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ENERGY CONVERSION AND CONSERVATION BY USING NANOTECHNOLOGY

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Abstract

Over the past few decades, the fields of science and engineering have been seeking to develop new and improved types of energy technologies that have the capability of improving life all over the world .As the electricity generation is the process of generating electric power from source of primary energy. Primary energy can be non-renewable or renewable. Non-renewable resources are a resource that does not renew itself at a sufficient rate for sustainable economic extraction in meaningful human time frame. Nowadays, electricity is being generated by using the non-renewable sources such as coal, petrol, etc. renewable energy is energy that is collected from renewable resources, which is naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. a sun is primary source of energy . The solar energy can be converted into the one type of device, this device called as solar cell. Generally, we use conventional solar cell for a production of electrical energy. But, this type of solar cells has lot of drawbacks hence in order to conserve the electrical energy and its production. We will be use the nanosolar cell.

Nanotechnology is a common word these days, although only 15 years ago it was a quite obscure term used almost exclusively in scientific community. This is a technology that draws a lot of attention not only in the scientific community but also among investors, governments and industry. There is a great deal of expectations connected with it and especially, amongst others, concerning sustainable energy production. This paper briefly explores some of possible implementations of nanotechnology for new and improved energy conversion methods, considering a need for this to be done without doing harm to our environment. Focus is placed on advanced photovoltaic and hydrogen production technology.

Keywords: *Primary sources, Electricity generation & Conservation, Conventional solar cell, Nanosolar cell, Nanotechnology, etc.*

1. INTRODUCTION

Mankind faces daunting energy challenges in the 21 st century, i.e., its over – reliance on the quickly diminishing fossil fuel - based energy sources and the consequent negative impacts to the global environment and climate. Although evolutionary improvements in existing technologies will continue to play important roles in addressing some of the challenges, revolutionary new technology will be the key to a clean, secure and sustainable energy future. Nanotechnology, by manipulating matter at the nanoscale with unprecedented accuracy, holds the promise of providing new materials with distinctly different properties. In recent years, breakthroughs in nanotechnology, especially in their applications in the energy sector, have opened up the possibility of moving beyond our current alternatives by introducing technologies that are more efficient, environmentally sound an cost effective.

Sustainable Energy Production covers the main developments of nanotechnology in clean energy production and conversion. Following a general overview on the contributions of nonmaterial's in selected specific areas of energy production, such as photovoltaic, hydrogen production, fuel cells and thermoelectricity, the remaining individual chapters within this part take these topics, i.e. dye -sensitized photo electrochemical devices, nanostructure thermoelectric materials, nano - sized electrodes and electrolytes for fuel cells, and nonmaterial's - based photo electrochemical water splitting, into in - depth discussions. Efficient Energy Storages concerned with the potential use of nonmaterial's in more efficient energy storage systems. Batteries, superconductors, hydrogen storage for fuel cell applications are the main foci, which exemplify the three main families of energy storage systems in which "going - Nano" is found to be especially beneficial. Firstly, hydrogen storage by physical and chemical adsorption is reviewed with an emphasis on how the use of nanomaterials helps improve its performance. Then the subsequent two chapters, with different focal points, discuss the impacts of nanostructuring on the performance of batteries and super capacitors.

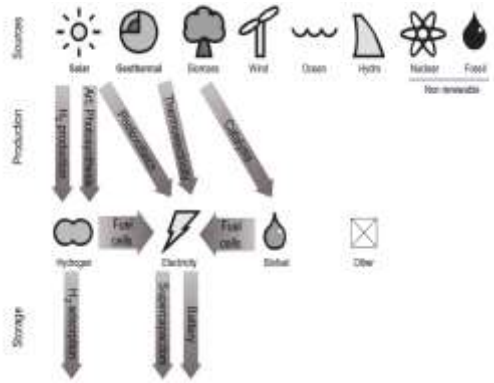

Figure.1 Flow chart of the energy production and storage processes where nanotechnology may contribute.

2. NANOTECHNOLOGY

Nanotechnology is a science, Engineering and the technology conducted at the Nano scale, which is about 1 to 100 nanometers. Nanoscience and Nanotechnology are the study and application of extremely small things can be used across all the other science field, such as chemistry, biology, physics, material science and engineering.

2.1Nanoscale

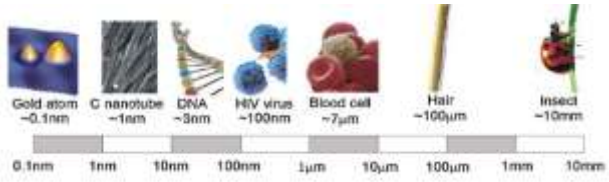

Figure1.1.Nanoscale

Nanoscale Technology is a branch of Nanotechnology in which standard size tools are used to manufacture simple structure and devices with dimension on the order of a few nanometer or less, where one nanometer (1nm) is equal to a billionth of a meter (10 -9 m).Nano scale Technology encompasses all of nanotechnology except molecular manufacturing, which involves the use of Nano scale (extremely small) tools to Build structures, devices, and system at the molecular level.

2.2) Nanotube

A nanotube is a nanometer scale tube like structure. A nanotube is a kind of nanoparticle, and may be large enough to serve as a pipe through which other nanoparticles can be channeled, or depending on the material, may be used as an electrical conductor or an electrical insulator.

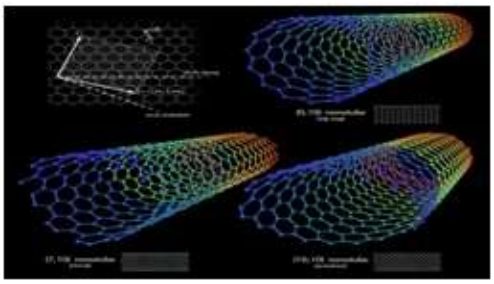

Figure 1.2: Nanotube

3. CONVENTIONAL SOLAR CELL

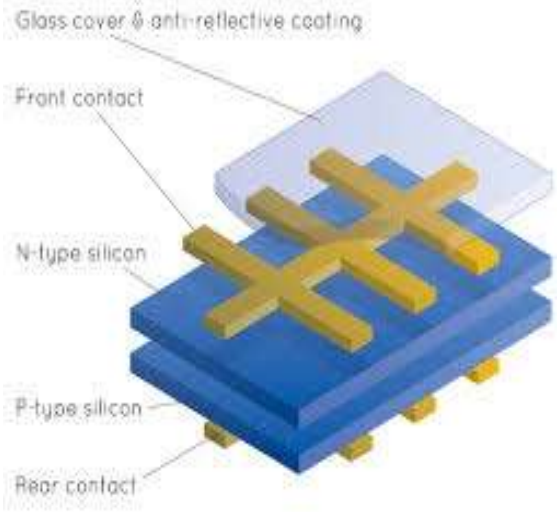

Figure 2.Conventional solar cell

1. Conventional solar cells are called photovoltaic cells.
2. These cells are made out of semiconducting material.
3. When light hits the cells, they absorb energy through photon.
4. This absorbed energy knocks out electrons in the silicon, allowing them to flow.
5. By adding different impurities to the silicon such as phosphorous or boron, an electric field can be established.
6. This electric field acts as a diode, because it only allows electrons to flow in one direction.

3.1 Drawback of conventional solar cell:-

Conventional solar cells have two main drawbacks: efficiencies and their expensive manufacturing cost. The first drawback, inefficiency, is almost unavoidable with silicon cells. This is because the incoming photons, or light, must have the right energy, called the band gap energy, to knock out an electron. If the photon has less energy than the band gap energy then it will pass through. If it has more energy than the band gap, then that extra energy will be wasted as heat. These two effects alone account for the loss of around 70 percent of the radiation energy incident on the cell.

Current solar cells cannot convert all the incoming light into usable energy because some of the light can escape back out of the cell into the air. Additionally, sunlight comes in a variety of colors and the cell might be more efficient at converting bluish light while being less efficient at converting reddish light. See in Figure 1. Lower energy light

Passes through the cell unused. Higher energy light does excite electrons to the conduction band, but any energy beyond the band gap energy is lost as heat. If these excited electrons aren't captured and redirected, they will spontaneously recombine with the created holes, and the energy will be lost as heat or light.

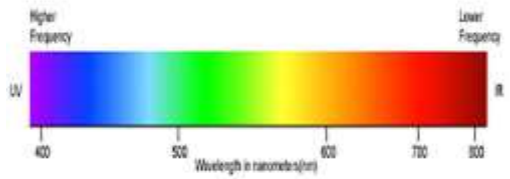

Figure 2.1. Visible Light Spectrum

4. WORKING OF NANOSOLAR CELL

1. Light passes to the middle semiconducting ink layer, which breaks up the electrons.
2. The molybdenum on the fourth layer acts as an electrode, and as the end of the circuit.
3. The second layer is a P/N junction, which conducts the electrons through to the top layer.
4. The top layer conducts the electrons and work as the beginning of the circuit.

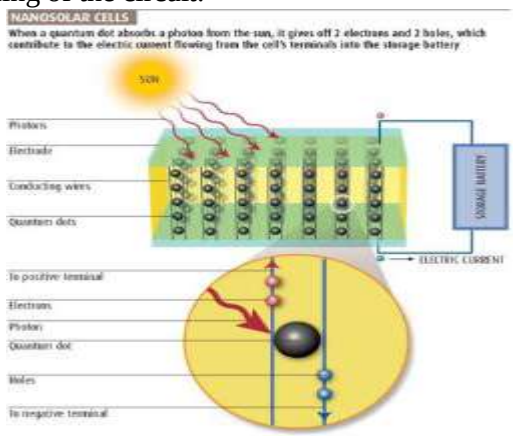

Figure 3.Nanosolar cell.

5. ADVANTAGES

1. By using the Nanotechnology And nanoparticle which is used for manufacturing of conventional solar cell and Nano solar cell we increase the efficiency of Nano solar cell which raised by 70 to 80% than conventional solar cell.
2. The size of the solar cell is very less as compare to conventional solar cell.
3. The manufacturing cost of the Nano solar cell is cheap.
4. The capacity of the solar cell in order to production and the conversion of an the energy are greater.

6. DISADVANTAGES

1. Even it's a less cost as compared to conventional solar cells but it's expensive because using the sliver metal for interconnecting of the panels.
2. Nanomaterial has high cost.

7. APPLICATION

1) Inexpensive solar cells, which would utilize Nanotechnology would help preserve the environment.

2) Coating existing roofing materials with its plastic photovoltaic cells which are inexpensive enough to cover a home's entire roof with solar cells, then enough energy could be captured to power almost the entire house. If many houses did this then our dependence on the electric grid (fossil fuels) would decrease and help to reduce pollution.

3) Inexpensive solar cells would also help provide electricity for rural areas or third world countries. Since the electricity demand in these areas is not high, and the areas are so distantly spaced out, it is not practical to connect them to an electrical grid. However, this is an ideal situation for solar energy.

4) Cheap solar cell could be used for lighting, hot water, medical devices, and even cooking. It would greatly improve the standard of living for millions, possibly even billions of people.

5) Flexible, roller-processed solar cells have the potential to turn the sun's power into a clean, green, convenient source of energy Even though the efficiency of Plastic photovoltaic solar cell is not very great, but covering cars with Plastic photovoltaic solar cells or making solar cell windows could be generate the power and save the fuels and also help to reduce the emission of carbon gases.

8. CONCLUSION

In view of a globally increasing energy demand, treating climatic changes due to continuously increasing carbon dioxide emissions, as well as the foreseeable scarcity of fossil fuels, the development and provision of sustainable methods for power generation belong to the most urgent challenges of mankind. Massive effort at political and economical evelis required to basically modernize the existing energy system. Growing efficiency and new methods through nanotechnological know-how may play a key role for the required innovation in the energy sector. Nano technological components provide for the more efficient utilization of energy reserves and the more economical development of renewable. The dye-sensitized nano crystalline electrochemical photovoltaic system has become a standard device for the conversion of solar energy into electricity.

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