Blair unger concentrated photovoltaic

Concentrator Photovoltaic (CPV) technology has recently entered the market as a utility-scale option for the generation of solar electricity. This report explores the current status of the CPV market, industry, research, and technology.

Eric Christensen, Duncan Moore, Greg Schmidt, and Blair Unger. ITuC5 International Optical Design Conference (IODC) 2010 View: PDF. Injecting Light of High-Power LEDs into Thin Light Guides. ... Concentrated Photovoltaic Stepped Planar Light Guide. Duncan Moore, Greg Schmidt, and Blair Unger. JMB46P International Optical Design Conference (IODC

This work presents a planar optical light guide design for concentrating solar power onto a photovoltaic cell. The design allows concentrated light injected into the guide to avoid interaction with other injection facets. The presented design has a HFOV of 1& deg;, geometrical concentration of 112.5x at the output of the guide, and can achieve greater than 500x with ...

Cooling of photovoltaic cells is one of the main concerns when designing concentrating photovoltaic systems. Cells may experience both short-term (efficiency loss) and long-term (irreversible damage) degradation due to excess temperatures. Design considerations for cooling systems include low and uniform cell temperatures, system reliability ...

Similarly, Matthew et al. (2016) developed a concentrating solar power-concentrated photovoltaic (CSP-CPV) system with active cooling and multi-junction PV cells to reduce thermalization losses, but I think that a use of two distinct technologies might raise the system"s cost and make it less accessible to some users. The complex nature of the ...

The strong point of concentrated photovoltaics is the increase in the efficiency of solar cells. In fact, Shockley and Queisser defined, in their article published in 1960 and entitled "Detailed Balance Limit of Efficiency of p-n Junction Solar Cells" [], a maximum conversion efficiency of about 30% for single-junction solar cells under an illumination of 1000 W/m 2.

The photovoltaic market is based upon three generation of solar cells (Burhan et al. 2016a, 2017a, 2018).If first- and second-generation solar cells are considered first, then it can be seen that they are fabricated using a single pn-junction of semiconductor material (Muhammad et al. 2016).Due to certain bandgap of pn-junctions, they can only respond to certain to a ...

This paper describes the design, assembly, and testing of a concentrating photovoltaic module which uses spectral splitting to achieve high system power efficiency. An efficiency of 37.5% was measured on a prototype module.

This paper describes the design, assembly, and testing of a concentrating photovoltaic module which uses spectral splitting to achieve high system power efficiency. The assembly and testing of two prototype modules is also described.

(DOI: 10.1117/12.877725) This work presents a planar optical light guide design for solar concentration. The design allows concentrated light injected into the guide to avoid interaction with other injection facets.

Unger, Blair; Abstract. This work presents a planar optical light guide design for concentrating solar power onto a photovoltaic cell. The design allows concentrated light injected into the guide to avoid interaction with other injection facets. The presented design has a HFOV of 1°, geometrical concentration of 112.5x at the output of the ...

Renewable energy plays a significant role in achieving energy savings and emission reduction. As a sustainable and environmental friendly renewable energy power technology, concentrated solar power (CSP) integrates power generation and energy storage to ensure the smooth operation of the power system. However, the cost of CSP is an obstacle hampering the commercialization ...

This work presents a planar optical light guide design for concentrating solar power onto a photovoltaic cell. The design allows concentrated light injected into the guide to avoid interaction with other injection facets.

Concentrator photovoltaics (CPV) (also known as concentrating photovoltaics or concentration photovoltaics) is a photovoltaic technology that generates electricity from sunlight. Unlike conventional photovoltaic systems, it uses lenses or curved mirrors to focus sunlight onto small, highly efficient, multi-junction (MJ) solar cells addition, CPV systems often use solar trackers ...

Nate J. Blair and Aron P. Dobos National Renewable Energy Laboratory Paul Gilman Contractor Presented at Solar 2013 Baltimore, Maryland April 16-20, 2013 ... Plate PV and High-X Concentrating PV models also have inputs for a set of monthly soiling factors that further reduce the incident irradiance. The soiling and shading factors are

The United Nations (UN) aims to equip the entire globe with affordable, cleaner, reliable, and sustainable energy resources. The growth of the industrial sector is greatly influenced by the availability of affordable and adequate energy supply, which affects the nation"s economic upliftment [1].Energy is a critical parameter in attaining sustainable development as ...

Abstract. This work presents a planar optical light guide design for solar concentration. The design allows concentrated light injected into the guide to avoid interaction with other injection facets.

We have designed, fabricated, and tested a small, integrated photovoltaic module comprised of two separately-contacted, high efficiency, multijunction solar cells and non-imaging optics that ...

Given the pressing climate issues, including greenhouse gas emissions and air pollution, there is an increasing emphasis on the development and utilization of renewable energy sources [1] this context, Concentrated Photovoltaics (CPV) play a crucial role in renewable energy generation and carbon emission reduction as a highly efficient and clean power ...

concentrated solar power (CSP) plants with storage. The paper spelt out that concentrated solar power (CSP) plant can deliver power on demand, making it an attractive renewable energy storage technology, and concluded that various measures would be required to develop CSP in the country in order to reach the ambitious target of 500 GW by 2030.

Concentrating Photovoltaics (CPV) is a technology that associates a concentrator with a photovoltaic device as shown in the Fig. 4.1 a more detailed way, the concentrator is actually one or a series of optical devices that concentrate the sun beams onto a solar cell in order to increase the electrical output of the photovoltaic device by increasing the intensity of ...

By using the designed spectral splitting concentrator, this paper further describes and investigates a concentrating solar power system. The originality and contribution of this research can be summarized as: (1) A concentrating solar power system is described and investigated. Co-producing photovoltaic electricity and solar thermal fuel is its ...

4.2.1 Concentrated photovoltaic. Concentrated photovoltaic is an approach for generating reasonable amount of electricity with limited solar cell areas. More sunlight radiation will be intercepted by the solar modules hence less coverage of PV rooftop is needed, which is beneficial for homogeneous indoor illumination and uniform growth of plants.

This paper describes the design, assembly, and testing of a concentrating photovoltaic module which uses spectral splitting to achieve high system power efficiency. The assembly and ...

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Research SHORT COMMUNICATION: ACCELERATED PUBLICATION Very High Efficiency Solar Cell Modules Allen Barnett 1*,y, Douglas Kirkpatrick2, Christiana Honsberg, Duncan Moore3, Mark Wanlass4, Keith Emery4, Richard Schwartz5, Dave Carlson6, Stuart Bowden7, Dan Aiken8, Allen Gray8, Sarah Kurtz4, Larry Kazmerski4, Myles Steiner4, Jeffery Gray5, ...

Concentrating solar power (CSP) tower technologies capture thermal radiation from the sun utilizing a field of solar-tracking heliostats. When paired with inexpensive thermal energy storage (TES), CSP technologies can dispatch electricity during peak-market-priced hours, day or night. The cost of utility-scale photovoltaic (PV) systems has dropped significantly in the ...

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