

# Development of Informative Training Materials in Modern Nanoelectronics

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**Abstract – The article provides content about developed inventions of educational materials in nanoelectronics**

**Keywords – Nanoelectronics, materials, technologies, devices, physical properties**

## I. Introduction

For the last decade in physics and technology of semiconductors and semiconductor devices the dominant interest grows in the heterostructures of nanometer range. Dimensions affect the quantum limit in one, two or all three spatial directions. There is every reason to believe these structures will form the core of material and technical basis of this nanoelectronics' century. There is a need for textbooks in which the relevant themes are analyzed, classified and described in a form accessible for students of various courses of different physical and technical specialties.

## II. Description of materials

The textbook "Fundamentals of nanoelectronics" is proposed. It is a result of synthesis and generalization of teaching experience and educational material for many years of teaching advanced students in National Technical University of Ukraine "Kyiv Polytechnic Institute" and the National University "Lvivska Politechnika" and great part of which was earlier proposed for student's audience in separate textbooks and monographs by the authors [1-4]. The proposed tutorial consists of two books: "Fundamentals of nanoelectronics: Quantum-mechanical principles, structure, physical properties" (Book One), "Fundamentals of nanoelectronics: materials, technologies and functional devices" (Book Two).

The book 1 consists of 4 parts and 15 chapters devoted to: potential wells and barriers; dimensionality of the system and the density of states of free electrons, energy spectrum of electrons in strong magnetic field, Landau levels, two-dimensional composite structures, superlattices, information about carbon and its allotropic modifications; fullerenes, carbon nanotubes and graphene etc.

The book 2 consists of 3 parts (17 chapters) devoted to the teaching of information as: the most used materials and nanotechnology manufacturing nanoelectronic devices, the most well-known nanoelements and nanosystems.

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Tutorial is built in such way: to hold the reader through the difficult road that starts from natural causes and laws of quantum effects which limit the size of its energy spectrum and density of states of free electrons and goes through displaying this effect in the specific and sometimes unique properties of systems of varying measurability, different compositions and different physical and chemical nature and leads ultimately to today's technological possibilities of the formation of quantum-sized systems and various electronic devices based on them.

Textbook is designed to the wide audience. At the same time the work with it involves introducing the reader to the basics of thermodynamics, statistical physics, quantum mechanics, solid state physics, physics of semiconductors and dielectrics, solid-state electronics.

## III. Conclusion

Authors sincerely hope that this first attempt of multi-authored creativity that combines the heritage of two different scientific and educational schools of Kiev and Lvivska Politechnika will be successful and justify itself in the sense that the proposed textbook will be useful to prepare students that are future professionals in the field of modern electronics, it will be found among student's audience and among teachers, designed to convey to students the latest achievements of the world scientific and technical ideas in the important and dynamic field of human knowledge as Nanoelectronics. Although we are aware that in such complicated case there are some inevitable omissions, inaccuracies and possibly errors. Therefore, the authors gratefully accept all friendly and criticism, advice and suggestions of readers to assist in improving the proposed textbook in the future.

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