Photodetectors and solar cells

Are solar cells photodetectors?

Abstract: Solar cells are not strictly photodetectors,in the sense that they convert radiant power to an electrical power supply rather than to an electrical signal carrying information like all other photodetectors considered so far.

What is the dark current in a photodetector?

The dark current in a photodetector is the current present even in the absence of lightand limits its sensitivity I = -(Io +IL) I_o I_L _Dark current is caused by thermal generation and device leakage current kT e o i i c v g I_A n^2_where n^2_is the density of charge carriers in the intrinsic semiconductor.

Are solar cells the same as photodiodes?

However,solar cells are very similarto and share many of the problems of photodiodes,and because of their engineering relevance for electrical utilities and stand-alone power supplies,the authors present in this chapter a brief outline of devices,technologies,and systems.

Can photodiodes be used as solar cells?

Photodiodes can be used as solar cellsto convert solar energy to electrical energy. Consider the solar cell connected in a circuit,as shown below. R . The solutions,corresponding to the intersection of the curves,represent the operating points of the cell. Note that the pn junction in a solar cell is always forward biased.

Can a PN diode be used to realize a photodetector?

Photoconductors will be the subject of a homework problem. A pn diode can be used to realize a photodetector of the photovoltaic type. Consider the pn diode structure shown in the figure below. Assume that the current-voltage relation of the pn diode,in the absence of light,is given as,- - ++

Why is the speed of operation of a photodetector important?

The speed of operation of a photodetector is important for high data rate fiber-optic communication links. Consider a photodetector connected as shown in the Figure below. We assume that the photodiode is well designed and all photogeneration takes place inside the junction depletion region.

We propose to use collective lattice resonances in plasmonic nanoparticle arrays to enhance and tailor photoelectron emission in Schottky barrier photodetectors and solar cells. We show that the interaction between narrow-band lattice resonances (the Rayleigh anomaly) and broader-band individual-particle excitations (localized surface plasmon ...

Light-emitting diodes (LEDs) are an indispensable part of our daily life. After being studied for a few decades, this field still has some room for improvement. In this regard, perovskite materials may take the leading role.

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In ...

Enhancing perovskite solar cells and X-ray photodetectors with hybrid MoSe 2 @CNT composites: A path to improved efficiency and sensitivity. Author links open overlay panel Xin Li a b 1, Sikandar Aftab c 1, Hailiang Liu d 1, ... Solar cells made of silicon are rigid and challenging to install.

Multiple Junction Cells. Connect solar cells in series. Usually wide gap cells in series with narrow gap cells. High energy gap Low energy gap Voltage of cells adds. But need same current through each cell. Must carefully tune absorption. E. C E V 1.6 eV 0.95 eV recombination interface. Advantage: highest performance cells made this way.

In the case of the FTO/TiO 2 /Sb 2 S 3 /SbSI/PCPDTBT/Au solar cell the charge transfer was even more effective due to an existence of energetically favorable external driving force. Thus, the PCE of this solar cell reached 6.08%, which is the best result among the antimony chalcohalide photovoltaic devices developed so far (Table 5.3).

Nanometre-scale semiconductor devices have been envisioned as next-generation technologies with high integration and functionality. Quantum dots, or the so-called "artificial atoms", exhibit unique properties due to their quantum confinement in all 3D. These unique properties have brought to light the great potential of quantum dots in optoelectronic ...

in the solar cell case. Although these curves are similar to the IV curves of a photo-voltaic device, the difference is that a photodetector is operated in the third quad- ... devices or solar cells, and b Photodetectors. c Typical IV curves of a photodetector with photocur-

Most solution-processed organic photodetectors and solar cells have been developed with a BHJ configuration. The efficiency of BHJ solar cells now ...

Subsequent to proton irradiation, comprehensive assessments of the devices as both solar cells and photodetectors were conducted, facilitating a thorough comparison of their performance before and ...

In this chapter, the basic device physics and structures, the operation principles, and the general characterstics of solar cells and photodetectors fabricated from elemental and compound ...

Themed issue on perovskite solar cells: research on metal halide perovskite solar cells towards deeper understanding, upscalable fabrication, long-term stability and Pb-free alternatives ... Argon plasma treatment to tune perovskite surface ...

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