

The photovoltaic (PV) industry is also growing rapidly every year. One of the PV technologies is concentrator photovoltaics (CPV). CPV uses high-efficiency multijunction solar cells and optics to concentrate sunlight, thereby significantly reducing the amount of semiconductor material needed.

The world energy crisis, as well as global warming, has intensified an urgent need for renewable energies. Solar radiation can be converted to electricity by solar cells readily; however, the high cost of photovoltaic systems has hindered its worldwide commercialization. Also, the solar cells cannot be integrated directly to skyscrapers. Therefore, luminescent solar ...

Light is absorbed by the coating and reemitted into waveguide modes for collection by the solar cells. We report single- and tandem-waveguide organic solar concentrators with quantum efficiencies exceeding 50% and projected power conversion efficiencies as high as 6.8%.

DOI: 10.1016/J.SOLMAT.2015.02.032 Corpus ID: 95550293; High-efficiency luminescent solar concentrators for flexible waveguiding photovoltaics @article{Correia2015HighefficiencyLS, title={High-efficiency luminescent solar concentrators for flexible waveguiding photovoltaics}, author={Sandra F. H. Correia and Patr{\'i}cia P. Lima and Paulo S. Andr{\'e} and M.F.S. ...

Luminescent solar concentrators (LSCs), a type of solar photovoltaics (Agri-PV), could potentially revolutionize agricultural methods and electricity generation. We introduce the ...

Photovoltaic systems comprising monocrystalline silicon have many applications in solar power generation. Yoon et al. describe a composite luminescent concentrator photovoltaic system containing ...

Luminescent solar concentrators (LSCs) can serve as large-area sunlight collectors for terrestrial and space-based photovoltaics. Due to their high emission efficiencies and readily tunable ...

We report single- and tandem-waveguide organic solar concentrators with quantum efficiencies exceeding 50% and projected power conversion efficiencies as high as 6.8%. The ...

Concentrating photovoltaic (CPV) technology is a promising approach for collecting solar energy and converting it into electricity through photovoltaic cells, with high conversion efficiency. Compared to conventional flat panel photovoltaic systems, CPV systems use concentrators solar energy from a larger area into a smaller one, resulting in a higher ...

Organic photovoltaic cells have the potential to become a low-cost source of renewable energy owing to their compatibility with high-throughput processing techniques and the demonstration of power ...

Luminescent solar concentrators (LSCs) fabricated using colloidal quantum dots (QDs) are considered as promising cost-effective solar collectors for future building-integrated photovoltaics (BIPV). Nevertheless, the solar-to-electricity conversion efficiency of the LSCs is commonly low due to limited quantum efficiency and large reabsorption ...

(15) As a new type of solar photovoltaics device, the luminescent solar concentrators (LSCs) collector demonstrates the excellent potential to become a photovoltaic conversion device in BIPV. (16) LSCs are mainly composed of three parts: light waveguide medium, luminophores, and solar cell.

The three main types of concentrating solar power systems are: linear concentrator, dish/engine, and power tower systems. Linear concentrator systems collect the sun's energy using long rectangular, curved (U-shaped) mirrors. The mirrors are tilted toward the sun, focusing sunlight on tubes (or receivers) that run the length of the mirrors.

Luminescent solar concentrators (LSCs) are semitransparent windows that are able to generate electricity from sunlight absorption. LSCs have shown huge promise for realizing ...

Luminescent solar concentrators (LSCs) have showed great interests since they can realize building-integrated photovoltaics (BIPV). To date, a variety of luminophores have been developed to fabricate LSCs. In this paper, we designed and prepared aggregation-induced emission (AIE) fluorescent organic nanoparticles (TPFE-Rho), and reported that TPFE-Rho ...

Moreover, though the PCE value of the new CuInS₂/ZnS QDs-LSC-PV device (8.71%) is lower than that of commercial PV cell (13%), the solar harvest area is enlarged for 7.33 folds to the same size ...

Here we go. Primarily there are four types of concentrating solar collectors, which are: Fresnel lens collector. A parabolic trough comprises a linear parabolic reflector that concentrates sunlight on a receiver that is positioned along the focal line of the reflector.

High-Efficiency Organic Solar Concentrators for Photovoltaics Michael J. Currie,* Jonathan K. Mapel,* Timothy D. Heidel, Shalom Goffri, Marc A. Baldo+ The cost of photovoltaic power can be reduced with organic solar concentrators. These are planar waveguides with a thin-film organic coating on the face and inorganic solar cells attached to ...

Luminescent solar concentrators (LSCs), a type of solar photovoltaics (Agri-PV), could potentially revolutionize agricultural methods and electricity generation. We introduce the new notation Agri-LSC, which combines greenhouse agriculture with luminescent solar concentrators.

The highest recorded power conversion efficiency of crystalline silicon (Si) solar cells, which have been the most predominant PV technology for decades, is 26.7%³, and this record efficiency is ...

The cost of photovoltaic power can be reduced with organic solar concentrators. These are planar waveguides with a thin-film organic coating on the face and inorganic solar cells attached to the edges. Light is absorbed by the coating and reemitted into waveguide modes for collection by the solar cells.

Luminescent solar concentrators (LSCs) are semitransparent windows that are able to generate electricity from sunlight absorption. LSCs have shown huge promise for realizing building-integrated photovoltaics (BIPV). Unfortunately, to date, the power conversion efficiency (PCE) of LSCs is still very low which dramatically hampers their practical applications. In this ...

However, most PV devices still exhibit high cost per surface area, limited color/shape variability, and the need for direct sunlight. To increase light harvesting efficiency, a complementary sunlight collector called luminescent solar concentrator (LSC) was proposed in 1979.

A Luminescence Solar Concentrators (LSC) [1], [2] is a simple light energy absorber, converter, and concentrating device consisting of a thin slab of a transparent material of ideally high refractive index with embedded a low concentration of luminescent emitters (luminophores or fluorophores). LSCs" emitters absorb a substantial portion of the sun ...

The intrinsic electronic properties of donor (D) and acceptor (A) materials in coupling with morphological features dictate the output in organic solar cells (OSCs). New physical properties of intimate eutectic mixing are used in nonfullerene-acceptor-based D-A 1 -A 2 ternary blends to fine-tune the bulk heterojunction thin film morphology ...

The exploitation of near-field energy transfer, solid-state solvation, and phosphorescence enables 10-fold increases in the power obtained from photovoltaic cells, without the need for solar tracking. The cost of photovoltaic power can be reduced with organic solar concentrators. These are planar waveguides with a thin-film organic coating on the face and inorganic solar cells attached to ...

that photovoltaics systems cannot be compatible with cities, and can be used for solar power generation while serving as the outer structure of a building.¹⁵ As a new type of solar photovoltaics device, the luminescent solar concentrators (LSCs) collector demonstrates the excellent potential to become a photovoltaic conversion device in BIPV.¹⁶

The ability to determine the macroscopic parameters that characterize photovoltaic performance, including their spatial dependence, especially at high flux, is demonstrated with extensive solar measurements on high-efficiency concentrator solar cells. Two case studies explore (a) the impact of inhomogeneous flux distribution on photovoltaic behavior, (b) ...

2. Single-Layer LSCs. The variety of luminophores used for single-layer LSCs can be from the common

fluorescent organic dyes and semiconductor quantum dots, to the newly developed perovskite quantum dots, carbon dots (CDs), silicon dots, etc., and all of them have been widely used in the field of LSCs with certain effects. 30-32 We first discuss a little bit ...

These concentrators can increase the power output from photovoltaic cells without the need for solar tracking and have the potential of achieving a lifetime matching standard silicon solar cells. Graphical abstract. ... High-efficiency organic solar concentrators for photovoltaics. Science, 321 (2008), pp. 226-228.

A luminescent solar concentrator (LSC)-based photovoltaic (PV) system, consisting of an LSC panel that harvests light and an edge-mounted solar cell that produces electricity using the photoluminescent light, is promising for semitransparent building-integrated photovoltaics (BIPVs). Here, we demonstrate a highly efficient and highly semitransparent ...

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