

Solar Cells: Fueling Tomorrow with Today's Sunshine

Dr. Ranjit Ashokrao Gayake

Late Nitin College, Pathri Tq. Pathri Dt. Parbhani (Maharashtra)- 431506

Abstract:-

The sun provides ample energy, which can be used for various reasons. Although just a small part of the sun's energy is utilized, it nevertheless generates a significant amount. The sun's light reaches the earth's surface, meeting increasing energy demands. Photovoltaic effects transform incident sunlight into electricity. First-generation solar cells are made of silicon. Improved solar cell efficiency is aimed at converting solar radiation into electrical energy. Thin film technology and amorphous silicon solar cells are being used to achieve the desired condition. This article discusses the usage of solar cells as a renewable source of electricity.

Keywords: Solar cell, Renewable source of energy, Electrical energy.

Introduction:-

Now technology have gone to a great height and improvements in the solar cell with its efficiency is tried to obtained with the use and progressive advancement in Solar cell technology from first generation solar cells to Dye sensitized solar cells, Quantum dot solar cells and some recent technologies(1). Over the past five years, there have been notable advancements in solar cell technology based on photovoltaic (PV) technologies, which has led to a renewed evaluation of how solar cells operate. An examination of solar cells and their varieties in relation to the advancement of power generation; these cells and modules are based on single-crystalline GaAs, Si, GaInP, InP, multicrystalline Si, and thin films of polycrystalline CdTe and $\text{CuIn}_x\text{Ga}_{1-x}\text{Se}_2$.

In addition to significant advancements in sustainable chalcogenides, organic PVs, and quantum dots technologies, PV developments of the more recently developed lead halide perovskites. In fact, different types of solar cells have been found to have improved control over the optoelectronic quality of PV-relevant materials and interfaces, as well as the discovery of new material properties. These factors interfere with the proper functioning or output of the solar cell. This improved method for producing electrical energy is evaluated both now and in the future. Cross-fertilization between technologies frequently occurs, making advancements in one cell type an indicator of evolutionary changes in others, even though precise or revolutionary developments cannot be foreseen. The development of metal halide perovskites is assisting in the unification of hitherto diverse, technology-focused strands of PV research, making this knowledge transfer urgent (2,3). Because solar cells run on solar energy, which is entirely renewable and available whenever we need it, the demand for solar cells has also increased due to the growing environmental crisis. The use of solar energy to generate electrical energy is gaining more attention worldwide. Solar energy is the most abundant, affordable, and promising renewable energy source. Even while high-performance solar cells have advanced significantly over the past few decades, the high module cost significantly prevents photovoltaic devices from being widely used. The pressing need for affordable solar cells over the past ten years has made solar cell research much easier. This essay examines the latest advancements in high-efficiency and reasonably priced solar cell technologies. The benefit of perovskite solar cells is their high efficiency and low cost. Additionally presented are the advancements and cutting-edge outcomes of perovskite solar cell technologies (4).

Currently, non-renewable fossil fuels, which have detrimental effects on human health and the environment, provide around 85% of the world's energy demands. Additionally, it is anticipated that the world's energy consumption would double by 2050. Consequently, it is now urgently necessary to create renewable energy sources like solar, wind, and water. It was estimated that 128 GW of power could be generated by renewable energy in 2014, of which 37% would come from wind, more than a third from solar, and more than a quarter from hydropower. This continued a previous upward trend, accounting for more than 45% of gains in worldwide power generation capacity in 2014. Due

to its availability, affordability, and environmental friendliness, solar energy is becoming more and more popular. (4) There are two categories of energy resources: renewable and non-renewable. Due to a number of detrimental environmental repercussions, including air pollution, climate change, and the loss of natural resources, people are focused on using less. Renewable energy sources are used to produce energy. One of the most discussed renewable energy sources is solar energy. New technologies and advancements in the energy sector are required due to the growing human population and energy demand. The sector of solar energy will grow in order to meet the world's energy needs and increase energy efficiency. Electricity cannot be produced at night. There is a serious problem with the average solar cell. This study tackles innovation with a primary focus on solar energy. Solar energy technology has advanced and has a promising future (5).

Based on literature surveys, the author argues that renewable energy can supply both current and future demand. This study analyzes the bibliometric positioning of research on renewable energy and solar panels in Scopus. The study utilized bibliometric approaches. We analyzed and visualized search results using the VOS Viewer tool and Scopus function. The study examined 1,598 papers from 1989 to 2020. According to the poll, the National University of Singapore and the Institute of India Studies are the most active institutions and countries involved in renewable energy and solar panel research. Engineering and Energy Procedia conducted extensive research on renewable energy and solar panels(6). Energy is largely considered as the primary driver of global economic progress. The world's energy resources are split into three categories: fossil energy (oil, gas, coal), nuclear energy, and renewable energy (wind, sun, geothermal, air power, biomass, hydrogen, ocean). According to Directive 2009/28/EC appendix 1, renewable energy sources include wind, solar, geothermal, ocean, hydropower, biomass, and biogas. (Scholikha, 2019). According to Zoghi et al. (2017), many current energy sources are finite and will eventually run out due to increased demand. The Indonesian government aims to reduce reliance on fossil fuels, especially for electricity, through renewable energy development (Widjaja, 2008). Abiogase, for example, is a kind of CH₄ that can function as both a fuel and an alternate energy source. This alternative energy source generates power, heat, and a significant amount of LPG gas for home use (Hariyanto et al., 2019). An important, rapid, and secure invention is renewable energy. (Shahabi et al., 2014; Mehrjerdi & Rahshani, 2019; Tabor et al., 2018). Renewable energy sources offer several advantages (Abazari et al., 2020). According to Corzine (2017), renewable energy can cover current and future needs (Cabrera-Tobar et al., 2016), increase global energy efficiency (Alippi & Galperti, 2008), and reduce transmission capacity requirements (Song et al., 2019). Several countries have already started using solar cells and advanced technologies (6, 7, 8, 9). The National Solar Mission is a major project of the Government of India and its state governments. The Mission aims to develop India as a global leader in solar energy. India will make a significant contribution to the global effort to address climate change. Solar energy systems are readily available for both industrial and residential applications. Solar energy could be made commercially viable by government tax breaks and rebates. India has high solar potential due to its location between the Tropic of Cancer and the Equator, with average yearly temperatures ranging from 25°C to 27.5°C (10, 11).

The Mission's goal is to create an atmosphere conducive to the country's adoption of solar technology. Solar energy has potential as a future energy source and allows for decentralized distribution, empowering local communities. Renewable resources will not only increase energy supply, but also contribute to climate change mitigation in India. Solar energy systems are readily available for both industrial and residential applications. Government tax incentives and rebates can make solar energy more financially viable. India's economic progress and industrial growth are being hampered by acute energy constraint. To address the energy dilemma, we must utilize renewable energy resources wisely. Renewable resources will not only increase energy supply, but also contribute to climate change mitigation in India. India relies significantly on fossil fuels for its energy needs. Coal and mineral oil-based power plants generate the majority of electricity. Government tax incentives and rebates might make solar energy more affordable. Solar energy could be made commercially viable by government tax breaks and rebates. Solar energy, a renewable energy source, can help decarbonize the global energy system. Solar energy is a clean, renewable resource with no emissions. Solar energy is increasingly becoming the primary renewable energy source in developed countries. India has significant solar potential, with the sunniest areas being along the south/east coast from Calcutta to Madras. Solar energy systems are readily available for both industrial and residential applications. According to the National Action Plan on Climate Change, India has significant potential for solar energy. Current architectural concepts use photovoltaic cells and circuitry into building plans. According to the National Action Plan on Climate

Change, India is a tropical country with abundant and intense sunshine. Climate change has emerged as a key worry in the current century. Solar cell innovations have significantly transformed the global energy industry (2,10).

Methodology:-

Solar cells, a renewable source of energy, are a necessary technology in today's world, as evidenced by research and literature reviews. Various writers have conducted research on enhanced solar cell technology and its application in generating electricity. This research examines and presents the efficiency of solar cells used to generate power.

Result and Discussion :-

Large number of sources of energy are available like conventional and non-conventional source of energy. Solar energy is the non-conventional source of energy as it is completely renewable and inexhaustible source of energy. Non-conventional energy sources are environmentally friendly and don't produce any poisonous or dangerous materials during their operation. Solar energy is the primary source of energy on the earth and all the forms of energy can be tracked back in to solar energy, there is an emphasis to utilize and use the solar energy in different forms and is achieved by conversion to solar energy in to heat energy and electrical energy. Solar energy is completely free because there is no expense associated with using it; it is a plentiful and natural energy source. Solar cells are used to convert solar energy into electrical energy, and they can be built using a variety of cutting-edge technologies to achieve high conversion efficiency. In order to use and produce electricity while lowering the cost of energy production, a huge number of solar cells connected in series to form a solar panel are now mounted on the roof of any building.

Conclusion:-

Oil, coal, petroleum, and natural gases are examples of conventional energy production sources that pose numerous health and environmental risks. Once they are depleted, these resources cannot be restored. And since this is a big problem in this nation right now, it can be readily solved by using solar cells and other cutting-edge technology in solar cells, which are necessary in the modern period to produce energy without producing hazardous or toxic byproducts.

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