

The Essence, Significance and Possibilities of Nanotechnologies

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Annotation: This article discusses the nature of nanotechnology, recognized as today's modern field, its role and importance in ensuring the development of society, and its current opportunities.

Keywords: Science, education, nanotechnology, human, development, reform, social development.

Introduction

An important place in the development of society is spiritual maturity, gaining deep knowledge about the world and man, and applying this knowledge to improving life. The role of science is especially important in the transition of society to the stage of information society. Solving environmental problems, managing social processes, and developing modern technology have largely depended on science. Science is a field of human activity, a component of spiritual culture, in which knowledge about nature and man expressed in clear concepts and rules, methods and methodological tools aimed at obtaining this knowledge are developed, their reality is proven in experience and practice. New knowledge gained in the field of science is constantly applied to life and technology.

Material and methods

Science is a unity of knowledge, knowledge and methods. In turn, knowledge and method are made up of concepts, laws, ideas, theories, axioms and principles. These elements perceive the properties, laws and relationships that apply in material and spiritual existence. The direct goal of science is to describe, explain and predict the phenomena, processes and laws of existence that constitute its subject. Thus, since science is a social system that includes the content, goal, scientific and practical tasks of researchers, the characteristics of science are its inner signs.

As an organized complex, science serves society, social system, and social forces, the order of which directs the activity of science. It is about applying the achievements of science to one or another field.

Philosophy of science is a field that covers the actual problems of 21st century science in a relatively wider and consistent manner. Among such problems, it is possible to include the phenomenon of passion, coevolutionary processes, the phenomenon of virtual reality, artificial intelligence, cloning, nanoscience, and nanotechnology.

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We have completed the first decade of the 21st century. All of us are thinking about the questions about the coming new decade, including issues that serve the interests of mankind, to the development of science, technology and production in our new era.

What kind of social, economic and spiritual-cultural changes the new century that awaits us will require. Many of our scientists have been puzzling over this for a long time. Since our goal is to build a civil society based on a strong socially oriented market economy, entering this society with a number of problems without solving many of the problems before us, without eliminating the issues that await their solution, will put us in a disadvantageous situation. As the First President of Uzbekistan, I. Karimov, said, "Our long-term strategic goals, that is, joining the ranks of modern developed democracies, ensuring the stable growth of our economy, improving the quality of life, and taking a worthy place in the world community, from today's point of view it is natural for us to evaluate" [1;3].

We need to find answers to such questions as what are the problems that are waiting for their solution, what are the ways and methods of their elimination, and whether it is possible to eliminate them in the near future. Currently, we are putting on the agenda the issue of solving the problems faced in Uzbekistan regarding the transition to a market economy and its further development through the fields of nanotechnology, which is considered the most modern technical achievement, which is rapidly developing today. We found it appropriate to include the following in the list of issues that we want to discuss:

First, during the transition to a market economy, our country made the reform of the economic sector an urgent issue. Further development of production is of great importance. By applying nanotechnologies to the production sector, it is possible to start production of the most modern, convenient, cheap and high-quality products. First of all, by spending less raw materials and funds, it becomes possible to obtain a productive and useful product. According to experts in this field, by controlling the smallest atoms, a robust product can be produced.

Secondly, one of the important directions of our economic reforms is the development of industry. Given that the industry is divided into heavy and light industry, experts emphasize the high efficiency of the introduction of this technology in both types. If we include consumer goods in light industry, they include clothing, food, household products, stationery, electronic equipment, small work tools, etc. can be entered. Heavy industry includes automobile industry, chemical industry, metallurgy, mining, etc.

Thirdly, one of the important activities carried out by our government is to establish a healthy lifestyle in the society. By bringing modern technology into the field of medicine, it will be possible to treat a number of diseases for which no cure has yet been found, and to provide quality medical care. At the same time, it creates an opportunity to eliminate the methods of implementation of various diseases by means of heavy surgery.

Fourthly, a number of facilities can be brought to light in the development of agriculture. For example, there are scientific hypotheses that it is possible to obtain more products from small plots of land in farms than from large plots.

Fifth, preserving mother nature is also a high duty before us. It has been proven by scientists in the field that the use of nanotechnology in improving ecology can lead to great positive results. The development of the above industries also greatly helps to protect the environment. It is possible to have a positive effect on improving ecology by cleaning the environment from harmful waste, rational use of water resources, purifying ocean and sea water using nanotechnology and turning it into drinking water, starting the production of vehicles that do not emit harmful fumes into the atmosphere.

The new information technologies or computers that appeared in the 20th century have fundamentally changed the way services are provided in the fields of society. With its help, banking activities, economy, aircrafts are managed, there is not a single field of activity in which information technologies related to the creation, collection, storage, processing and transmission of large volumes of data are not used. However, a computer at home is no longer enough. We want to use it wherever we want, whether it's an airport or a coffee shop or a university. Accordingly, the processors, which are the "brain" of the computer, are getting smaller in size. There is no question of fitting, for example, the entire library of Paris into chips that are only the size of a fingertip.

Such consolidation in the field is called "nanotechnology". This is the most modern technology at the moment, and the goal is to dwarf everything. For example, in the future, computers that will perform all operations will be the size of a wristwatch. As a result of this, the materials used in the equipment currently used in all fields will be saved, the products created on the basis of nanotechnology will be compact, their efficiency will increase, and the economy will naturally benefit from this.

It is not for nothing that the 21st century is called the age of information and communication. Automation equipment installed in organizations is updated and technically improved every year. In a word, in the new century, working with information technologies and informatization has developed a lot. This is due to the increasing importance of information, their processing and transmission in everyday life. This, in turn, requires every member of the society to know the secrets of informatization and information technology, its rules and laws. A question arises. So what is all this being done for? Of course, thanks to nanotechnology.

Nanotechnologies, which are an important aspect of science and innovative development, are deeply entering our lives. Experts say that in the coming years, many branches of modern science will be called with the suffix "nano".

Today, the concept of nanotechnology, which is rapidly entering our lives, is gaining importance in accelerating the development of our society, increasing the well-being of our lives, and eliminating environmental, social and other problems that await their solution in our lives. Because such discoveries of science serve to obtain and apply new meta-materials with unique properties and nanomaterials resistant to extreme conditions. That's why the world is paying more and more attention to expanding the scope of nanotechnological research and the widespread use of innovative technologies in this regard.

For example, as a result of research in the field of computer technology, the science of quantum informatics has emerged. This field involves the creation of quantum computers with nanoscale processors and the development of programs for them. In quantum computers, one or more atoms are used to write one unit of information. Today's computers use billions of atoms to perform this process. Hence, the computing process in quantum computers automatically increases the speed, compactness, convenience and efficiency.

In the next decade, the word "nano" entered the vocabulary of the world community. So what is "nano"? In short, a nano is a part in a billion. Translated from the Greek language, "nano" means dwarf.

The term "nanotechnology" was coined by the Japanese Norio Taniguchi in 1974, long after the start of working with them. Nanotechnology is measured in nanometers. Each nanometer (nm) is one billionth of a meter in size. In simpler terms, it is roughly the ratio of a ping-pong ball to the entire globe. For example, a sheet of paper is 100,000 nanometers thick. Carbon nanotubes are 10,000 times thinner than a human hair. The Uzbek scientist said that in nanotechnology, it is possible to change the size of small substances by stretching them in length and width and maintaining their hardness. Nanotechnologists mainly work with objects in the size range from 0.1 to 100 nm.

To give you a broader idea, we remind you that the thickness of one hair fiber is equal to 80,000 nm. This volume is considered "very large" in the world of nanotechnology. It should also be mentioned that the first nanotechnology devices were created in the laboratory of the Swiss company IBM. Despite the fact that we entered the world of atoms more than 100 years ago, we are only now understanding its essence. Nobel laureate Richard Feynman, who spoke at the California Institute of Technology in 1959, said: "One day, for example, in the year 2000, people will be surprised that they did not take the nanoworld research seriously until the 1960s" [2;13]. These words have turned from prophecy to reality today. It seems that a number of countries have already realized the effect of the particle world. This is probably why special attention is being paid to this new field of science.

There is no complete and precise expression for the concept of nanotechnology, but based on the existing microtechnology, these dimensions can be considered technology in nanometers. Therefore, the transition from the micro to the nano means the transition from the control of matter to the control of the atom. The development of the industry mainly means three areas:

- preparation of electronic circuits comparable in size to the size of atoms and molecules;
- design and development of nanomachines;
- managing individual atoms and molecules and assembling individual micro-objects from them.

Research in this direction has been conducted for a long time. In 1981, the tunneling microscope was created, and it became possible to see individual atoms. Since then, the technology has improved significantly. Today, we use these achievements in everyday life: the production of laser discs, including DVD discs, is impossible without nanotechnological methods.

In the 20th century, airplanes, rockets, television, and computers changed the world. Scientists say that raw materials, medicines, communication and service tools created with the help of nanotechnology will be the basis of the development of new technology of the 21st century. Many myths are becoming reality before our eyes. Humans have learned to create simple invisible devices by manipulating atoms. Nanotechnology, which includes the achievements of physics, chemistry and biology, is entering our lives faster and faster. Scientist-nanotechnologists are working on extremely small objects measured in nanometers.

The 20th century marked the incomparable place of electronics and microelectronics in the development of space technologies, automation, new means of communication and science and technology in general. The results of these sciences are seen in the current problems of the time - ecology, energy, conservation of natural

resources, economical use, creation of jobs for young people of a completely new content and form. At the moment, it is being developed by all countries as the most important direction of the future economy. In particular, it is known to everyone that electronics and microelectronics have gained significant importance in the development and economic prosperity of countries such as Japan, South Korea, and Singapore.

Conclusion

Today, humanity is on the verge of great discoveries in the field of nanotechnology and nanoelectronics. Nanoelectronics is a new stage of the science of microelectronics, which is created not on the basis of a complex of devices, tools, and substances, but with the participation of a few and selected atomic molecules. It should be noted that the differences between electronic lamps, semiconductors, and transistors are greater than those between microcircuits and nanoelectronic devices. As we mentioned above, one nano is a unit of measurement equal to one billionth of a meter. This will be the second great technical revolution that will literally create unprecedented opportunities and conveniences for mankind in all aspects of industry, agriculture, energy, communication, transportation. Therefore, in all developed countries special attention is paid to this nanotechnology - nanoelectronics. According to experts, in the next 10-15 years, humanity will reach the level where it can fully use the products of nanotechnology - nanoelectronics in all spheres of its life.

Although the world of nanotechnology is too small for the human eye, its potential impact is huge. Nanotechnology involves the use of matter at the atomic level. Currently, researchers are working to find ways to use this technology for better medical treatment, more powerful computers, and making lighter but tougher materials.

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