

The Role of Solar Panels in Energy Production

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ABSTRACT

The article provides information about solar panels and energy systems. Here static and dynamic data is collected and analyzed. General information about renewable energy systems is collected and the work done is analyzed. The work done in the past and future and the direction of this system are indicated.

KEYWORDS: *General information about solar panels, Energy systems, Working principle of renewable energy systems, Reduction of unused energy sources*

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INTRODUCTION

Among the alternative energy sources that can be used in industrial energy systems, solar energy can provide practical, functional and economical solutions. The choice of renewable energy technology, which can be used in industrial and laboratory production processes, depends mainly on the type of energy, renewable energy source and capacity, and physical/technical infrastructure capabilities. The total energy stored in the world's coal, oil and natural gas reserves is equivalent to the energy of 30 days of sunshine. The sun is used in agricultural fields to produce light, heat and energy. Solar energy; electric fence lighting, drip irrigation and their automation equipment can be a suitable alternative energy source for its operation. Solar energy is an environmentally friendly energy source that comes from the sun and has no operating costs. In our world, which is already exposed to the sun's rays all day, there is no pollution and no waste compared to energy obtained from fossil fuels. Solar energy plays a vital role in agriculture and animal husbandry as well as industry. Irrigation is one of the most efficient areas where solar energy is used, and given that wells and other water resources are located in rural areas far from urban centers, the demand in this sector is increasing day by day due to the high cost of electricity. The most important advantage of

solar water pumping systems is their ease of use and longevity. Solar energy panels collect direct sunlight and use these rays to produce heat or electricity. The source of this energy is the fusion reactions that take place on the surface of the sun during the conversion of hydrogen into helium. The intensity of solar energy outside the Earth's atmosphere is constant at about 1370 W/m², but varies between 0 and 1100 W/m² on Earth. The greatest characteristic of the energy reaching the Earth from the Sun is that it is limitless. Solar energy is evaluated in the form of light, heat and electricity. Photovoltaic (PV) systems convert solar energy directly into electricity and can be installed on the roofs of buildings, appliances and even cars. Solar thermal collectors, which are widely used in our country, are used to heat water. This technology is especially useful for off-grid power generation in rural areas. The biggest drawback of this technology is that it cannot be produced at night. Due to the fact that the earth's energy reserves will be exhausted in no time, fuel prices are increasing day by day. It is estimated that a barrel of fuel oil will cost around \$60 in 2025. Solar panels are the only inexhaustible source of energy that does not generate smoke, carbon monoxide, and radiation. It also provides alternative system solutions for a wide variety of applications with low operating costs. Since

solar energy is not dependent on foreign countries, economic and political crises do not affect solar energy.

Experimental Details:

Basically, a solar panel uses photons to separate electrons from atoms. The process of removing electrons from atoms also creates electricity. Solar panels contain photovoltaic cells made of silicon that convert sunlight into electricity instead of heat. In these solar cells located on the panels, a direct current is generated due to the sun's rays. The amount of energy received is measured according to the location or season of use, and a series or parallel mechanism is installed and connected to homes or workplaces. A photovoltaic system is a system that uses solar energy and converts it into energy. A photovoltaic system is formed by combining several processes and absorbing sunlight with solar panels, then converting it into electricity. A solar inverter converts electricity from direct current to alternating current. After that, the connection, wiring and installation of other electrical devices form a working system. Also, this system enhances its overall performance with a solar tracking system, and can also include a built-in battery solution. The photovoltaic module is shown below- Photovoltaic cells convert light directly into electricity and then cool it. Photovoltaic elements are small systems of several kilowatts that are installed on objects or in power plants. Today, many photovoltaic systems are connected to the grid. Solar panels use photons to separate electrons from atoms. This process also produces electricity. Solar panels contain photovoltaic cells made of silicon that convert sunlight into electricity rather than heat. This is how we can flow solar panels to generate electricity. First, solar panels absorb heat, then photovoltaic cells receive light (photons) and convert light into electricity. When heat hits the solar panel, the PV cells start working and generate direct current electricity. We can divide solar panels into 2 parts: Polycrystalline solar panels and Monocrystalline solar panels Polycrystals are cheaper than single crystals because they do not require the crucible drawing process. Here, the raw silicon is melted and converted into square cells. Monocrystalline solar panels are made of high grade silicon. Though it is a bit expensive, it is widely used due to its useful work coefficient. It is used in stations and high-tech facilities, as it is high quality and efficient, and long lasting as well. As it was mentioned above that solar cells differ from each other in terms of efficiency.

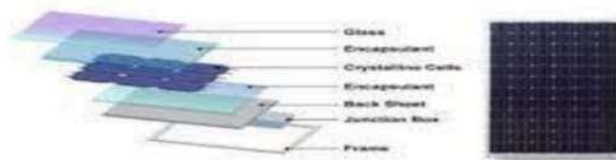


Figure 1 Photovoltaic module

| Parameters | InAs | GaAs | $In_xGa_{1-x}As$ |
|----------------|-----------|-----------|------------------|
| b (eV) | -1.8^c | -1.7^c | $-1.7-0.1x$ |
| a_c (eV) | -5.08^a | -7.17^a | $-7.17+2.09x$ |
| a_v (eV) | 1.0^c | 1.16^c | $1.16-0.16x$ |
| m_e^*/m_0 | 0.04^b | 0.067^b | $0.067-0.027x$ |
| m_{hh}^*/m_0 | 0.035^a | 0.112^a | $0.112-0.077x$ |
| m_c^*/m_0 | 0.341^b | 0.377^b | $0.377-0.036x$ |
| E_g (eV) | 0.419 | 1.519 | $1.519-1.102x$ |

Table 1 Materials used in solar panels

Conclusion:

Synthesis and characterization of graphene oxide flakes is shown in the article titled Process of synthesis of graphene oxide as transparent thin film. Here, thin graphene oxide flakes were synthesized by the Hummer method. Their suitability for the production of transparent nanocomposites was investigated. The graphene oxide flakes were then thoroughly X-rayed and characterized by scanning electron microscopy (SEM), energy dispersive X-ray analysis (EDX), Raman spectroscopy and differential scanning calorimetry (DSC). Graphene oxide is widely used in manufacturing processes due to its high solubility properties, large scale and transparency. They can be very useful in solar panels, biomedical applications and electromagnetic interference (EMI) environmental protection. As a result, it uses dispersed graphite as a carbon source, which is modified by the Hummer method. Synthesized large-scale, transparent, thin graphene oxide flakes. Concentrated thermal power uses various types of mirrors to focus the sun's rays. These rays heat a liquid and then drive a turbine. As a result, it creates steam to produce electricity. Concentrated thermal energy is used to generate electricity in power plants designed with special technology. By the beginning of 2019, the global installed capacity of combined heat and power was approaching 8 GW, a fivefold increase between 2010 and 2019.

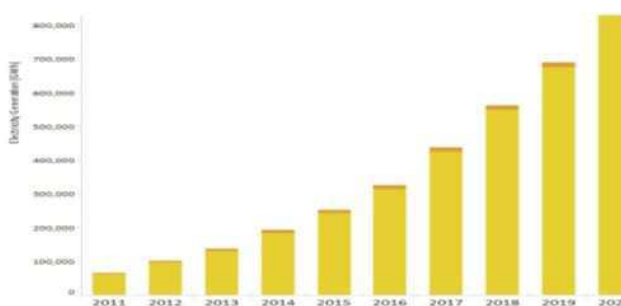


Fig 2 Electricity generation in renewable system

The article provides information about renewable energy systems. Today and experience shows that the most commonly used energy source for our future is solar energy sources. Solar cells vary in their efficiency and electrical conductivity. Studies show that solar panels made of graphene oxide are more economical. Energy sources should not be a problem for countries to move forward economically. Oil, gas and other non-renewable energy sources that harm the environment will eventually run out.

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