PHYSICAL PERCULARITIES OF HETEROSTRUCTURED SOLAR PHOTOELEMENTS

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Abstract. The thermonuclear energy is the primary source of all energy resources on Earth; coal, oil, gas; hydropower; wind and ocean energy. The sun is the source of all energy on earth. Solar power photoelement cells with the help of sunlight settling energy carrier into a high-temperature thermal energy source. Typically, each of these cells will be heterostructure and the efficiency coefficient is 9%. In this study, the efficiency of a heterostructured solar cell photocell was calculated.

Key words: *solar energy devices, photoelectric cells, amorphous silicon, photoelectric efficiency*

Sunlight is the addition of four atoms of hydrogen and one atom of helium. As we know, the thermonuclear reaction begins when the temperature inside the sun reaches T = 20 million °C. Therefore, thermonuclear energy is the primary source of all energy resources on Earth; coal, oil, gas; hydropower; wind and ocean energy. The sun is the source of all energy on earth. The sun emits an average of $88 x 10^{24}$ calories of heat or $368 x 10^{12}$ TVt of energy per second. However, only $2 x 10^{-6}$ % of this amount of energy, $180 x 10^{6}$ TVt, reaches the earth's surface. This is about 5,000 times the energy of all the world's permanent power plants.

Figure 1 . When calculating the use of solar energy, the amount of energy emitted by sunlight per 1 m 2 of area is taken into account.

The energy of solar radiation falling on the upper part of the atmosphere is 1,395 kW/m^2, and this amount is called the solar constant. However, until this amount reaches the earth's surface, it will face various contradictions, and its amount will vary depending on the season and the width of the area being calculated. For example, the average intensity of sunlight falling on the Earth's surface:

- In European countries - 2 kWh/m^2;
- In tropical and Asian countries - 6 kWh/m^2.

The Republic of Uzbekistan is one of the most prosperous countries. On average per year:

-300 days is a sunny day;

-2980 ÷ 3130 hours, the average temperature is + 420C, the length of the day is 14-16 hours;

-in some provincy the temperature increases to + 700C;

- at curfase of per metr m^2 1900-2000 кVt sun radiation appears for each year.

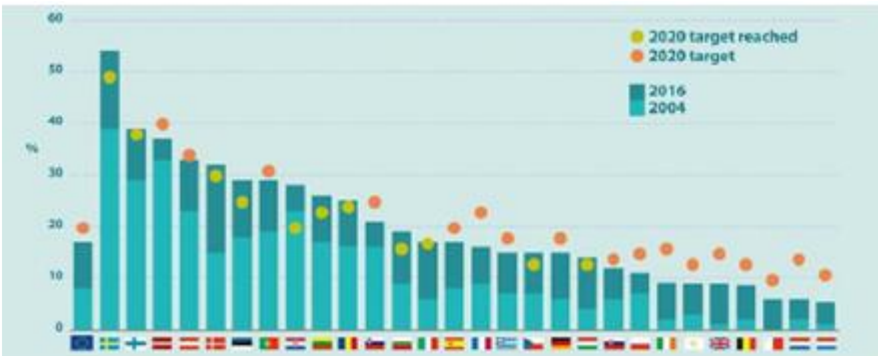

FIGURE 2. Radiation of Sun

It is known that sunlight can be considered as electromagnetic waves. According to quantum theory, electromagnetic waves are considered to be zero-mass elementary particles - photons. Created by Hertz in 1887 to convert solar energy into photovoltaic energy , light photons interact with the electrons of some metals to give the electrons a certain amount of energy.

Solar power photoelement cells with the help of sunlight settling energy carrier into a high-temperature thermal energy source. Power photoelement converts light energy into electrical energy and technological development should be clearly divided into three generations. Power photoelement based on the use of mono or polycrystalline silicon. Photoelement statements of this type in the world are installed on 80 percent of the systems. The efficiency coefficient of these devices is about 8% . they are super-imposed fear may be submitted. Typically, these cells heterostructure, and each of the efficiency of 9 %. The third generation of photovoltaic cells is also in the development stage and is not yet a fully formed technology. It is expected that normal levels and low material levels in the future due to heterostructure devices in the production of small amount of money is required.

FIGURE 3. Panels of photoelements

Heterostructure photoelement independent systems or energy networks can be connected to the system menu. Connect the target systems fail to heterostructure many cells are made. This increases the power of the device and reduces the cost. Photovoltaic systems at work without being connected to the network for photo electric cell inverter, mexa nik, and electrical equipment must also be installed. Energy system heterostructure photovoltaic system settings 20-30 voltage constant current module for the standard 6 standard voltage 0-80 cells are formed. Higher voltages can be achieved by connecting multiple modules in series. Now, 100 -150 W photovoltaic cells with a wide range of users. So, heterostructure photoelement systems settings at light radiation energy is converted into electrical energy. Mono or polycrystalline silicon was the first to be used in the manufacture of heterostructure photoelement cells. Today heterostructure photoelement system settings menu prepared boxes all over the world, learning systems is built and 80 percent. Their efficiency is 16 ÷ 18 %. In past years heterostructure photovoltaic system settings, amorphous silicon, cadmium - tellurid prepared in the form of thin films. Their efficiency is about 9 %, but they are cheaper to make than photovoltaic cells made of mono or polycrystalline silicon. For example, heterostructure photoelement consists of (900) cell. Let its power be 1.5 W. In this case, photoelement size 20 x 30 cm. We assume that the current density in the photocell is G = 500 W/m^2 and find the efficiency of the photocell. We know that we calculate the power of a battery using the following formula

$$P = n \cdot 15$$

Here n is the total number of heterostructure photoelement. In this case, we find the efficiency of the photocell by the following formula

$$\eta = \frac{P}{S \cdot G}.$$

Putting the values of the required quantities in the formula we find the efficiency of the photocell

$$P = 900 \cdot 15 = 1350 \text{ Вт}$$

$$S = 0.06\,m^2 \cdot 900 = 54\,m^2$$

So,

$$. \ \eta = 135054 \cdot 500 = 0.05$$

Thus

$$\eta = 5\%$$

Let's assume that the surface of the photoelemet is S=0.25 m^2, the electric current I=3 10^{-3} A/$см^2$, density of radiation is G =300 Vt/$sм^2$ and the value of coefficient is $\eta = 0.3\%$. Thus, we find the electric mobility force of the photoelement. So, the power of the element can be found by formula

$$P = E \cdot I = S \cdot G \cdot \eta$$

We find the electric mobility force

$$E = \frac{S \cdot G \cdot \eta}{I} = \frac{300 \cdot 10^{-4} \cdot 0.3}{3 \cdot 10^{-3}} = 3\,V$$

CONCLUSION

At the moment, heterostructure photoelement boxes to display the effitsentini 50÷60% increase on the scientific and research work is conducted. This is Heterostructure photoelement films 4÷8 times fired installation is needed at the top. As a result of these studies, the capacity of the device will be increased and the cost of production will be sharply reduced.

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