or atoms can also be placed in the cavities of fullerenes by encapsulation methodologies, the species that are produced are known as endohedral fullerenes [14]. Nucleophilic and radical additions occur by eliminating a π bond in the electron-deficient zones of the C 60 fullerene [15], [16], [17] .



Semiconducting polymer-buckminsterfullerene heterojunctions: ...

The characterization of rectifying heterojunctions (diodes) fabricated from a semiconducting polymer, a soluble derivative of poly (phenylene-vinylene), and ...



Fullerenes for Bioscience & Photovoltaic Applications

Fullerenes in Photovoltaics Fullerenes have an extremely low reorganization energy following electron transfer, a property that makes them one of the most useful electron acceptor molecules in organic electronics. 4 They are also n-type semiconductors (with band gap = 2.3eV), making them a good counterpart to the numerous good p-type organic semiconductors.

Development of Fullerenes and Their Derivatives

6.1 Functionalized Fullerenes for Photovoltaics/Solar Cells The C₆₀ fullerene is a unique structure that is electron-deficient and can act as an electrophile in various organic syntheses. One of the most exciting applications of functionalized fullerenes is in the field



Fullerenes: the stars of photovoltaics

"The molecule, buckminsterfullerene, is beautiful physically and intellectually. Its qualities, and even some of its properties, can be appreciated instantly and intuitively by nonscientists. Its ...



Mass production of fullerenes takes off

Derived from the soccer-ball-shaped 'buckminsterfullerene' molecule, fullerene-based nanomaterials are a key ingredient in some of the first commercial, high-performance, ...



Fullerenes for Bioscience & Photovoltaic Applications

Condensed Fullerene Fullerenes in Photovoltaics
Fullerenes in Biosciences Small-Cap Fullerenes
Introduction Twenty-five years ago, it was discovered that carbon vapor preferentially condenses into an exceedingly stable cluster with 60 carbon atoms (C 60), and it was hypothesized that the 60 atoms were arranged as the vertices of a truncated icosahedron, aka a soccer ball. 1 The ...



Fullerene micro/nanostructures: controlled synthesis and energy

To date, several reports have shown the crucial role of fullerenes in developing various functional micro/nanostructures. For example, Goodson et al. [7] modulated the thermal and thermoelectric transport of individual CNT by fullerene encapsulation, resulting in 35-55% suppression in thermal conductivity and approximately 40% enhancement in thermopower.



Photovoltaic Heterojunctions of Fullerenes with MoS

First-principles calculations are performed to explore the geometry, bonding, and electronic structures of six ultrathin photovoltaic heterostructures consisting of pristine and B- or N-doped fullerenes and MoS2 or WS2



monolayers. The fullerenes prefer to be attached with a hexagon parallel to the monolayer, where B and N favor proximity to the monolayer. The main ...



Semiconducting polymer-buckminsterfullerene heterojunctions: Diodes

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[\(PDF\) Fullerenes: the Stars of Photovoltaics](#)

uncountable reviews, the present paper will take a slightly different path by describing important facts about fullerenes in the field of photovoltaics. Configurations of Normal and Inverted Bulk

Photovoltaic Heterojunctions of Fullerenes with MoS2 and

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Semiconducting polymer-buckminsterfullerene heterojunctions: Diodes, photodiodes, and photovoltaic cells
@article{Sariifti1993SemiconductingPH, title={Semiconducting polymer-buckminsterfullerene heterojunctions: Diodes, photodiodes, and photovoltaic cells}, author={Niyazi Serdar Sariçiftçi ...

MASS PRODUCTION OF FULLERENES TAKES OFF

organic photovoltaic (OPV) solar cells. As the production of these sustainable, lightweight and flexible solar cells grows to meet market demand, fullerene mass manufacture is itself poised to



Semiconducting Polymer-Buckminsterfullerene Heterojunctions: Diodes

Semiconducting polymer-buckminsterfullerene heterojunctions: Diodes, hotodiodes, and photovoltaic cells N. S. Sariciftci, D. Braun, and C. Zhang Institute for Polymers and Organic Solids

Targeted Molecular Design of Functionalized Fullerenes for High

functionalized fullerenes play crucial roles as charge transport layers, interfacial layers, and additives in perovskite photovoltaics, dramatically contributing to the promotion of power conversion efficiency (PCE) and stability. As the field advances rapidly, the



Fullerene-Based Materials for Photovoltaic Applications: Toward

Perovskite solar cells are promising candidates for next-generation photovoltaics. Fullerenes and their derivatives can act as efficient electron transport layers, interfacial modification layers, and trap state passivators in perovskite solar cells, all of which play an important role in increasing efficiency, reducing current hysteresis, and enhancing device stability. Herein, recent

Hybrids of Fullerenes and 2D Nanomaterials

their applications. Upon hybridization with fullerenes, noncovalently or covalently, the physical/chemical properties of 2D The photovoltaic applications of C 60 /MoS 2 and C 60 /WS 2 hybrids were also studied theoretically by Cheng and ...



Semiconducting Polymer-Buckminsterfullerene Heterojunctions: Diodes

Semiconducting Polymer-Buckminsterfullerene Heterojunctions: Diodes, Photodiodes, and Photovoltaic Cells March 1993 (donor) onto C 60 (acceptor). The photodiode and photovoltaic responses are



[\(PDF\) Fullerenes: the Stars of Photovoltaics](#)

"The molecule, buckminsterfullerene, is beautiful physically and intellectually. Its qualities, and even some of its properties, can be appreciated instantly and intuitively by ...



[Fullerenes in Photovoltaics](#)

Semantic Scholar extracted view of "Fullerenes in Photovoltaics" by H. Lin et al. Cyclo[60]fullerenes are widely used in many applications including photovoltaic devices owing to their high electron affinity and mobility for an organic molecule.

[Fullerene , PPT , Free Download](#)

3. A Fullerene is any molecule composed entirely of carbon, in the form of a hollow sphere, ellipsoid, or tube. Spherical fullerenes are also called buckyballs, and cylindrical ones are called carbon nanotubes or buckytubes.4. HISTORY The existence of C60 was predicted by Eiji Osawa of Toyohashi University of Technology in a Japanese magazine in 1970 ...





Fullerenes for Photovoltaic and Bioscience Applications



Fullerenes in Photovoltaics Fullerenes have an extremely low reorganization energy following electron transfer, a property that makes them one of the most useful electron acceptor molecules in organic electronics.⁴ They are also n-type semiconductors (with

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