Micro and nanoelectronics

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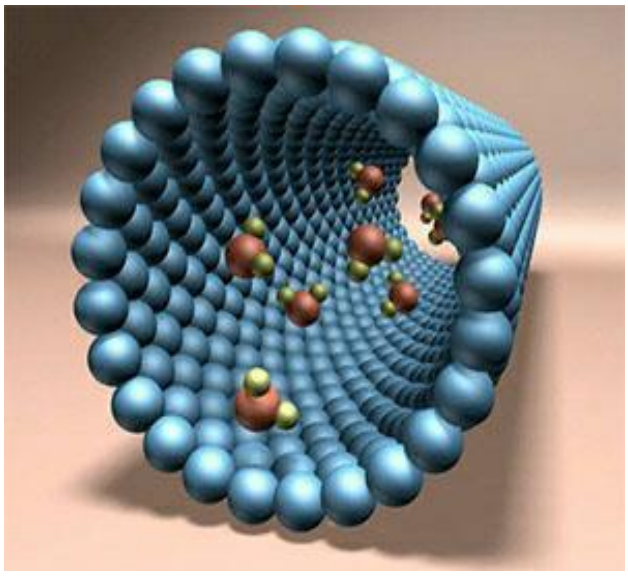
Nanoelectronics is a field of electronics engaged in the development of physical and technological foundations for creating integrated electronic circuits with characteristic topological dimensions of elements of less than 100 nanometers.



The term "nanoelectronics" is logically connected with the term "microelectronics" and reflects the transition of modern semiconductor electronics from elements with a characteristic size in the micron and submicron region to elements with a size in the nanometer region. This process of technology development reflects Moore's empirical law, which states that the number of transistors on a chip doubles every one and a half to two years.

However, a fundamentally new feature of nanoelectronics is related to the fact that quantum effects begin to prevail for elements of such sizes. A new nomenclature of properties appears, and new attractive prospects for their use open up. If, when switching from microelectronics to nanoelectronics, quantum effects are largely parasitic (for example, tunneling of charge carriers interferes with the operation of a classical transistor with decreasing dimensions), then electronics using quantum effects is the foundation of a new, so-called nanoheterostructured electronics.

It must be emphasized that although the direction of training "Electronics and Nanoelectronics" belongs to the group of specialties "Electronics, Radio Engineering, Communication", the curriculum of the direction fully complies with the standards of classical university education. For a potential applicant, this circumstance should be of fundamental importance, since he not only masters the chosen specialty, but receives fundamental training in the field of physics and the physical foundations of micro- and nanoelectronics. First of all, these are classical and quantum solid theory, physics of semiconductors and low-dimensional systems. A separate block in the curriculum of the specialty includes disciplines in quantum informatics and quantum computers, the physical implementation of which is one of the priority tasks of Nanoelectronics.