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BOOK REVIEW

Nanobiotechnology. Bioinspired Devices and Material of the Future

(O. Shoseyov and I. Levy, eds., Humana Press, Totowa, New Jersey, 2008, 485 p., $149)

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The book is organized into five major sections including 19 chapters prepared by an international team of authors.

Section I is an introductory overview on nanobiotechnology (NBT) and consists one chapter where the authors identify this new direction in the science. According to the authors, NBT is a multidisciplinary field that covers a vast and diverse array of technologies coming from engineering, physics, chemistry, and biology. The primary feature of NBT is the field of research and fabrication that is on the scale of 1 to 100 nm. The range of such research is rather wide and includes studies of molecular motors, which determines organelles moving in the cell, intracellular complexes, nanomedical aspects of diseases, and biological computer systems.

Section II considers biometric aspects of NBT. Chapter 2 opening this section discusses peculiarities of porin MspA from *Mycobacterium smegmatis*. It is formed by supramolecular interaction of eight identical monomers of 184 amino acid residues. Porin is a very stable structure. It forms membrane channel, which keeps their shape even on boiling in 2% sodium dodecyl sulfate or during extraction by organic solvents. Porin construction and its medical applications are discussed.

Chapter 3 considers NBT and bionanoscience capabilities for the invention of artificial bioassemblies that might function as bones. The building units for such nanoscale "scaffolds" could be protein–protein complexes, DNA-immobilized structures, and others biological molecules.

Chapter 4 discusses supramolecular structures of living organisms that are derived by noncovalent binding of various molecules. The authors point out high potential capacity of various types of polysaccharides and glycoconjugates to form numerous supramolecular structures, layers, and other subcellular formations.

Section III addresses bionanoelectronics and nanocomputing. Chapter 5 deals with long distance photo-induced electron transport in DNA. Chapter 6 discusses effective models for charge transport in DNA nanowires.

Chapter 7 summarized data about optimization of photoactive proteins such as bacteriorhodopsin, proteorhodopsin, and others.

Chapter 8 discusses DNA-based nanoelectronics. It is suggested that DNA derivatives can serve as wires with high conductivity. This point of view continues also in chapter 9, where electrical manipulation of DNA on metal surfaces is discussed.

Chapter 10 deals with nanocomputing. It is suggested that development of DNA computing will help solve some problems existing in current computing processes.

In chapter 11 problems of biomolecular automation based on restriction endonucleases and DNA self-assembling are discussed.

Section IV includes chapters discussing nanomedicine and nanopharmacology. Chapter 12 deals with nanomedicine. This field of NBT is based on nanobiotechnology in medicine including diagnosis and treatment of certain diseases. Various nanotechnologies facilitate such methods as imaging, nanoendoscopes, nanolasers, and nanorobotics, drug discovery and drug delivery; super mini-surgical application and others NBT-procedure promised to switch medicine to new quantitative level.

Chapter 13 deals with miniaturization of drug carriers based on NBT technologies. Polymeric nanoparticles, antibodies, and polymer–drug conjugates as drug delivery system will explore their applications for drug targeting.

Chapter 14 deals with drug delivery systems with soluble inorganic carriers.

Chapter 15 is devoted to molecules, cells, materials, and systems designed based on NBT use in bioanalytical technology.

Section V contains materials related to *de novo* designed structures. Chapter 16 discusses self-assembly of short peptides for nanotechnological applications.

Chapter 17 presents data for application of nanotube membranes in NBT. These nanopore membranes are

suitable for template synthesis, bioseparations, and chemical and biochemical sensor development.

Chapter 18 deals with engineering of molecular "railroads". There is discussion of the possibility of using various intracellular motors and systems that realize intracellular transport of molecules. Structure and motility of kinesin, tubulin, and microfilaments are considered together with application of these cell components for microsystem engineering.

Chapter 19 discusses water-based nanotechnology. Here the unique properties of water are discussed: structure, crystallization, and capacity to bind biologically active molecules.

This book, no doubt, will be very useful for biochemists, biophysics, molecular biologists, and biotechnologists. It will also serve as an additional source for students and teachers of universities and colleges that are involved in preparation of experts in NBT.

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