Thin-film solar cells with nanosilver

Can thin film solar cells be made?

Lately,the most advanced materials for making thin film solar cellsare based on the use of CdTe or CIGS as absorber layer materials . However,problems related to toxicity [4 - 7]and scarcity of some of the constituent elements of these compounds have been reported as issues to overcome,in a mass production .

What is a thin-film solar cell?

Nowadays,a variety of high-performance solar cells are constantly emerging. Thin-film solar cells made from inorganic materialshave constituted one of the major categories of solar cells showing potential in the fast growing photovoltaic (PV) market.

What are thin-film solar cells (TFSC)?

This book provides recent development in thin-film solar cells (TFSC). TFSC have proven the promising approach for terrestrial and space photovoltaics. TFSC have the potential to change the device design and produce high efficiency devices on rigid/flexible substrates with significantly low manufacturing cost.

Are SNS-bi films a good absorber layer for thin film solar cells?

It was also found that the SnS:Bi films exhibit an absorption coefficient >10 4 cm -1 and a direct energy band gap ranging from 1.37 to 1.47 eV,indicating that this compound shows the required optimal propertiesfor an absorber layer in thin film solar cells.

How do SNS-based thin film solar cells achieve a record efficiency?

A record efficiency was achieved for SnS-based thin film solar cells by varying the oxygen-to-sulfur ratio in Zn (O,S)by Prasert et al. . Studies showed that increasing the sulfur content in Zn (O,S) raises the conduction band offset between Zn (O,S) and SnS to an optimum slightly positive value.

What is thin film photovoltaics (TFP) technology?

Thin film photovoltaics (TFP) technology,known as second generation of solar cells,emerged to meet some of these expectations. The massive use of solar cells requires increasing the conversion efficiency of the devices and effective lowering of the manufacturing costs .

We simulate and calculate numerically the electromagnetic field and energy flux in single crystal silicon thin film solar cell coated with silver nano-disk square array by using the finite-difference time-domain (FDTD) method. Because of the surface plasmon resonance (SPR) of silver nano array, the electromagnetic field is redistributed and enhanced in the solar cell.

Ultrathin solar cells attract interest for their relatively low cost and potential novel applications. Here, Massiot et al. discuss their performance and the challenges in the fabrication of ...

Using layer-by-layer solid-state ligand exchange technique, a compact and crack-free thin film of Cs2AgBiBr6 NCs were fabricated. Finally, perovskite solar cells consisting of Cs2AgBiBr6 as an absorber layer were fabricated and tested. Recently developed lead-free double perovskite nanocrystals (NCs) have been proposed for the possible application in ...

Plasmonic metal nanoparticles are of great interest for light trapping in thin-film silicon solar cells. In this Letter, we demonstrate experimentally that a back reflector with plasmonic Ag nanoparticles can provide light-trapping performance comparable to state-of-the-art random textures in n-i-p ...

Wide-bandgap (1.5 eV) submicron CIGS-based solar cells were prepared in this study unlike conventional CIGS with a bandgap of 1.2 eV, in order to enhance see-throughness. But such cells demonstrated low conversion efficiency due to the poor grain morphology and absence of back grading.

In this paper, we use silver pyramid-shaped nanoparticles, a noble plasmonic nanoparticle, inside thin-film silicon and InP solar cells to increase light absorption compared to previously published topologies. The ...

Bifacial Cu(In,Ga)Se2 (CIGS) solar cells are attractive for a range of applications, but their low power conversion efficiency is a limitation. To improve their efficiency, the formation of GaOx ...

This paper introduces a highly effective method to enhance the power conversion efficiency of thin-film solar cells with a microcrystalline absorber layer. The study involves the creation of a device simulation model that takes into account optical phenomena like light scattering and diffusive reflection, as well as electrical aspects related ...

In this study, we will discuss a new approach based on silver nanoparticles to improve the light absorption in the thin-film silicon solar cells. Raman and SNOM measurements and theoretical investigations on systems with metallic nanoparticles indicate a strong increase of the electric field in their surrounding when they are ...

In recent years, many inorganic PV materials with high absorption coefficient have emerged due to their low-cost and high PCE potentials given that absorber layers with micron or even nanometer thickness can be fabricated making them suitable for thin-film solar cells on flexible substrates or as part of a tandem cell stack, thus becoming a ...

New types of thin film solar cells made from earth-abundant, non-toxic ...

This review summarizes the current research status on the fabrication methods, device structure selection, design, and optimization of Ag 2 S thin films. Finally, insights into achieving high-efficiency Ag 2 S devices by ...

In this study, we will discuss a new approach based on silver nanoparticles to ...

In this paper, we use silver pyramid-shaped nanoparticles, a noble plasmonic nanoparticle, inside thin-film silicon and InP solar cells to increase light absorption compared to previously published topologies. The proposed structure consists of a TiO2 pyramid structure placed at the top of the surface working as an anti-reflective layer ...

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Recently plasmonic effects have gained tremendous interest in solar cell research because they are deemed to be able to dramatically boost the efficiency of thin-film solar cells. However, despite of the intensive efforts, the desired broadband enhancement, which is critical for real device performance improvement, has yet been achieved with simple fabrication and ...

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