Design concept of ultra-thin solar cells

duction of solar cells and solar modules. Particular interest exists in thin-film pho-tovoltaics, where laser structuring is aimed to realize appropriate monolithic serial interconnection. a novel concept successfully demonstrated complete laser structuring by application of short nano-second laser pulses with a single, visible wavelength.

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Seeking ways to design and fabricate solar cells using 100 um thicker silicon substrates is the subject of intense research efforts among the photovoltaic (PV) community. The aim is to ...

Here, we design and demonstrate complex GBBRs for specific metamorphic solar cell applications. We design buffers that provide (1) high reflectivity over a narrow bandwidth, for quantum well solar ...

Thick wafer-silicon is the dominant solar cell technology. It is of great interest to develop ultra-thin solar cells that can reduce materials usage, but still achieve acceptable performance and high solar absorption. Accordingly, we developed ...

The thickness of thin-film solar cells is several nanometers to 10 u m, much smaller than the conventional first-generation crystalline silicon (cSi) solar cells [11], [40]. cSi-based thin-film solar cells are a promising option for designing efficient and low-cost PV ...

18.9% efficiencies for SiGe-based solar cells developed on silicon. Similarly, solar cells fabricated on thinner silicon substrates have also been reported that offer exciting potential for fabricating the efficient and cost-effective thin-film silicon solar cells [17]. Spitzer et al. [18] forecasted the theoretical efficiency of 27% on a 15 µm

For example, single-junction GaAs solar cells hit an efficiency as high as 29.1% under the terrestrial AM1.5G sun spectrum [7], [8], which is pretty close to the Shockley-Queisser (SQ) limit for silicon solar cells of 33.5% [8]. Thus, the group III-V compounds could be the most promising alternative materials for silicon-based solar cells.

Semantic Scholar extracted view of "Design of an ultra-thin silicon solar cell using Localized Surface Plasmonic effects of embedded paired nanoparticles" by Abolfazl Jangjoy et al. ... This paper presents a concept to significantly improve the photocurrent of ultrathin crystalline silicon solar cells using plasmonic hemispherical dielectric ...

Design concept of ultra-thin solar cells

Our design rule thus meets all relevant aspects of light-trapping for solar cells, clearing the way for simple, practical, and yet outstanding diffractive structures, with a potential impact ...

Reducing the absorber thickness is an attractive solution to decrease the production cost of solar cells. Furthermore, it allows to reduce the amount of material needed and improve the current collection in the cell. This thesis has been focused on the design of nanostructures to enhance light absorption in very small semiconductor volumes in order to achieve efficient ultra-thin ...

Here, the authors studied a silicon-germanium (Si 1-x Ge x) absorber layer for the design and simulation of an ultra-thin crystalline silicon solar cell using Silvaco technology ...

Passivated contacts produce very high power conversion efficiencies for single-junction mono-crystalline silicon (mono-Si) wafer solar cells [[1], [2], [3]].The use of amorphous silicon (a-Si) or polycrystalline silicon (poly-Si) with interfacial oxides (iO x) are two widely used approaches [4] spite delivering high efficiency, heterojunction with intrinsic thin layer (HIT) ...

In this paper, the cylindrical, conical and parabolic nanostructures inherited from self-organized anodic aluminum oxide (AAO) are applied to silicon-based ultra-thin solar cells aiming for a new design concept for low-cost, high-efficiency double-grating solar cells. Numerical results reveal that the optimal bottom metal grating can enhance the absorption capacity of ultra-thin solar ...

Numerical analysis of thin film Cu 2 InGaSe 4 solar cells design. Author ... order in the efficiency with the increasing various layers thicknesses of the devices could be correlated to structural concept of the CIGS like solar cells. According to the structural configuration CIGS like solar cells, the ZnO:Al window layer is the first contact ...

At present, the main candidate material for second-generation thin-film solar cells is crystalline silicon (c-Si) [6] and compound semiconductor thin-film solar cells. However, c-Si has a low absorption coefficient and to increase the light absorption of c-Si solar cells, it is necessary to thicken the c-Si layer, which can lead to higher material consumption and ...

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