

Nanoelectronics Principles And Devices The Artech House Nanoscale Science And Engineering

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Atomic-Scale Electronics Beyond CMOS - Mircea Dragoman 2020-11-16

This book explores emerging topics in atomic- and nano-scale electronics after the era of Moore's Law, covering both the physical principles behind, and technological implementations for many devices that are now expected to become key elements of the future of nanoelectronics beyond traditional complementary metal-oxide semiconductors (CMOS). Moore's law is not a physical law itself, but rather a visionary prediction that has worked well for more than 50 years but is rapidly coming to its end as the gate length of CMOS transistors approaches the length-scale of only a few atoms. Thus, the key question here is: "What is the future for nanoelectronics beyond CMOS?" The possible answers are found in this book. Introducing novel quantum devices such as atomic-scale electronic devices, ballistic devices, memristors, superconducting devices, this book also presents the reader with the physical principles underlying new ways of computing, as well as their practical implementation. Topics such as quantum computing, neuromorphic computing are highlighted here as some of the most promising candidates for ushering in a new era of atomic-scale electronics beyond CMOS.

Smart Structures - Vinod K. Wadhawan 2007-10-18

Smartness is often associated with living beings, as they can adapt themselves to changing situations. Artificial smart structures are designed to mimic biological structures to a small or large extent. This book gives a comprehensive account of how this can be done. It will be of interest to students and professionals in science and engineering.

Molecular Electronics - Michael C. Petty 2008-03-11

This consistent and comprehensive text is unique in providing an informed insight into molecular electronics by contrasting the prospects for molecular scale electronics with the continuing development of the inorganic semiconductor industry. Providing a wealth of information on the subject from background material to possible applications, Molecular Electronics contains all the need to know information in one easily accessible place. Speculation about future developments has also been included to give the whole picture of this increasingly popular and important topic.

Handbook of Nanostructured Materials and Nanotechnology, Five-Volume Set - Hari Singh Nalwa 1999-10-29

Nanostructured materials is one of the hottest and fastest growing areas in today's materials science field, along with the related field of solid state physics. Nanostructured materials and their based technologies have opened up exciting new possibilities for future applications in a number of areas including aerospace, automotive, x-ray technology, batteries, sensors, color imaging, printing, computer chips, medical implants, pharmacy, and cosmetics. The ability to change properties on the atomic level promises a revolution in many realms of science and technology. Thus, this book details the high level of activity and significant findings are available for those involved in research and development in the field. It also covers industrial findings and corporate support. This five-volume set summarizes fundamentals of nano-science in a comprehensive way. The contributors enlisted by the editor are at elite institutions worldwide. Key Features * Provides comprehensive coverage of the dominant technology of the 21st century * Written by 127 authors

from 16 countries, making this truly international * First and only reference to cover all aspects of nanostructured materials and nanotechnology

Integrated Interconnect Technologies for 3D Nanoelectronic Systems - Muhannad S. Bakir 2008-11-30

This cutting-edge book on off-chip technologies puts the hottest breakthroughs in high-density compliant electrical interconnects, nanophotonics, and microfluidics at your fingertips, integrating the full range of mathematics, physics, and technology issues together in a single comprehensive source. You get full details on state-of-the-art I/O interconnects and packaging, including mechanically compliant I/O approaches, fabrication, and assembly, followed by the latest advances and applications in power delivery design, analysis, and modeling. The book explores interconnect structures, materials, and packages for achieving high-bandwidth off-chip electrical communication, including optical interconnects and chip-to-chip signaling approaches, and brings you up to speed on CMOS integrated optical devices, 3D integration, wafer stacking technology, and through-wafer interconnects.

Bionanoelectronics - Daniela Dragoman 2012-03-22

This book presents the achievements in bionanoelectronics in a coherent manner. It deals with nanodevices applied to biostructures, molecular motors, molecular pumps, molecular nanoactuators and electronic biodevices, including nanodevices for sensing and imaging biomolecules. The book describes bionanoelectronics, detection of biomolecules and targets various biological applications such as detection and sequencing of DNA and early detection of various diseases and nanomedicine. Further important topics of the book are biomimetics and bioinspired electronics. The book also deals with biomolecules as building blocks of nanodevices for nanoelectronics or future computing architecture The application of scanning probe techniques to biological samples is described.

The British National Bibliography - Arthur James Wells 2006

Field Effect Transistors, A Comprehensive Overview - Pouya Valizadeh 2016-02-01

This book discusses modern-day Metal Oxide Semiconductor Field Effect Transistors (MOSFETs) and future trends of transistor devices. This book provides an overview of Field Effect Transistors (FETs) by discussing the basic principles of FETs and exploring the latest technological developments in the field. It covers and connects a wide spectrum of topics related to semiconductor device physics, physics of transistors, and advanced transistor concepts. This book contains six chapters. Chapter 1 discusses electronic materials and charge. Chapter 2 examines junctions, discusses contacts under thermal-equilibrium, metal-semiconductor contacts, and metal-insulator-semiconductor systems. Chapter 3 covers traditional planar Metal Oxide Semiconductor Field Effect Transistors (MOSFETs). Chapter 4 describes scaling-driving technological variations and novel dimensions of MOSFETs. Chapter 5 analyzes Heterojunction Field Effect Transistors (FETs) and also discusses the challenges and rewards of heteroepitaxy. Finally, Chapter 6 examines FETs at molecular scales. Links the discussion of contemporary

transistor devices to physical processes Material has been class-tested in undergraduate and graduate courses on the design of integrated circuit components taught by the author Contains examples and end-of-chapter problems Field Effect Transistors, A Comprehensive Overview: From Basic Concepts to Novel Technologies is a reference for senior undergraduate / graduate students and professional engineers needing insight into physics of operation of modern FETs. Pouya Valizadeh is Associate Professor in the Department of Electrical and Computer Engineering at Concordia University in Quebec, Canada. He received B.S. and M.S. degrees with honors from the University of Tehran and Ph.D. degree from The University of Michigan (Ann Arbor) all in Electrical Engineering in 1997, 1999, and 2005, respectively. Over the past decade, Dr. Valizadeh has taught numerous sections of five different courses covering topics such as semiconductor process technology, semiconductor materials and their properties, advanced solid state devices, transistor design for modern CMOS technology, and high speed transistors.

Intelligent Systems Modeling and Decision Support in Bioengineering - Mahdi Mahfouf 2006

Intelligent systems try to achieve, through the use of computers, flexible learning and adaptive activity like that found in the human brain. For the first time, this groundbreaking resource provides a detailed understanding of the analysis, design, and application of new intelligent systems in the biomedical industry.

Springer Handbook of Nanotechnology - Bharat Bhushan 2017-11-05

This comprehensive handbook has become the definitive reference work in the field of nanoscience and nanotechnology, and this 4th edition incorporates a number of recent new developments. It integrates nanofabrication, nanomaterials, nanodevices, nanomechanics, nanotribology, materials science, and reliability engineering knowledge in just one volume. Furthermore, it discusses various nanostructures; micro/nanofabrication; micro/nanodevices and biomicro/nanodevices, as well as scanning probe microscopy; nanotribology and nanomechanics; molecularly thick films; industrial applications and nanodevice reliability; societal, environmental, health and safety issues; and nanotechnology education. In this new edition, written by an international team of over 140 distinguished experts and put together by an experienced editor with a comprehensive understanding of the field, almost all the chapters are either new or substantially revised and expanded, with new topics of interest added. It is an essential resource for anyone working in the rapidly evolving field of key technology, including mechanical and electrical engineers, materials scientists, physicists, and chemists.

Quantum Mechanics - Paul Bracken 2020-10-14

Quantum mechanics touches all areas of physics, chemistry, life sciences, and engineering. It has emerged as a tool for researching and developing new technology that has had a deep impact on modern life. An essential ingredient of quantum mechanics is the role of the observer and the duality between particle and wave properties of matter at very small scales. This book covers such topics as complex space forms of quantum mechanics, entropy in quantum mechanics, and equations of relativistic quantum mechanics as well as applications of quantum mechanics to more complicated situations. Written by international experts, the book illustrates the wide scope, influence, and applicability of quantum mechanics.

Nanoscale Communication Networks - Stephen F. Bush 2010

A highly useful resource for professionals and students alike, this cutting-edge, first-of-its-kind book provides a thorough introduction to nanoscale communication networks. Written in a clear tutorial style, this volume covers a wide range of the most important topics in the area, from molecular communication and carbon nanotube nano-networks, to nanoscale quantum networking and the future direction of nano networks. Moreover, the book features numerous exercise problems at the end of each chapter to ensure a solid understanding of the material.

Toxicity of Nanomaterials - Suresh C. Pillai 2019-05-16

Choice Recommended Title, April 2020 This comprehensive book, edited by two leading experts in nanotechnology and bioengineering with contributions from a global team of specialists, provides

a detailed overview of the environmental and health impacts associated with the toxicology of nanomaterials. Special attention is given to nanomaterial toxicity during synthesis, production and application, and chapters throughout are focused on key areas that are important for future research and development of nanomaterials. This book will be of interest to advanced students studying biomedical engineering and materials science, PhD researchers, post-docs and academics working in the area of nanotechnology, medicine, manufacturing and regulatory bodies. Features: Collates and critically evaluates various aspects of the toxicology of nanomaterials in one comprehensive text Discusses the various effects of nanocrystals including the morphologies on cytotoxicity, in addition to the environmental and cytotoxicity risks of graphene and 2D nanomaterials Explores practical methods of detection and quantification, with applications in the environmental and healthcare fields

Introduction to Biosensors - Jeong-Yeol Yoon 2016-01-25

This book equips students with a thorough understanding of various types of sensors and biosensors that can be used for chemical, biological, and biomedical applications, including but not limited to temperature sensors, strain sensor, light sensors, spectrophotometric sensors, pulse oximeter, optical fiber probes, fluorescence sensors, pH sensor, ion-selective electrodes, piezoelectric sensors, glucose sensors, DNA and immunosensors, lab-on-a-chip biosensors, paper-based lab-on-a-chip biosensors, and microcontroller-based sensors. The author treats the study of biosensors with an applications-based approach, including over 15 extensive, hands-on labs given at the end of each chapter. The material is presented using a building-block approach, beginning with the fundamentals of sensor design and temperature sensors, and ending with more complicated biosensors. New to this second edition are sections on op-amp filters, pulse oximetry, meat quality monitoring, advanced fluorescent dyes, autofluorescence, various fluorescence detection methods, fluoride ion-selective electrode, advanced glucose sensing methods including continuous glucose monitoring, paper-based lab-on-a-chip, etc. A new chapter on nano-biosensors and an appendix on microcontrollers make this textbook ideal for undergraduate engineering students studying biosensors. It can also serve as a hands-on guide for scientists and engineers working in the sensor or biosensor industries.

Flow Chemistry - Applications - Ferenc Darvas 2021-10-25

The fully up-dated edition of the two-volume work covers both the theoretical foundation as well as the practical aspects. A strong insight in driving a chemical reaction is crucial for a deeper understanding of new potential technologies. New procedures for warranty of safety and green principles are discussed. Vol. 1: Fundamentals.

Biomolecular Computation for Bionanotechnology - Jian-Qin Liu 2007

The drive toward non-silicon computing is underway, and this first-of-its-kind guide to molecular computation gives researchers a firm grasp of the technologies, biochemical details, and theoretical models at the cutting edge. It explores advances in molecular biology and nanotechnology and illuminates how the convergence of various technologies is propelling computational capacity beyond the limitations of traditional hardware technology and into the realm of moleware.

Science at the Nanoscale - Chin Wee Shong 2010

Nanotechnology is one of the most important growth areas of this century. This book aims to introduce the various basic principles and knowledge needed for students to understand science at the nanoscale.--[book cover].

Cell-based Biosensors - Qingjun Liu 2009-10-01

Written by recognized experts the field, this leading-edge resource is the first book to systematically introduce the concept, technology, and development of cell-based biosensors. You find details on the latest cell-based biosensor models and novel micro-structure biosensor techniques. Taking an interdisciplinary approach, this unique volume presents the latest innovative applications of cell-based biosensors in a variety of biomedical fields. The book also explores future trends of cell-based biosensors, including integrated chips, nanotechnology and

microfluidics. Over 140 illustrations help clarify key topics throughout the book.

Introduction to Nanophotonics - Henri Benisty 2022

"The aim of this book is to cover the scope of Nanophotonics, a discipline that has emerged around the turn of the millennium. It results from the merge of different communities working in different aspects of light-matter interaction at the nanoscale. These include near-field optics and super-resolution microscopy, photonic crystals, diffractive optics, plasmonics, optoelectronics, synthesis of metallic and semiconductor nanoparticles, two-dimensional materials and metamaterials. Our feeling when we started the project was that a book covering most of these aspects altogether was lacking. The field is so rapidly evolving that it is impossible to summarize all the recent breakthroughs. The goal of this book is to provide a self-contained discussion of the fundamentals of the different subfields involved in nanophotonics. The current project is a collaborative project between three researchers that have been actively involved in the field from different communities. Henri Benisty has a background in semiconductor physics and optoelectronics, Jean-Jacques Greffet has a background in near-field optics and light scattering, Philippe Lalanne has a background in diffractive optics and photonic crystals. All of them made significant contributions to the advancement of the field. The book material is based on lectures that have been given by them at the Institut d'Optique Graduate School (Palaiseau, Bordeaux and Saint-Etienne)"--

Metamaterial - Xun-Ya Jiang 2012-05-16

In-depth analysis of the theory, properties and description of the most potential technological applications of metamaterials for the realization of novel devices such as subwavelength lenses, invisibility cloaks, dipole and reflector antennas, high frequency telecommunications, new designs of bandpass filters, absorbers and concentrators of EM waves etc. In order to create a new devices it is necessary to know the main electrodynamic characteristics of metamaterial structures on the basis of which the device is supposed to be created. The electromagnetic wave scattering surfaces built with metamaterials are primarily based on the ability of metamaterials to control the surrounded electromagnetic fields by varying their permeability and permittivity characteristics. The book covers some solutions for microwave wavelength scales as well as exploitation of nanoscale EM wavelength such as visible specter using recent advances of nanotechnology, for instance in the field of nanowires, nanopolymers, carbon nanotubes and graphene. Metamaterial is suitable for scholars from extremely large scientific domain and therefore given to engineers, scientists, graduates and other interested professionals from photonics to nanoscience and from material science to antenna engineering as a comprehensive reference on this artificial materials of tomorrow.

Principles of Photonic Integrated Circuits - Richard Osgood jr. 2021-05-21

This graduate-level textbook presents the principles, design methods, simulation, and materials of photonic circuits. It provides state-of-the-art examples of silicon, indium phosphide, and other materials frequently used in these circuits, and includes a thorough discussion of all major types of devices. In addition, the book discusses the integrated photonic circuits (chips) that are currently increasingly employed on the international technology market in connection with short-range and long-range data communication. Featuring references from the latest research in the field, as well as chapter-end summaries and problem sets, Principles of Photonic Integrated Circuits is ideal for any graduate-level course on integrated photonics, or optical technology and communication.

RFID Design Principles - Harvey Lehpamer 2012-01-01

This revised edition of the Artech House bestseller, RFID Design Principles, serves as an up-to-date and comprehensive introduction to the subject. The second edition features numerous updates and brand new and expanded material on emerging topics such as the medical applications of RFID and new ethical challenges in the field. This practical book offers you a detailed understanding of RFID design essentials, key applications, and important management issues. The book explores the role of RFID technology in supply chain management, intelligent

building design, transportation systems, military applications, and numerous other applications. It explains the design of RFID circuits, antennas, interfaces, data encoding schemes, and complete systems. Starting with the basics of RF and microwave propagation, you learn about major system components including tags and readers. This hands-on reference distills the latest RFID standards, and examines RFID at work in supply chain management, intelligent buildings, intelligent transportation systems, and tracking animals. RFID is controversial among privacy and consumer advocates, and this book looks at every angle concerning security, ethics, and protecting consumer data. From design detailsOC to applicationsOC to socio-cultural implications, this authoritative volume offers the knowledge you need to create an optimal RFID system and maximize its performance."

Introduction to Nanoelectronic Single-Electron Circuit Design - Jaap Hoekstra 2016-10-14

Today, the concepts of single-electron tunneling (SET) are used to understand and model single-atom and single-molecule nanoelectronics. The characteristics of nanoelectronic devices, especially SET transistors, can be understood on the basis of the physics of nanoelectronic devices and circuit models. A circuit theory approach is necessary for considering possible integration with current microelectronic circuitry. To explain the properties and possibilities of SET devices, this book follows an approach to modeling these devices using electronic circuit theory. All models and equivalent circuits are derived from the first principles of circuit theory. Based on energy conservation, the circuit model of SET is an impulsive current source, and modeling distinguishes between bounded and unbounded currents. The Coulomb blockade is explained as a property of a single junction. In addition, this edition differs from the previous one by elaborating on the section on spice simulations and providing a spice simulation on the SET electron box circuit, including the spice netlist. Also, a complete, new proof of the two-capacitor problem in circuit theory is presented; the importance of this proof in understanding energy conservation in SET circuits cannot be underestimated. This book will be very useful for advanced undergraduate- and graduate-level students of electrical engineering and nanoelectronics and researchers in nanotechnology, nanoelectronic device physics, and computer science. Only book modeling both single-electron tunneling and many electron tunneling from the points of view of electronics; starting from experiments, via a physics description, working towards a circuit description; and based on energy conservation, in electrical circuits, developing the impulse circuit model for single-electron tunneling.

Bioinorganic Photochemistry - Grazyna Stochel 2009-06-10

Bioinorganic photochemistry is a rapidly evolving field integrating inorganic photochemistry with biological, medical and environmental sciences. The interactions of light with inorganic species in natural systems, and the applications in artificial systems of medical or environmental importance, form the basis of this challenging inter-disciplinary research area. Bioinorganic Photochemistry provides a comprehensive overview of the concepts and reactions fundamental to the field, illustrating important applications in biological, medical and environmental sciences. Topics covered include: Cosmic and environmental photochemistry Photochemistry of biologically relevant nanoassemblies Molecular aspects of photosynthesis Photoinduced electron transfer in biosystems Modern therapeutic strategies in photomedicine The book concludes with an outlook for the future of environmental protection, discussing emerging techniques in the field of pollution abatement, and the potential for bioinorganic photochemistry as a pathway to developing cheap, environmentally friendly sources of energy. Written as an authoritative guide for researchers involved in the development of bioinorganic photochemical processes, Bioinorganic Photochemistry is also accessible to scientists new to the field, and will be a key reference source for advanced courses in inorganic, and bioinorganic chemistry.

Choice - 2006

Nanostructures and Thin Films for Multifunctional Applications - Ion Tiginyanu 2016-04-02

This book is focused on recent advances in the development of thin films for photovoltaic

applications, TiO₂/WO₃ bi-layers for applications with enhanced photo-catalytic properties, nanometer oxide and hydroxide films for anticorrosive coatings, surface passivation in chemical industries, micro- and nanoelectronics, trilayers of metglas and lead free piezoelectrics for magnetic field sensors, current sensors, spintronics, microwave and read/write devices. Diluted ferromagnetic alloy films are also considered for superconducting spintronics based on superconducting spin-valves. Thermal properties of segmented nanowires are analyzed with respect to thermoelectric applications. Recent advances in template production of nanocomposites are also reviewed with particular focus on technologies for template assisted formation of metal nanotubes. Some elements related to abrasive flow machining (AFM), specifically state of the art elements of technological systems and construction of equipment are presented. The book is written for researchers in materials science, nanotechnologies, PhD students and graduate student.

Communication Shock - Ty Adams 2015-09-04

In the spirit of Alvin Toffler's acclaimed works peering into the future of the technological society, Communication Shock is a concise history of communication technologies and an exploration of the possible social and human impacts of nanotechnology on the ecology of human communication. As we become increasingly more networked with communication technologies, we must come to understand and confront the social impact of these changes. More importantly, we must wisely choose in embracing or rejecting these technologies and exploring how we might do both by striking an appropriate balance. Grounded in communication theory and praxis, Communication Shock brings some objectivity to the discussion of technology, maps its development, and encourages a rational conversation about its potential problems and promise. It challenges readers to reach their own conclusions - about the future, imagined and unimaginable, about the fundamental values in conflict, and how one might choose to embrace or contest them to maintain individual autonomy in the face of increasingly ubiquitous marketing and technological change. Present and emerging communications technologies hold the promise for a bold new future, but they also have their inherent risks and drawbacks. Communication shock is the human response, conscious or unconscious, wherein the individual chooses to resist the growing pervasiveness of technology in his or her life by seeking ways to reduce or redirect new technologies or to reject the addition of such technologies altogether. Here is a framework for understanding the potential of the evolving technologies, determining which are essential and which are distractions from the life that one believes to be meaningful, and making informed choices for the life one wishes to live.

Photon Management in Solar Cells - Ralf B. Wehrspohn 2016-03-09

Written by renowned experts in the field of photon management in solar cells, this one-stop reference gives an introduction to the physics of light management in solar cells, and discusses the different concepts and methods of applying photon management. The authors cover the physics, principles, concepts, technologies, and methods used, explaining how to increase the efficiency of solar cells by splitting or modifying the solar spectrum before they absorb the sunlight. In so doing, they present novel concepts and materials allowing for the cheaper, more flexible manufacture of solar cells and systems. For educational purposes, the authors have split the reasons for photon management into spatial and spectral light management. Bridging the gap between the photonics and the photovoltaics communities, this is an invaluable reference for materials scientists, physicists in industry, experimental physicists, lecturers in physics, Ph.D. students in physics and material sciences, engineers in power technology, applied and surface physicists.

Quantum Nanoelectronics - Edward L. Wolf 2015-11-20

A tutorial coverage of electronic technology, starting from the basics of condensed matter and quantum physics. Experienced author Ed Wolf presents established and novel devices like Field Effect and Single Electron Transistors, and leads the reader up to applications in data storage, quantum computing, and energy harvesting. Intended to be self-contained for students with two

years of calculus-based college physics, with corresponding fundamental knowledge in mathematics, computing and chemistry.

2D Nanoelectronics - Mircea Dragoman 2016-12-01

This book is dedicated to the new two-dimensional one-atomic-layer-thick materials such as graphene, metallic chalcogenides, silicene and other 2D materials. The book describes their main physical properties and applications in nanoelectronics, photonics, sensing and computing. A large part of the book deals with graphene and its amazing physical properties. Another important part of the book deals with semiconductor monolayers such as MoS₂ with impressive applications in photonics, and electronics. Silicene and germanene are the atom-thick counterparts of silicon and germanium with impressive applications in electronics and photonics which are still unexplored. Consideration of two-dimensional electron gas devices conclude the treatment. The physics of 2DEG is explained in detail and the applications in THz and IR region are discussed. Both authors are working currently on these 2D materials developing theory and applications.

Fundamentals of Nanotechnology - Gabor L. Hornyak 2018-12-14

WINNER 2009 CHOICE AWARD OUTSTANDING ACADEMIC TITLE! Nanotechnology is no longer a subdiscipline of chemistry, engineering, or any other field. It represents the convergence of many fields, and therefore demands a new paradigm for teaching. This textbook is for the next generation of nanotechnologists. It surveys the field's broad landscape, exploring the physical basics such as nanorheology, nanofluidics, and nanomechanics as well as industrial concerns such as manufacturing, reliability, and safety. The authors then explore the vast range of nanomaterials and systematically outline devices and applications in various industrial sectors. This color text is an ideal companion to Introduction to Nanoscience by the same group of esteemed authors. Both titles are also available as the single volume Introduction to Nanoscience and Nanotechnology Qualifying instructors who purchase either of these volumes (or the combined set) are given online access to a wealth of instructional materials. These include detailed lecture notes, review summaries, slides, exercises, and more. The authors provide enough material for both one- and two-semester courses.

Mobile Communication Networks: 5G and a Vision of 6G - Mladen Božanić 2021-02-15

This book contributes to the body of scholarly knowledge by exploring the main ideas of wireless networks of past, present, and future, trends in the field of networking, the capabilities of 5G and technologies that are potential enablers of 6G, potential 6G applications and requirements, as well as unique challenges and opportunities that 6G research is going to offer over the next decade. It covers research topics such as communication via millimeter-waves, terahertz waves and visible light to enable faster speeds, as well as research into achieving other basic requirements of 6G networks. These include low end-to-end latency, high energy efficiency, coverage that is ubiquitous and always-on, integration of terrestrial wireless with non-terrestrial networks, network management that is made more effective by connected intelligence with machine learning capabilities, as well as support for the evolution of old service classes and support for new ones.

Nanotechnology Applications and Markets - Lawrence Gasman 2006

The buzz on nanotechnology is deafening, but which industries will it really impact - and when? This professional-level book gives executives, venture capitalists, and investors the first "down to business" market analysis that separates commercial reality from hype and provides real-world tools for assessing nanotech's impact on any business or company. It spotlights the most viable R&D now taking root and what nano-enabled products will likely emerge in what industries first. Readers get a rich understanding of technical, business, and legal essentials, and a solid framework for judging nanotech without overheated expectations or overcautious pessimism.

Encyclopedia of Nanoscience and Society - David H. Guston 2010-07-14

Labeled either as the "next industrial revolution" or as just "hype," nanoscience and nanotechnologies are controversial, touted by some as the likely engines of spectacular transformation of human societies and even human bodies, and by others as conceptually flawed. These challenges make an encyclopedia of nanoscience and society an absolute necessity.

Providing a guide to what these understandings and challenges are about, the Encyclopedia of Nanoscience and Society offers accessible descriptions of some of the key technical achievements of nanoscience along with its history and prospects. Rather than a technical primer, this encyclopedia instead focuses on the efforts of governments around the world to fund nanoscience research and to tap its potential for economic development as well as to assess how best to regulate a new technology for the environmental, occupational, and consumer health and safety issues related to the field. Contributions examine and analyze the cultural significance of nanoscience and nanotechnologies and describe some of the organizations, and their products, that promise to make nanotechnologies a critical part of the global economy. Written by noted scholars and practitioners from around the globe, these two volumes offer nearly 500 entries describing the societal aspects of nanoscience and nanotechnology. Key Themes - Art, Design, and Materials - Bionanotechnology Centers - Context - Economics and Business - Engagement and the Public - Environment and Risk - Ethics and Values - Geographies and Distribution - History and Philosophy - Integration and Interdisciplinarity - Nanotechnology Companies - Nanotechnology Organizations

Electroceramic-Based MEMS - Nava Setter 2006-03-30

The book is focused on the use of functional oxide and nitride films to enlarge the application range of MEMS (microelectromechanical systems), including micro-sensors, micro-actuators, transducers, and electronic components for microwaves and optical communications systems. Applications, emerging applications, fabrication technology and functioning issues are presented and discussed. The book covers the following topics: Part A: Applications and devices with electroceramic-based MEMS: Chemical microsensors Microactuators based on thin films Micromachined ultrasonic transducers Thick-film piezoelectric and magnetostrictive devices Pyroelectric microsystems RF bulk acoustic wave resonators and filters High frequency tunable devices MEMS for optical functionality Part B: Materials, fabrication technology, and functionality: Ceramic thick films for MEMS Piezoelectric thin films for MEMS Materials and technology in thin films for tunable high frequency devices Permittivity, tunability and loss in ferroelectrics for reconfigurable high frequency electronics Microfabrication of piezoelectric MEMS Nano patterning methods for electroceramics Soft lithography emerging techniques The book is addressed to engineers, scientists and researchers of various disciplines, device engineers, materials engineers, chemists, physicists and microtechnologists who are working and/or interested in this fast growing and highly promising field. The publication of this book follows a Special Issue on electroceramic-based MEMS that was published in the Journal of Electroceramics at the beginning of 2004. The ten invited papers of that special issue were adapted by the authors into chapters of the present book and five additional chapters were added.

Principles and Applications of NanoMEMS Physics - Hector Santos 2006-07-02

Presents the first unified exposition of the physical principles at the heart of NanoMEMS-based devices and applications Provides newcomers with a much needed coherent scientific base for

undertaking study and research in this field Takes great pains in rendering transparent advanced physical concepts and techniques, such as quantum information, second quantization, Luttinger liquids, bosonization, and superconductivity

Carbon Nanotubes and Graphene - Kazuyoshi Tanaka 2014-07-10

Carbon Nanotubes and Graphene is a timely second edition of the original Science and Technology of Carbon Nanotubes. Updated to include expanded coverage of the preparation, purification, structural characterization, and common application areas of single- and multi-walled CNT structures, this work compares, contrasts, and, where appropriate, unitizes CNT to graphene. This much expanded second edition reference supports knowledge discovery, production of impactful carbon research, encourages transition between research fields, and aids the formation of emergent applications. New chapters encompass recent developments in the theoretical treatments of electronic and vibrational structures, and magnetic, optical, and electrical solid-state properties, providing a vital base to research. Current and potential applications of both materials, including the prospect for large-scale synthesis of graphene, biological structures, and flexible electronics, are also critically discussed. Updated discussion of properties, structure, and morphology of biological and flexible electronic applications aids fundamental knowledge discovery Innovative parallel focus on nanotubes and graphene enables you to learn from the successes and failures of, respectively, mature and emergent partner research disciplines High-quality figures and tables on physical and mathematical applications expertly summarize key information – essential if you need quick, critically relevant data

Nanoelectronics - Mircea Dragoman 2009

This revised edition provides a current, unified treatment of the research, technology, and applications fueling the rapid growth of nanoelectronics. It features numerous updates, including expanded discussions on nanomaterials, micro and nano cantilevers, and spintronics.

Nanotechnology Regulation and Policy Worldwide - Jeffrey H. Matsuura 2006

The emerging commercial application of nanotechnology involves devices, processes, and materials that are manipulated at the atomic and molecular level. This first-of-its-kind resource identifies and describes the legal and policy initiatives aimed at encouraging or restricting nanotech research and applications.

Bionanoelectronics - Daniela Dragoman 2012-03-23

This book presents the achievements in bionanoelectronics in a coherent manner. It deals with nanodevices applied to biostructures, molecular motors, molecular pumps, molecular nanoactuators and electronic biodevices, including nanodevices for sensing and imaging biomolecules. The book describes bionanoelectronics, detection of biomolecules and targets various biological applications such as detection and sequencing of DNA and early detection of various diseases and nanomedicine. Further important topics of the book are biomimetics and bioinspired electronics. The book also deals with biomolecules as building blocks of nanodevices for nanoelectronics or future computing architecture The application of scanning probe techniques to biological samples is described.