Solar360 Mobile Energy

Solar cell pdf notes

Overview

What are the basic physical principles underlying the operation of solar cells?

The basic physical principles underlying the operation of solar cells are the subject of this chapter. First, a brief review of the fundamental properties of semiconductors is given that includes an overview of semiconductor band structure and carrier generation, recombination, and transport.

What is the working principle of solar cells?

All the aspects presented in this chapter will be discussed in larger detail in the following chapters. The working principle of solar cells is based on the photovoltaic effect, i.e. the generation of a potential dif-ference at the junction of two different materials in re-sponse to electromagnetic radiation.

Which physics is relevant to solar cell operation?

Finally, we will focus on the physics of semi-conductor junctions in Chapter 8. The first successful solar cell was made from crystalline silicon (c-Si), which still is by far the most widely used PV material. Therefore we shall use c-Si as an example to explain the concepts of semiconductor physics that are relevant to solar cell operation.

What is a solar cell?

In effect, "solar" cells are used with a small manmade "sun" created by burning methane. However, because this "sun" is only 1" away from the cell, IR power intensities at the cell are one thousand times higher than the sunlight on the roof of a car.

How does a solar cell work?

The solar cell is the basic building block of solar photovoltaics. The cell can be considered as a two terminal device which conducts like a diode in the dark and generates a photovoltage when charged by the sun. When the junction is illuminated, a net current flow takes place in an external lead connecting the

p-type and n-type regions.

How to design a solar cell?

the solar cell should be designed with a minimum amount of grid shadowing s, minimum reflectance r(λ), and be optically thick enough such that nearly all the photons with E > EG are absorbed. It can be seen that FF is a weak function of the open-circuit voltage, increasing slowly as the open-circuit voltage increases.

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Solar Cell: Working Principle & Construction ...

Key learnings: Solar Cell Definition: A solar cell (also known as a photovoltaic cell) is an electrical device that transforms light energy directly into electrical energy using the photovoltaic effect. Working Principle: The working ...

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