

Research and development of solar power generation materials

What is the progress made in solar power generation by PV technology?

Highlights This paper reviews the progress made in solar power generation by PV technology. Performance of solar PV array is strongly dependent on operating conditions. Manufacturing cost of solar power is still high as compared to conventional power. **Abstract**

Can materials improve the performance of solar photovoltaic devices?

Hence, the development of materials with superior properties, such as higher efficiency, lower cost, and improved durability, can significantly enhance the performance of solar panels and enable the creation of new, more efficient photovoltaic devices. This review discusses recent progress in the field of materials for solar photovoltaic devices.

How many articles on solar power generation materials were published between 2003 & 2023?

This study employs Web of Science and Citespace to visually analyze 521 articles on solar power generation materials published between 2003 and 2023. The development of these materials is categorized into three distinct phases: the start-up phase, rapid growth phase, and steady phase.

What is solar power?

Solar power is the conversion of sunlight into electricity, either directly using photovoltaic (PV), or indirectly using concentrated solar power (CSP). The research has been underway since very beginning for the development of an affordable, in-exhaustive and clean solar energy technology for longer term benefits.

Why are materials important for solar photovoltaic devices?

Hence, the development of materials with superior properties, such as higher efficiency, lower cost, and improved durability, can significantly enhance the performance of solar panels and enable the creation of new, more efficient photovoltaic devices. This review discusses recent progress in the field of materials for solar photovoltaic devices.

Does solar radiation influence research in materials for solar power generation?

Therefore, this paper argues that for developing countries, solar radiation strongly influences the decision to pursue research in materials for solar power generation. In contrast, for developed countries, the motivation for such research is not significantly influenced by solar radiation. Two key reasons underpin this observation.

The purpose of this paper is to discuss the different generations of photovoltaic cells and current research directions focusing on their development and manufacturing technologies. The ...

The remarkable development in photovoltaic (PV) technologies over the past 5 years calls for a renewed assessment of their performance and potential for future progress. ...

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The block-scale application of photovoltaic technology in cities is becoming a viable solution for renewable energy utilization. The rapid urbanization process has provided urban buildings with a colossal ...

Solar power generation is a sustainable and clean source of energy that has gained significant attention in recent years due to its potential to reduce greenhouse gas emissions and mitigate ...

Progress in Research and Development of Molten Chloride Salt Technology for Next Generation Concentrated Solar Power Plants ... storage of the solar heat in the TES material allows CSPs ...

The performance of the solar Stirling power generation system is predicated by the test results of the solar collector and the Stirling engine generator in low output range. ...

We derive a simple analytical relationship between the open-circuit voltage (V_{OC}) and a few properties of the solar absorber materials and solar cells, which make it possible to accurately...

Promoting material development on donor ... ultrathin, cost effective solar cells are naturally radiation hardened suggesting applications in power solar arrays for generation ...

Major development potential among these concepts for improving the power generation efficiency of solar cells made of silicon is shown by the idea of cells whose basic feature is an additional ...

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