Nanostructured photocathodes for infrared photodetectors and photovoltaics

Are nanostructures suitable for wide-band photodetectors?
In such a way, we discussed the most recent developments on IR detectors using InAs and PbS quantum dot nanostructures. Overall, this review gives clear view on the development of suitable device architecture under prominent nanostructures to tune the photodetector performance from UV to IR spectral regions for wide-band photodetectors.

Can inorganic nanostructures be used for infrared photodetection?
This article reviews the state-of-the-art research of low-dimensional inorganic nanostructures and their application for infrared photodetection. Thanks to nano-structuring,a narrow bandgap,hybrid systems,surface-plasmon resonance,and doping,many common semiconductors have the potential to be used for infrared detection.

Why are nanostructured materials attracting interest in photodetectors?
The nanostructured materials and architectures are attracting extensive interests in photodetectors in view of the potential benefits from confined light-matter interaction, fast carrier dynamics and ultrahigh photoconductive gains.

What are the different types of nanowire-based infrared photodetectors?
The current research of nanowire-based infrared photodetectors can be mainly divided into three categories: single nanowire, [7, 43, 64] ensemble (random) nanowire, [65 - 67] and ensemble (ordered) nanowire array [6, 26, 27] based photodetectors.

Can nanostructured plasmonic metamaterials be used for infrared photodetection?
The recent achievements in exploring nanostructured plasmonic metamaterials for the intriguing subwavelength photon confinement and waveguides in devices are also surveyed considering their importance in device integration. An outlook of infrared photodetection is given in the end as a guideline for this vigorous field.

Are infrared photodetectors based on quantum wells?
This review concentrates on the photodetection in the infrared spectrum and recent progresses in constructing advanced infrared photodetectors based on quantum wells, dots, and the rapidly evolving 1D and 2D materials are summarized.

Infrared photodetectors can be used as infrared night vision. [8 ... are enough to show that the photodetectors based on nanostructured perovskites have. ... For photovoltaic photodetector, or.

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Semiconductor-based photodetectors (PDs) convert light signals into electrical signals via a photon-matter interaction process, which involves surface/interface carrier generation, separation, and transportation of the photo-induced charge media in the active media, as well as the extraction of these charge carriers to external circuits of the constructed ...

Transparent nanostructured photocathodes with beneficial energy level alignment with small bandgap semiconductors can widen the material choices for IR photoelectrodes. Herein we ...

Infrared photodetectors are finding widespread applications in telecommunication, motion detection, chemical sensing, thermal imaging and bio-medical imaging, etc. The nanostructured materials and architectures are attracting extensive interests in photodetectors in view of the potential benefits from confined light-matter interaction, fast carrier dynamics and ...

Nanostructured photocathodes for infrared photodetectors and photovoltaics. Ronen Gertman, Adi Harush, Iris Visoly-Fisher. Department of Chemistry; The Swiss Institute for Dryland Environmental and Energy Research; Ben-Gurion University of the Negev. Research output: Contribution to journal > Article > peer-review.

This review concentrates on the photodetection in the infrared spectrum and recent progresses in constructing advanced infrared photodetectors based on quantum wells, ...

Infrared photovoltaic cells (IRPCs) have attracted considerable attention for potential applications in wireless optical power transfer (WOPT) systems. As an efficient fiber-integrated WOPT system typically uses a 1550 nm laser beam, it is essential to tune the peak conversion efficiency of IRPCs to this wavelength. However, IRPCs based on lead sulfide ...

Interfacial energy band alignment is crucial for applications involving charge transfer and transport. Specifically, efficient photovoltaic (PV) devices require fine-tuning of the energy ...

Photodetectors are critical components in a wide range of applications, from imaging and sensing to communications and environmental monitoring. Recent advancements in material science have led to the development of emerging photodetecting materials, such as perovskites, polymers, novel two-dimensional materials, and quantum dots, which offer unique ...

Metal sulfide materials are a large category of minerals that represent a rich subject of research for various emerging optoelectronic applications such as photodetectors, solar cells, and light emitting diodes [31].These compounds occur naturally in the form of minerals including chalcocite (Cu 2 S), heazlewoodite (Ni 3 S 2), pyrite (FeS 2), and among others, which are ...

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Near infrared light organic photodetectors have attracted tremendous attention due to their tailorable response, ease of processing, compatibility with flexible substrate, room temperature operation and broad applications such as remote sensing, health monitoring, artificial vision, night vision, and so on. ...

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Photodetectors Devices, Circuits and Applications Second Edition Silvano Donati ... 4.1 Photocathodes 34 4.1.1 Properties of Common Photocathodes 37 4.1.2 Photocathodes Technology 41 . vi Contents ... Chapter 9 Solar Cells 265 9.1 Electrical Parameters 266

Nanostructured Photocathodes for Infrared Photodetectors and Photovoltaics. The Journal of Physical Chemistry C 2015, 119 (4) ... High performing air stable inverted perovskite solar cells using nanostructured CuSCN thin film as hole transport material. Solar Energy Materials and Solar Cells 2021, 231, 111116.

The growing need for the multiband photodetection of a single scene has promoted the development of both multispectral coupling and broadband detection technologies. Photodetectors operating across the infrared (IR) to terahertz (THz) regions have many applications such as in optical communications, sensing imaging, material identification, and ...

This review provides the complete insight on the research progress of photodetectors based on nanostructured metal sulfide films, which are classified into three categories such as ultraviolet (UV), visible, and infrared (IR) photodetectors. Initially, the fundamentals of photodetectors with various figures of merit are discussed.

This study investigates the impact of proton irradiation on perovskite devices fabricated fully through vacuum deposition. Exposure to irradiation induces changes in both electrical and optical ...

Transparent nanostructured photocathodes with beneficial energy level alignment with small bandgap semiconductors can widen the material choices for IR photoelectrodes. ...

The visible photodetectors can be used in biological sensing, video imaging, and convert communications [4,5,6,7]. Infrared photodetectors can be used as infrared night vision. [8,9,10] The THz photodetectors can be used in the security detection of customs, airports, and other special occasions [11,12,13]. Therefore, the further research of ...

Sittingizing conjugated polymers with infrared-active nanocrystal quantum dots provides a spectrally tunable means of accessing the infrared while maintaining the advantageous properties of polymers, and makes use of the wavelength tunability afforded by the nanocrystals to show photocurrent spectra tailored to three different regions of the infrared spectrum. In ...

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In this section, we discuss the device fabrication, array design, working mechanism and current progress of III-V nanowire array-based infrared photodetectors based on a variety ...

The development of CNT-based photodetectors goes a long way since the first CNT photoconductor [7].Numerous materials synthesis methods and device optimization collectively contribute to improve performance of the fabricated photodetectors [8, 9].Typically, high-quality CNT networks and aligned arrays with the semiconducting purity of 99.9999 % ...

Nanostructured Materials and Architectures for Advanced ... in developing infrared photodetectors.[4,5] In this period, Hg ... photovoltaic type photodetectors could be feasibly constructed

The nanostructured III-nitride strategy provides a route towards realistic room temperature intermediate band solar cells while leveraging the cost benefits of silicon substrates.