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DEVELOPMENT OF THE COMBINED CONSTRUCTION OF THE HIGH EFFICIENCY PHOTOELECTRIC CONVERTER BASED ON THERMOELECTRIC CONVERTERS

Salokhiddinova Muslima
Student of Andijan machine building institute

Thermoelectric phenomena are physical phenomena based on the interaction between electrical and thermal processes in an electric current circuit consisting of various solid conductors connected in a pattern. Seebeck, Peltier and Thomson effects are thermoelectric phenomena, based on which the quantitative values of these phenomena are determined. Electromotive force in two conductors with different composition and temperature at the connection points is thermo electromotive force German physicist T.I. Seebeck discovered in 1821. In 1953, another source of thermoelectric power was discovered - the effect of electrons following phonons.

If there is a temperature change in a solid, then the number of phonons moving from the hot side to the cold side is greater than those moving in the opposite direction. As a result, phonons collide with electrons and attract them, and a negative charge (positive on the hot side) begins to accumulate on the cold side. This process continues until the resulting potential difference balances the movement of phonons. Metals have a large concentration of electrons and it does not depend on temperature. Electron energy also does not depend on temperature, so in metals thermo electromotive force small. Thermal electromotive force in semiconductors and their alloys. achieves great value. Because the concentration of current carriers in them is small and it depends on the temperature. Disruption of heat balance in the flow of current carriers causes all thermoelectric phenomena. The absolute value of all thermoelectric coefficients increases with decreasing concentration of current carriers; therefore, they are ten and even hundred times larger in semiconductors than in metals and their alloys. Thermoelectric phenomena are used to measure temperatures and convert thermal energy into electrical energy.

Semiconductors are substances between conductors and dielectrics. They include many chemicals (germanium, silicon, selenium, tellurium, etc.) and many types of chemical compounds. Almost all inorganic substances that surround us are semiconductors. The most widespread semiconductor in nature is silicon, which makes up 30% of the earth's crust. One of the main characteristics of semiconductors is that their physical properties are strongly dependent on external influences - changes in temperature or the introduction of inputs.

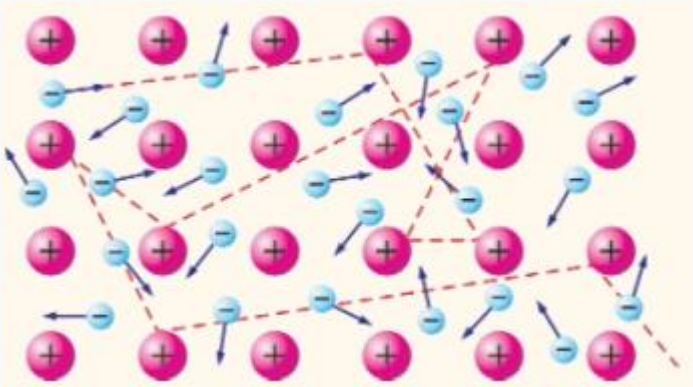
By purposefully changing the temperature of semiconductors or doping them, its physical properties, including electrical conductivity, can be controlled. 180 years ago, people knew that different conductors conduct electricity in different ways

In 1821, English chemist Humphrey Davy discovered that the electrical conductivity of metal decreases with increasing temperature. His student Michael Faraday continued the experiments in 1833 and observed that the electrical conductivity of the sulfur and silver compound did not decrease with temperature, but rather increased. Later, he discovered several other substances whose conductivity was unusually related to temperature. But at that time, this world did not interest people of knowledge. In 1873, interest in these works increased after it was discovered that the resistance of selenium (Se) changes under the influence of light. Selenium photoresists quickly began to be used in various optical devices. A photoresistor made of a simple column of selenium was the first semiconductor device. Its electrical conductivity increased when illuminated compared to that in the

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dark. First, the discovery of point-type transistors in 1948, and then in 1951, led to the rapid development of semiconductor electronics. To explain how transistors work, it is necessary to consider a number of physical processes that take place in semiconductors. First, let's talk about the mechanism of electrical conductivity in them. Electrical conductivity. It is known that all substances are composed of atoms formed by various chemical bonds, and these bonds determine many of their physical and chemical properties, including electrical conductivity. For example, salt and oil belong to the group of dielectrics and do not conduct electricity, while a wire made of metal is a very good conductor.

What is the reason for the high electrical conductivity of metal? Electrical conductivity of metals. What is the reason for the high electrical conductivity of metal? Electrical conductivity of metals. Therefore, the valence electrons in the outer electron shell of a metal atom are "free" and form an "electron gas" in irregular thermal motion inside the metal. The metal ions in the nodes of the crystal lattice are located as if immersed in this electron gas. Both ions and free electrons of metals located in the nodes of the crystal lattice participate in the chaotic heat movement. Ions vibrate at the nodes of the crystal lattice, and free electrons move randomly along the crystal (pic.1.1).



Picture 1.1 is the movement of free electrons in the crystal lattice of a metal.

The electrical conductivity of semiconductors can be changed not only by changing the temperature, but also by exposure to light. Under the influence of light, the active resistance of semiconductors decreases sharply, and the electrical conductivity increases. Elements that change their resistance under the influence of light are called photoresistors or photoresistors.

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