Working principle of inorganic solar cells

What is the working principle of solar cells?

All the aspects presented in this chapter will be discussed in greater detail in the following chapters. The working principle of solar cells is based on the photovoltaic effect,i.e. the generation of a potential difference at the junction of two different materials in response to electromag-netic radiation.

Are inorganic solar cells a good investment?

As a whole, inorganic solar cells exhibit the most stable performance with longer life-span, which has helped to provide faster commercialization. However, most researchers are still trying to reduce the thickness of the films from bulk to thin films, which can be deposited on top of supports like glass, metal foil, or polymer substrates.

How do solar cells work?

The operation of solar cells is intimately related to two kinds of particles,electrons and holes,known as the charge carriers of semiconductors. For the case of electrons,this does not come as a surprise since general knowledge identifies an electric (charge) current to the continuous flow of electrons.

How does a silicon solar cell work?

In Figure 15 shows below t he struc tu re of a typic al silicon solar cell. The electrical current generated in the se miconductor is ext racted by contacts to the front and back o f the cell. A s pass through that supply current to a larg er bus bar. Transparent conducting oxide is also used on a number of thin film devices.

What is covered in Chapter 3 of solar cells?

In Chapter 3,the structures and types of solar cellsare summarized,and general aspects of the working principles of solar cells are explained. Chapter 3 also contains a comparison of the solar cells in regards to their efficiencies.

How do solar cells produce a photovoltaic effect?

Solar cells exploit the optoelectronic properties of semiconductorsto produce the photovoltaic (PV) effect: the transformation of solar radiation energy (photons) into electrical energy. Note that the photovoltaic and photoelectric effects are related,but they are not the same.

In general, a solar cell absorbs light, separates the created electrons and holes from each other, then delivers electrical power at the contacts. The fundamental difference between the working principles of organic and inorganic solar cells is the direct generation of free charge carries in the inorganic solar cells.

The first working solar cell was silicon wafer-based and used all-inorganic materials in its whole structure. However, overtime, other solar cell absorbers, including binary, ternary, or even quaternary compounds, demonstrated semiconducting properties for use as a p-n junction type of device structure. The inorganic

semiconductor materials ...

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In this chapter, we focus on describing the mechanisms that govern photocurrent generation and carrier recombination, essential for the design of efficient solar cells and for the evaluation of their performance.

An inorganic solar cell works by converting sunlight into electricity. It typically consists of several layers, including a photoanode, a porous nano film, a quantum-dot film, a solid electrolyte, and a counter electrode. The photoanode, made of materials like ZnO or TiO2, absorbs sunlight and generates electrons. These electrons ...

In this chapter, we focus on describing the mechanisms that govern photocurrent generation ...

In this paper, the solar energy is described and quantified, along with a review ...

Key to the success of solar cells: lower cost, higher efficiency! Band gaps have to be optimized ...

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