MATERIALS SCIENCE AND ITS PROBLEMS

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Annotation: *This article, along with the achievements of materials science, provides information about the challenges it faces, the search for new materials is very important for the development of science and technology, the rapid development of the engineering industry in independent Uzbekistan, the need to create new effective methods of search and repair.*

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It is known that every time the materials used to create a new technique are selected based on the latest advances in science, that is, the latest materials are used, the newly created machines must be used at high working pressures, have high speeds and be able to withstand high temperatures. These figures are compared with the old model figures to determine the specific power of the machine. So, the high level of these indicators is an achievement of the science of materials science.

Modern machines require materials to have high strength in the first place. By the end of the twentieth century, the strength of materials has increased almost 8-10 times. One of the problems facing modern science is to further increase the accuracy of high-strength materials used in practice, to reduce their cost economically.

The production and application of ultra-hard materials - boride, carbide, artificial diamonds - will depend on the capacity and technical improvement of the industry. In addition to being very hard, such materials are brittle, making them difficult to process. Therefore, there is a problem of industrial processing of such materials and finding technologically advanced and efficient methods of processing.

The efficiency of a material is determined by the power of the machine or its productivity, which corresponds to the unit of mass measurement in engineering. This means that the new demand for machinery is to increase the capacity and productivity of machines and mechanisms, as well as to ensure that the materials used for them are accurate and light. For example, recently obtained magnesium and lithium alloys meet such requirements. The deformation resistance of structures of the same mass made of such materials is superior to the resistance of structures made of steel or titanium. Some gas-saturated materials are very useful in aviation and spacecraft, which are modern techniques. Therefore, the supply of such materials for aviation and space technology is one of the important challenges.

In engineering, some materials have the effect of "remembering" the previous geometric shape. For example, a structure that has changed its shape as a result of plastic deformation will return to its previous shape when heated over time. Such properties of metals are very important in the field of surgical medicine, especially in spacecraft. For example, titanium-

based alloys are used to make space antennas that operate under the influence of sunlight. Discovering previously unknown properties of metal alloys is one of the technical problems.

The increasing use of jet engines poses a challenge to the science of materials science to create materials that can withstand high voltages and high temperatures. However, the current method of creating such materials, ie the ability to form alloys based on iron, nickel, aluminum and other metals, has been limited, as the operating conditions of engine parts have approached the liquefaction temperature of these elements. For example, the operating temperature of most steels does not exceed 750-800 ° C, and that of nickel alloys does not exceed 1100 ° C.

Until recently, the low resistance of metals to high temperatures prevented the creation of new engine designs, as the performance of the construction material depended on the gas temperature in the turbine. The solution to this problem depends on the fineness of the grains in the material structure. Because the grains in the structure (crystallites) are very small and the shape is compact, the strength of the material can be 1.5 times greater. For example, by carrying out the crystallization process of materials at high speed, a microstructured grain (granule) the size of which is close to the shape of a grain or a ball is obtained. These materials have high strength.

Increasing the power of internal combustion engines leads to an increase in operating temperature. Increasing the working temperature depends on the high temperature resistance of the construction material. Therefore, the problem of using ceramic in internal combustion engines arises. But the problem is not that the material can work at high temperatures. There are also aspects of technology where the technological process takes place at a very low temperature. The materials are very brittle at low temperatures. For example, in cryogenic techniques, the process takes place at temperatures below -150 ° C. Therefore, it is also a problem to create materials that can work flawlessly and for a long time in processes such as the separation of gases, such as oxygen and nitrogen, and bringing them into the liquid phase.

In energy, conductive solenoids, windings of electric machines are made of electrically conductive materials. The creation of such materials depends on the development of the energy industry and semiconductor materials. Future materials in this field will be used to make superconducting transformers, power grids and strong magnets that can hold a beam of light (plasma) in thermonuclear reactions.

In technology, its complex alloys are more important than pure metals. Therefore, "technically pure" or "chemically pure" metals are used in laboratories for more specialized research. However, in recent years, in some areas of technology, the purity of metals has become of great importance. For example, the high corrosion resistance of chemically pure iron or zinc elements is of great technical importance. In recent times, the purity of nuclear fuel has been required. For example, the amount of compound elements in uranium should not exceed. In semiconductor technology, great importance is attached to the purity of materials.

Even in some branches of the electronics industry and aerospace engineering, the purity of the material must be at a very high level. The technical requirements for the further development of science and technology will continue to grow. Due to the increase in technical and economic requirements, as well as the limited availability of surface and underground raw

materials, there is a need to find and change new technologies for the production of high-strength materials. This requires, first of all, the addition of other additives to the existing materials and the enrichment of the basic material element with reinforcing elements that have nothing to do with it, ie the synthesis of composite materials.

Composite materials can not only increase the longevity and technical and economic performance of machines and mechanisms, but also improve the production process. However, large-scale production of composite materials can also cause significant problems. For example, the production of some composite materials causes great harm to human health, pollutes the environment, that is, causes new environmental problems. But one of the most important tasks of the science of materials science is to make the greatest use of composite materials wisely.

Protecting materials from abrasion, especially from corrosion under the influence of corrosion, remains a major challenge. As a result of the expansion of production, the chemical effects of the environment have greatly increased. A lot of money is being spent on repairing broken car parts. The study of the laws of structural change in the process of processing of materials and its consequences allows to achieve the stability of the properties. This allows for a more precise definition of the duration of work.

It is clear from the above brief information that along with the achievements of material science, the problems facing it are important for the development of science and technology. This is very important for independent Uzbekistan, where the engineering industry is developing rapidly. Because it is necessary to find new materials and create new effective methods of repair.

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