

Nanotechnology is one of the main resources of development of the world economy

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Nanotech developments for a number of years are actively used in the world industry, both in high-tech and in other industrial sectors. There has been a steady tendency to the use of nanotechnology primarily, as a promising source of economic growth of leading countries in the global world. The further development of nanoscience will make conceptual contribution to the world industrial production and change many technological methods and chain.

machinery construction and metal cutting, electronics and optoelectronics, informatics, energetics, nuclear energetics

Contemporary world entered a new era of development connected with elaborations and practical usage of scientific achievements in the field of nanotech. Usage of nanotechnological achievements will, in long-term perspective, allow solving key problems of our civilization: energetic, ecological, life quality, education, public control, illnesses, terrorism, etc. At the same time, the world community will have to take unprecedented measures to restrict development of military nanotechnology, to bring in a regime of limited access to military nanoequipment, to establish effective procedures of international control on which survival of humankind will directly depend in 21st century.

Elaboration and wide introduction of nanotechnologies in any developed country as well as scientific and industrial branches connected with them will allow reaching the important global goals.

Understanding of the key role of nanotechnologies in leading countries of the world brought to development of comprehensive national programs concerning nanotech and their serious state support. More than 50 countries have governmental programs concerning development of nanotechnologies. In 2000 US approved the priority long-term complex program called “*National Nanotechnology Initiative*” which now considered as “an effective instrument for providing leadership of the USA in the first half of the century”.

At present Russia has sufficient amount of scientific-technical groundwork in the field of nanotechnology and nanomaterials on the level of international achievements, were created the fundamentals of the nanoindustry development up to 2020. Usage of nanotechnologies already in the near decades may lead to significant economic effect in the basic industrial branches.

In machinery construction and metal cutting: increase of resources of cutting and machining tools with the use of special coatings and emulsions; wide introduction of nanotechnological innovations for modernization of high-precision machines; methods of measurement and positioning developed with the use of nanotechnologies will ensure adaptive control of cutting instruments on the basis of optic measurements of the treated surfaces of details and treating surface of the tool directly during technological process (such methods, for example, will allow to reduce treatment errors from 40 mkm to hundreds nanometers). *In electronics and optico-electronics:* broadening of possibilities of radio-location systems with the use of phase antenna grids with low-noise super high-frequency transistors on the basis of nanostructures and fiber-optic communication lines of high transmitting capacity due to photo-receivers and injection lasers based on structures of quantum dots; development of heat-vision observing-aiming systems with the use of matrix photo-receivers produced with nanotechnologies and characterized by high-temperature resolution; creation of powerful injection lasers on nanostructures used for pumping of solid-state lasers. *In informatics:* multiple rise of production of the systems of transfer, treatment and storage of information as well as creation of new architecture of highly productive devices with possibilities of

computing systems close to properties of natural living objects with elements of artificial intellect. *In energetics*: nanomaterials are used for perfecting technologies of manufacturing fuel and construction elements, increasing efficacy of existing equipment and forming alternative hydrogen energetics on the basis of carbon nanostructures; multiple increasing efficiency of sun-batteries based on the processes of accumulation and energy-transfer in inorganic and organic materials with nanolayer and cluster-fractal structure; creating electrodes with developed surface for hydrogen energetics on the basis of track membranes. *In nuclear energetics*: nanomaterials are used in heat-emitting and neutrino-consuming elements of nuclear reactors; nanodetectors ensure environmental control during storage and working over of depleted atomic fuel and monitoring of all technological procedures of installation and exploitation of atomic reactors; nanofilters are used in separation of media during production and treatment of atomic fuel.

According to the data of “*Lux Research*”, total world expenditure on all directions of nanoscience and nanotechnology (academic studies, universities, production, etc.) already in 2001 was US\$64 billion, in 2009 – US\$250 billion, and in 2015 the conservative forecast promised US\$800 billion. Meanwhile according to the study of “*MIT Technology Review*”, if in 2013, the nanotechnology was associated about 15% of production with a total cost of US\$2.6 trillion, by 2020, with nanotechnologies will be connected 100% of world production, being the core of the sixth technological structure of global economy.

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