

1. Record Nr.	UNINA9911004776503321
Autore	Zhirnov Victor V
Titolo	Microsystems for bioelectronics : the nanomorphic cell / / Victor V. Zhirnov, Ralph K. Cavin III
Pubbl/distr/stampa	Amsterdam ; ; Boston, : William Andrew/Elsevier, 2011
ISBN	9786612955914 9781282955912 1282955918 9781437778410 1437778410
Edizione	[1st ed.]
Descrizione fisica	1 online resource (209 p.)
Collana	Micro & nano technologies series
Altri autori (Persone)	CavinRalph K., III, <1939->
Disciplina	610.28/4
Soggetti	Medical electronics Nanomedicine Bioelectronics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Front Cover; Microsystems for Bioelectronics; Copyright; Contents; Preface; Acknowledgment; Chapter 1 The nanomorphic cell; 1.1 Introduction; 1.2 Electronic scaling; 1.3 Nanomorphic cell; 1.4 Current status of technologies for autonomous microsystems; 1.5 Concluding remarks; References; Chapter 2 Energy in the small: Integrated micro-scale energy sources; 2.1 Introduction; 2.2 Electrochemical energy: Fundamentals of galvanic cells and supercapacitors; 2.3 Energy from radioisotopes; 2.4 Remarks on energy harvesting; 2.5 Summary; Appendix: A kinetic model to assess the limits of heat removal List of symbols References; Chapter 3 Nanomorphic electronics; 3.1 Introduction; 3.2 Information and information processing; 3.3 Basic physics of binary elements; 3.4 System-level analysis; 3.5 Summary; Appendix 1: Quantum confinement; Appendix 2: Derivation of electron travel time (Eq. 3.55); List of symbols; References; Chapter 4 Sensors at the micro-scale; 4.1 Introduction; 4.2 Sensor basics; 4.3 Analog signal; 4.4 Fundamental sensitivity limit of sensors: Thermal noise; 4.5 What information can be obtained from cells?; 4.6 Sensors of bioelectricity;

4.7 Chemical and biochemical sensors
4.8 Thermal biosensors
4.9 Concluding remarks; Glossary of biological terms; List of symbols; References; Chapter 5 Nanomorphic cell communication unit; 5.1 Introduction; 5.2 Electromagnetic radiation; 5.3 Basic RF communication system; 5.4 EM Transducer: A linear antenna; 5.5 Free-space single-photon limit for energy in EM communication; 5.6 Thermal noise limit on communication spectrum; 5.7 The THz communication option ($\lambda = 100$ m); 5.8 Wireless communication for biomedical applications; 5.9 Optical wavelength communication option ($\lambda \sim 1$ m); 5.10 Status of -scaled LEDs and PDs
5.11 Concluding remarks
List of symbols; References; Chapter 6
Micron-sized systems: In carbo vs. in silico; 6.1 Introduction; 6.2 Information: A quantitative treatment; 6.3 Abstract information processors; 6.4 In silico and in carbo systems: A design perspective; 6.5 In carbo long-term memory: Storing information in DNA; 6.6 In carbo logic information procession; 6.7 In carbo sensors; 6.8 In carbo communication; 6.9 In carbo energy source; 6.10 Benchmark in carbo information processor; 6.11 Summary; Appendix: Choice of probability values to maximize the entropy function; List of symbols
References
Concluding remarks; Index

Sommario/riassunto

Microsystems for Bioelectronics is the ultimate guide in the biomedical application industry. It provides a physics-based assessment of the limitless potential of miniaturization technologies. This book goes far beyond the complete design of the final systems. It also discusses the developments of computation and communication subsystems. The future of this technology lies in understanding the scaling limits for the individual systems. This includes all of its components and the fundamental energy source that powers all autonomous microsystems. Rapid advances in microfabrication te
