

What are the patents on photovoltaic cells?

The patents on photovoltaic cells are concentrated in the area of semiconductors for the conversion of solar radiation into electric energy, in the area of generators for the direct conversion of light energy into electric energy and in the area of solar panels adapted for roof structures.

What are the patents for solar cells?

The patents that stand out in this TR are: US20040200520A1 (Metal contact structure for solar cell and method of manufacture), US20050016585A1 (Manufacturing a solar cell with backside contacts), US20060130891A1 (Back-contact photovoltaic cells) and US20070186970A1 (Solar cell and method of fabricating the same).

Why are photovoltaic cell patent registrations important?

Photovoltaic cell patent registrations are a valuable data set in the analysis and diffusion of PV technology and R&D activities. The dynamics of PV R&D activity is considered high, documented in a large increase in PV patent documents .

Are photovoltaic cells a technological development?

There is a prominence of deposited patents for polymer-based photovoltaic cell technologies, carbon nanostructures, III-V compounds, CdTe and amorphous silicon cells. The objective of this article is to identify the technological development of photovoltaic cells by the analysis of patents.

How has photovoltaic technology developed over the last 30 years?

Photovoltaic technology has developed rapidly over the last thirty years. The main activities of photovoltaic patents began in the late 1950s and the main photovoltaic patent assignees at that time were involved in the space business . Patent data has been widely used in technology assessment and forecasting ,,,

What is the IPC GI for photovoltaic patents?

As search criteria, photovoltaic (PV) patents applied from 1998 to 2017 were selected and whose classification (IPC) are related to green technologies according to the IPC Green Inventory (IPC-GI) available on the WIPO (World Intellectual Property Organization). Such IPC of PV green technologies are shown in Table 2.

An apparatus (1) for generating electricity using photovoltaic panels (2) comprises a panel (2) mounting structure (4) adapted to position the panels in a body of water in such a way that the top faces (3) of the panels (2) designed to receive the solar radiation are operatively covered by a layer of water of predetermined depth. A method for generating electricity using ...

Since the discovery of Photovoltaic (PV) effect, numerous ways of utilizing the energy that can be generated by the free everlasting solar radiation using solar panels were put forward by many researchers. However, the

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major disadvantage of solar panel to date is its low efficiency, which is affected by the panel temperature, cell type, panel orientation, irradiance ...

Among renewable energy resources, solar energy offers a clean source for electrical power generation with zero emissions of greenhouse gases (GHG) to the atmosphere (Wilberforce et al., 2019; Abdelsalam et al., 2020; Ashok et al., 2017). The solar irradiation contains excessive amounts of energy in 1 min that could be employed as a great opportunity ...

The invention concerns an anti-theft module (200) for photovoltaic panel (100), comprising: - a GPS receiver (210); - a power switch (240), connected to the electric exit of photovoltaic panel (100) so as to interrupt delivery of electric energy generated by photovoltaic panel (100), and managed by an activation sub-system (230) of power switch; - a microcontroller (220); - said ...

Photovoltaic power generation is developing rapidly with the approval of The Paris Agreement in 2015. However, there are many dust deposition problems that occur in desert and plateau areas. Traditional cleaning methods such as manual cleaning and mechanical cleaning are unstable and produce a large economic burden. Therefore, self-cleaning ...

The TR of Systems, methods and devices for solar PV solar cells is composed of 21 patents (Fig. 6) and the most influential are: US6058930A (Solar collector and tracker arrangement), US20060283497A1 (Planar concentrating photovoltaic solar panel with individually articulating concentrator elements), US20100288332A1 (Solar photovoltaic concentrator ...

A solar panel arrangement for capturing solar energy and supplying power for use in a building. Solar cells are embedded in a window pane and generate electrical direct current that is converted, by an electrical circuit permanently attached to the pane, to an oscillating current that is fed to a ferrite core mounted to the pane. An external ferrite core is mounted in close ...

The refraction of light as it passes through the water layer straightens the incident radiation. The straightened radiation along with lower temperature of PV panel synergistically increases photovoltaic conversion efficiency. The computational fluid dynamics simulation of PV panel temperature closely resembles experimental data.

In the photovoltaic power plant work progress, photovoltaic module connecting wire and subassembly connecting wire are pricked the silk by the iron of taking the insulating layer and are banded, make MC4 connector and steel construction roofing have the certain distance, but in the actual motion, along with photovoltaic power plant's operation, factor influences such as ...

The EU Intellectual Property Office (EU IPO) recently examined trends in "green" trade mark filings in its "Green EUTM Study", which was released in September 2021, and found that 9.7% of green filings concerned energy production and were dominated by terms relating to solar energy such as

"photovoltaic", "solar collector" or "solar battery ...

The average lifetime of a PV panel is, irrespective of the considered technology, around 25 years (Paiano, 2015). Since the electric power share from PV installations became relevant starting from the end of nineties, a dramatic increase in the annual flux of end-of-life PV panels can be expected around 2025.

PV modules may be attached to a support frame and combined with electrical connectors, interconnect cables, and optional components such as temperature sensors and voltage sensors to form a mechanical and electrical assembly referred to as a PV panel. All of the PV modules on one PV panel may be positioned to face in one direction as a group. The PV panel may ...

Demand for Solar Energy. ... The most influential PV Patent applications based on their patent impact factor and citation are given in descending order. Data extracted from PATSTAT 2016b [M.H ...

The results indicate that 1) the number of patents deposited on photovoltaic cells grows every year, 2) the main depositor countries are the United States, China, Japan, Germany and South Korea, 3) American and Japanese organizations stand out with the highest number of patent registrations, 4) the main areas of knowledge were Engineering, Instruments ...

The increase in temperature of photovoltaic (P&#183;V.) module is not only due to the climatic environment (ambient temperature) but also to the problems of direct and indirect partial shading; several recent studies are of interest to our present research [10, 11]. The shading on the photovoltaic module can be caused by the projection of the shadow of an object installed far ...

When people think of the PV panels, they do not think of the fact that they have a maximum period of operation, in most cases 25-30 years. It is estimated that worldwide PV wastes will increase between 4% and 14% by 2030, which will dramatically jump even more than 80% (around 78 million tons) by 2050, leading a serious waste generation. ...

INTERNATIONAL ENERGY AGENCY PHOTOVOLTAIC POWER SYSTEMS PROGRAM End-of-Life Management of Photovoltaic Panels: Trends in PV Module Recycling Technologies IEA PVPS Task12, Subtask 1, Recycling Report IEA-PVPS T12-10:2018 January 2018 ISBN 978-3-906042-61-9 Operating Agent Garvin Heath National Renewable Energy Laboratory, USA

Dust accumulation significantly affects the solar PV(Photovoltaic) performance, resulting in a considerable decrease in output power, which can be reduced by 40% with the dust of 4 g/m<sup>2</sup>. Understanding the dust deposition characteristics of PV modules can provide theoretical support for selecting dust cleaning methods and formulating cleaning strategies.

1 INTRODUCTION. In the context of energy efficiency and conservation, the building sector has attracted increasing attention worldwide. In developing countries, buildings are responsible for consuming up to 40% of



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the total energy, with a related emission of 40% of total Greenhouse Gas (GHG) emissions [].As such, there is a great potential for building energy ...

Edward Weston Receives Two Solar Panel Patents in 1888. The first solar panel patent in the United States was registered on September 4, 1888. American inventor Edward Weston received US Patent 389,124 for his "Apparatus for Utilizing Solar Radiant Energy." The goal of the apparatus was to transform radiant energy (from sunlight) into ...

Within the optical and thermal arrangement of solar PV panels, the patent entitled "Concentrating solar energy receiver" [90] is found to be highly influential, as it has been cited by 181 patent and non-patent publications since its priority date in 2002 (PIF = 12.9). The application is assigned to an American individual called Bernard Bareis.

In the utilization of solar energy, the common energy conversion approaches can be broadly classified into the following categories: (1) conversion of solar energy to electrical energy using solid ...

The installations of photovoltaic (PV) solar modules are growing extremely fast. As a result of the increase, the volume of modules that reach the end of their life will grow at the same rate in the near future. It is expected that by 2050 that figure will increase to 5.5-6 million tons. Consequently, methods for recycling solar modules are being developed worldwide to ...

Introduction. Permanence, cleanliness, and sustainability are the three main characteristics of photovoltaic (PV) industry. Currently, the world is facing severe environmental problems and expanding energy crisis, and China is making efforts for the exploration and layout of PV industry [].However, the PV industry is also characterized by serious pollution in the ...



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