

Principles Of Electrical Engineering Materials And Devices

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Principles of Solar Cells, LEDs and Related Devices - Adrian Kitai 2018-11-05

The second edition of the text that offers an introduction to the principles of solar cells and LEDs, revised and updated The revised and

updated second edition of Principles of Solar Cells, LEDs and Related Devices offers an introduction to the physical concepts required for a comprehensive understanding of p-n junction devices, light emitting diodes and solar

cells. The author - a noted expert in the field - presents information on the semiconductor and junction device fundamentals and extends it to the practical implementation of semiconductors in both photovoltaic and LED devices. In addition, the text offers information on the treatment of a range of important semiconductor materials and device structures including OLED devices and organic solar cells. This second edition contains a new chapter on the quantum mechanical description of the electron that will make the book accessible to students in any engineering discipline. The text also includes a new chapter on bipolar junction and junction field effect transistors as well as expanded chapters on solar cells and LEDs that include more detailed information on high efficiency devices. This important text: Offers an introduction to solar cells and LEDs, the two most important applications of semiconductor diodes Provides a solid theoretical basis for p-n junction devices Contains updated information

and new chapters including better coverage of LED out-coupling design and performance and improvements in OLED efficiency Presents student problems at the end of each chapter and worked example problems throughout the text Written for students in electrical engineering, physics and materials science and researchers in the electronics industry, Principles of Solar Cells, LEDs and Related Devices is the updated second edition that offers a guide to the physical concepts of p-n junction devices, light emitting diodes and solar cells.

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.

An Introduction To Electrical Engineering Materials - C.S. Indulkar 2008-01-01

The Electrical Age has opened new problems to all connected with modern electrical industry, making a thorough working knowledge of the fundamental principles of the science of materials necessary. The increasing importance of this science has led to a number of new devices used in present day electrical engineering. As such the subject of electrical materials is occupying an important place in all electrical engineering undergraduate courses. This book is an outgrowth of a course

given by Prof. John Brown of the University College, London to the undergraduate students of the Indian Institute of Technology, Delhi.

Electrical and Electronic Principles and Technology - John Bird 2017-03-31

This practical resource introduces electrical and electronic principles and technology covering theory through detailed examples, enabling students to develop a sound understanding of the knowledge required by technicians in fields such as electrical engineering, electronics and telecommunications. No previous background in engineering is assumed, making this an ideal text for vocational courses at Levels 2 and 3, foundation degrees and introductory courses for undergraduates.

Electrical Engineering 101 - Darren Ashby 2011-10-13

Electrical Engineering 101 covers the basic theory and practice of electronics, starting by answering the question "What is electricity?" It goes on to explain the fundamental principles

and components, relating them constantly to real-world examples. Sections on tools and troubleshooting give engineers deeper understanding and the know-how to create and maintain their own electronic design projects. Unlike other books that simply describe electronics and provide step-by-step build instructions, EE101 delves into how and why electricity and electronics work, giving the reader the tools to take their electronics education to the next level. It is written in a down-to-earth style and explains jargon, technical terms and schematics as they arise. The author builds a genuine understanding of the fundamentals and shows how they can be applied to a range of engineering problems. This third edition includes more real-world examples and a glossary of formulae. It contains new coverage of: Microcontrollers FPGAs Classes of components Memory (RAM, ROM, etc.) Surface mount High speed design Board layout Advanced digital electronics (e.g. processors)

Transistor circuits and circuit design Op-amp and logic circuits Use of test equipment Gives readers a simple explanation of complex concepts, in terms they can understand and relate to everyday life. Updated content throughout and new material on the latest technological advances. Provides readers with an invaluable set of tools and references that they can use in their everyday work.

Electronic, Magnetic, and Optical Materials, Second Edition - Pradeep Fulay 2016-11-18

This book integrates materials science with other engineering subjects such as physics, chemistry and electrical engineering. The authors discuss devices and technologies used by the electronics, magnetics and photonics industries and offer a perspective on the manufacturing technologies used in device fabrication. The new addition includes chapters on optical properties and devices and addresses nanoscale phenomena and nanoscience, a subject that has made significant progress in the

past decade regarding the fabrication of various materials and devices with nanometer-scale features.

Introduction to Electronic Materials and Devices - Sergio M. Rezende 2021-11-10

This textbook lays out the fundamentals of electronic materials and devices on a level that is accessible to undergraduate engineering students with no prior coursework in electromagnetism and modern physics. The initial chapters present the basic concepts of waves and quantum mechanics, emphasizing the underlying physical concepts behind the properties of materials and the basic principles of device operation. Subsequent chapters focus on the fundamentals of electrons in materials, covering basic physical properties and conduction mechanisms in semiconductors and their use in diodes, transistors, and integrated circuits. The book also deals with a broader range of modern topics, including magnetic, spintronic, and superconducting materials and

devices, optoelectronic and photonic devices, as well as the light emitting diode, solar cells, and various types of lasers. The last chapter presents a variety of materials with specific novel applications, such as dielectric materials used in electronics and photonics, liquid crystals, and organic conductors used in video displays, and superconducting devices for quantum computing. Clearly written with compelling illustrations and chapter-end problems, Rezende's Introduction to Electronic Materials and Devices is the ideal accompaniment to any undergraduate program in electrical and computer engineering. Adjacent students specializing in physics or materials science will also benefit from the timely and extensive discussion of the advanced devices, materials, and applications that round out this engaging and approachable textbook.

Entrepreneurship in Power Semiconductor Devices, Power Electronics, and Electric Machines and Drive Systems - Krishnan Ramu

2020-12-07

Entrepreneurship in Power Semiconductor Devices, Power Electronics, and Electric Machines and Drive Systems introduces the basics of entrepreneurship and a methodology for the study of entrepreneurship in electrical engineering and other engineering fields. Entrepreneurship is considered here in three fields of electrical engineering, viz. power semiconductor devices, power electronics and electric machines and drive systems, and their current practice. It prepares the reader by providing a review of the subject matter in the three fields, their current status in research and development with analysis aspect as needed, thus allowing readers to gain self-sufficiency while reading the book. Each field's emerging applications, current market and future market forecasts are introduced to understand the basis and need for emerging startups. Practical learning is introduced in: (i) power semiconductor devices entrepreneurship

through the prism of 20 startups in detail, (ii) power electronics entrepreneurship through 28 startup companies arranged under various application fields and (iii) electric machines and drive systems entrepreneurship through 15 startups in electromagnetic and 1 in electrostatic machines and drive systems. The book: (i) demystifies entrepreneurship in a practical way to equip engineers and students with entrepreneurship as an option for their professional growth, pursuit and success; (ii) provides engineering managers and corporate-level executives a detailed view of entrepreneurship activities in the considered three fields that may potentially impact their businesses, (iii) provides entrepreneurship education in an electrical engineering environment and with direct connection and correlation to their fields of study and (iv) endows a methodology that can be effectively employed not only in the three illustrated fields of electrical engineering but in other fields as

well. This book is for electrical engineering students and professionals. For use in undergraduate and graduate courses in electrical engineering, the book contains discussion questions, exercise problems, team and class projects, all from a practical point of view, to train students and assist professionals for future entrepreneurship endeavors.

Electronic Materials - Yuriy M. Poplavko
2018-11-23

Mechanical and thermal properties are reviewed and electrical and magnetic properties are emphasized. Basics of symmetry and internal structure of crystals and the main properties of metals, dielectrics, semiconductors, and magnetic materials are discussed. The theory and modern experimental data are presented, as well as the specifications of materials that are necessary for practical application in electronics. The modern state of research in nanophysics of metals, magnetic materials, dielectrics and semiconductors is taken into

account, with particular attention to the influence of structure on the physical properties of nano-materials. The book uses simplified mathematical treatment of theories, while emphasis is placed on the basic concepts of physical phenomena in electronic materials. Most chapters are devoted to the advanced scientific and technological problems of electronic materials; in addition, some new insights into theoretical facts relevant to technical devices are presented. Electronic Materials is an essential reference for newcomers to the field of electronics, providing a fundamental understanding of important basic and advanced concepts in electronic materials science. Provides important overview of the fundamentals of electronic materials properties significant for device applications along with advanced and applied concepts essential to those working in the field of electronics Takes a simplified and mathematical approach to theories essential to the understanding of

electronic materials and summarizes important takeaways at the end of each chapter. Interweaves modern experimental data and research in topics such as nanophysics, nanomaterials and dielectrics.

Electrical Principles and Technology for Engineering - John Bird 2013-10-22

The aim of this book is to introduce students to the basic electrical and electronic principles needed by technicians in fields such as electrical engineering, electronics and telecommunications. The emphasis is on the practical aspects of the subject, and the author has followed his usual successful formula, incorporating many worked examples and problems (answers supplied) into the learning process. Electrical Principles and Technology for Engineering is John Bird's core text for Further Education courses at BTEC levels N11 and N111 and Advanced GNVQ. It is also designed to provide a comprehensive introduction for students on a variety of City & Guilds courses,

and any students or technicians requiring a sound grounding in Electrical Principles and Electrical Power Technology.

Sustainable Materials for Next Generation Energy Devices - Kuan Yew Cheong 2020-12-01

Sustainable Materials for Next Generation Energy Devices: Challenges and Opportunities presents the latest state-of-the-art knowledge and innovation related to environmentally-friendly functional materials that can be developed for, and employed in, producing a feasible next generation of energy storage and conversion devices. The book is broken up into three sections, covering Energy Storage, Energy Conversion and Advanced Concepts. It will be an important reference for researchers, engineers and students who want to gain extensive knowledge in green and/or sustainable functional materials and their applications. Provides a concise resource for readers interested in sustainable and green functional materials for energy conversion and storage

devices Emphasizes sustainable and green concepts in the design of energy devices based on renewable functional materials Presents a survey of both the challenges and opportunities available for renewable functional materials in the development of energy devices

Electronic Materials and Devices David K. Ferry 2001-06-18

This book provides the knowledge and understanding necessary to comprehend the operation of individual electronic devices that are found in modern micro-electronics. As a textbook, it is aimed at the third-year undergraduate curriculum in electrical engineering, in which the physical electronic properties are used to develop an introductory understanding to the semiconductor devices used in modern micro-electronics. The emphasis of the book is on providing detailed physical insight into the microscopic mechanisms that form the cornerstone for these technologies. Mathematical treatments are therefore kept to

the minimum level necessary to achieve suitable rigor. * Covers crystalline structure * Thorough introduction to the key principles of quantum mechanics * Semiconductor statistics, impurities, and controlled doping * Detailed analysis of the operation of semiconductor devices, including p-n junctions, field-effect transistors, metal-semiconductor junctions and bipolar junction transistors * Discussion of optoelectronic devices such as light-emitting diodes (LEDs) and lasers * Chapters on the device applications of dielectrics, magnetic materials, and superconductors

Electrical and Electronic Properties of Materials - Md. Kawsar Alam 2019-01-16

Materials properties, whether microscopic or macroscopic, are of immense interest to the materials scientists, physicists, chemists as well as to engineers. Investigation of such properties, theoretically and experimentally, has been one of the fundamental research directions for many years that has also resulted in the discovery of

many novel materials. It is also equally important to correctly model and measure these materials properties. Keeping such interests of research communities in mind, this book has been written on the properties of polyesters, varistor ceramics, and powdered porous compacts and also covers some measurement and parameter extraction methods for dielectric materials. Four contributed chapters and an introductory chapter from the editor explain each class of materials with practical examples.

Electrical Craft Principles, Vol-1
Whitfield 2008

The book comprises 15 chapters dealing with the following subjects: basic electrical units and circuits; resistance and resistors; mechanics; heat; electrical power and energy; permanent magnetism and electromagnetism; applications of electromagnetism; electric cells and batteries; electromagnetic induction; basic alternating-current theory; electrical motor principles; practical supplies and protection; cables and

enclosures; lighting and heating installations; and introduction to electronics. Each chapter concludes with a summary of the formulas introduced in it. A complete list of symbols, abbreviations, and units is included. Numerical answers to exercises are provided

Materials Principles and Practice - Charles Newey 2013-10-22

Materials Principles and Practice deals with materials science in the technological context of making and using materials. Topics covered include the nature of materials such as crystals, an atomic view of solids, temperature effects on materials, and the mechanical and chemical properties of materials. This book is comprised of seven chapters and begins with an overview of the properties of different kinds of material, the ways in which materials can be shaped, and the uses to which they can be put. The next chapter describes the state of matter as a balance between the tendencies of atoms to stick together (by chemical bonding) or rattle apart

(by thermal agitation), paying particular attention to ionic bonds and ionic crystals, the structure and properties of polymers, and transition metals. The reader is also introduced to how the structure of materials, especially microstructure, can be manipulated to give desired properties via thermal, mechanical, and chemical agents of change. This text concludes by describing the chemistry of processing and service of various materials. Exercises and self-assessment questions with answers are given at the end of each chapter, together with a set of objectives. This monograph will be a valuable resource for students of materials science and the physical sciences.

Undergraduate Announcement - University of Michigan--Dearborn 1983

Handbook of Organic Materials for Optical and (Opto)Electronic Devices - Oksana

Ostroverkhova 2013-08-31

Small molecules and conjugated polymers, the

two main types of organic materials used for optoelectronic and photonic devices, can be used in a number of applications including organic light-emitting diodes, photovoltaic devices, photorefractive devices and waveguides.

Organic materials are attractive due to their low cost, the possibility of their deposition from solution onto large-area substrates, and the ability to tailor their properties. The Handbook of organic materials for optical and (opto)electronic devices provides an overview of the properties of organic optoelectronic and nonlinear optical materials, and explains how these materials can be used across a range of applications. Parts one and two explore the materials used for organic optoelectronics and nonlinear optics, their properties, and methods of their characterization illustrated by physical studies. Part three moves on to discuss the applications of optoelectronic and nonlinear optical organic materials in devices and includes chapters on organic solar cells, electronic

memory devices, and electronic chemical sensors, electro-optic devices. The Handbook of organic materials for optical and (opto)electronic devices is a technical resource for physicists, chemists, electrical engineers and materials scientists involved in research and development of organic semiconductor and nonlinear optical materials and devices. Comprehensively examines the properties of organic optoelectronic and nonlinear optical materials. Discusses their applications in different devices including solar cells, LEDs and electronic memory devices. An essential technical resource for physicists, chemists, electrical engineers and materials scientists.

Nanoelectronics and Information

Technology - Rainer Waser 2012-05-29

This outstanding textbook provides an introduction to electronic materials and device concepts for the major areas of current and future information technology. On about 1,000 pages, it collects the fundamental concepts and

key technologies related to advanced electronic materials and devices. The obvious strength of the book is its encyclopedic character, providing adequate background material instead of just reviewing current trends. It focuses on the underlying principles which are illustrated by contemporary examples. The third edition now holds 47 chapters grouped into eight sections. The first two sections are devoted to principles, materials processing and characterization methods. Following sections hold contributions to relevant materials and various devices, computational concepts, storage systems, data transmission, imaging systems and displays. Each subject area is opened by a tutorial introduction, written by the editor and giving a rich list of references. The following chapters provide a concise yet in-depth description in a given topic. Primarily aimed at graduate students of physics, electrical engineering and information technology as well as material science, this book is equally of interest to

professionals looking for a broader overview. Experts might appreciate the book for having quick access to principles as well as a source for getting insight into related fields.

Nanoscaled Semiconductor-on-Insulator Structures and Devices - S. Hall 2007-07-09

This book offers combined views on silicon-on-insulator (SOI) nanoscaled electronics from experts in the fields of materials science, device physics, electrical characterization and computer simulation. Coverage analyzes prospects of SOI nanoelectronics beyond Moore's law and explains fundamental limits for CMOS, SOICMOS and single electron technologies.

Functional Materials and Electronics - Jiabao Yi 2018-05-11

This informative book focuses on newly developed functional materials and their applications for electronic and spintronic devices. Electronic devices have become a part of our daily modern life, involving mobile

phones, data storage, computers, and satellites, and there is relentless growth in microelectronics. This volume covers the topics of oxide materials for electronics devices, new materials, and new properties, especially in newly developed research areas, such as oxide magnetic semiconductors and two-dimensional electron gas. Key features: Emphasizes functional materials for electronic devices, including two-dimensional materials, two-dimensional electron gas, multiferroic materials, memory materials, sensor materials, and spintronic materials. Describes the basics as well as new developments of these functional materials and devices.

Principles of Electronic Materials and Devices Safa O. Kasap 2006

"The third edition includes new topics and extended sections, such as diffusion, conduction in thin films, interconnects in microelectronics, electromigration, Stefan's radiation law, field emission from carbon nanotubes,

piezoresistivity, amorphous semiconductors, solar cells, LEDs, Debye relaxation, giant magnetoresistance, magnetic data storage, Reststrahlen absorption, luminescence and white LEDs, and X-ray diffraction (Appendix). It also has a large number of new worked examples, numerous new homework problems, and many new illustrations and photographs. This text is one of the few books in the market that has the broad coverage of electronic materials and devices that today's scientists and engineers need."--Jacket.

Cambridge Illustrated Handbook of Optoelectronics and Photonics - Safa Kasap
2009-06-11

From fundamental concepts to cutting-edge applications, this is the first encyclopaedic reference of important terms and effects in optoelectronics and photonics. It contains broad coverage of terms and concepts from materials to optical devices and communications systems. Self-contained descriptions of common tools and

phenomena are provided for undergraduate and graduate students, scientists, engineers and technicians in industry and laboratories. The book strikes a balance between materials and devices related coverage and systems level terms, and captures key nomenclature used in the field. Equations are used where necessary, and lengthy derivations are avoided. Over 600 clear and self-explanatory illustrations are used to help convey key concepts, and enable readers to quickly grasp important concepts.

Electronic and Electrical Engineering
Lionel
Warnes 2017-03-14

A third edition of this popular text which provides a foundation in electronic and electrical engineering for HND and undergraduate students. The book offers exceptional breadth of coverage without sacrificing depth. It uses a wealth of practical examples to illustrate the theory, and makes no excessive demands on the reader's mathematical skills. Ideal as a teaching tool or for self-study.

Quantum Mechanics for Electrical Engineers

Dennis M. Sullivan 2012-01-24

The main topic of this book is quantum mechanics, as the title indicates. It specifically targets those topics within quantum mechanics that are needed to understand modern semiconductor theory. It begins with the motivation for quantum mechanics and why classical physics fails when dealing with very small particles and small dimensions. Two key features make this book different from others on quantum mechanics, even those usually intended for engineers: First, after a brief introduction, much of the development is through Fourier theory, a topic that is at the heart of most electrical engineering theory. In this manner, the explanation of the quantum mechanics is rooted in the mathematics familiar to every electrical engineer. Secondly, beginning with the first chapter, simple computer programs in MATLAB are used to illustrate the principles. The programs can easily be copied and used by

the reader to do the exercises at the end of the chapters or to just become more familiar with the material. Many of the figures in this book have a title across the top. This title is the name of the MATLAB program that was used to generate that figure. These programs are available to the reader. Appendix D lists all the programs, and they are also downloadable at <http://booksupport.wiley.com>

Electrical Engineering Fundamentals - S.

Bobby Rauf 2020-12-17

Many, in their quest for knowledge in engineering, find typical textbooks intimidating. Perhaps due to an extensive amount of physics theory, an overwhelming barrage of math, and not enough practical application of the engineering principles, laws, and equations. Therein lies the difference between this text and those voluminous and daunting conventional university engineering textbooks. This text leads the reader into more complex and abstract content after explaining the electrical

engineering concepts and principles in an easy to understand fashion, supported by analogies borrowed from day-to-day examples and other engineering disciplines. Many complex electrical engineering concepts, for example, power factor, are examined from multiple perspectives, aided by diagrams, illustrations, and examples that the reader can easily relate to. Throughout this book, the reader will gain a clear and strong grasp of electrical engineering fundamentals, and a better understanding of electrical engineering terms, concepts, principles, laws, analytical techniques, solution strategies, and computational techniques. The reader will also develop the ability to communicate with professional electrical engineers, controls engineers, and electricians on their "wavelength" with greater confidence. Study of this book can help develop skills and preparation necessary for succeeding in the electrical engineering portion of various certification and licensure exams, including Fundamentals of

Engineering (FE), Professional Engineering (PE), Certified Energy Manager (CEM), and many other trade certification tests. This text can serve as a compact and simplified electrical engineering desk reference. This book provides a brief introduction to the NEC®, the Arc-Flash Code, and a better understanding of electrical energy and associated cost. If you need to gain a better understanding of myriad battery alternatives available in the market, their strengths and weaknesses, and how batteries compare with capacitors as energy storage devices, this book can be a starting point. This book is ideal for engineers, engineering students, facility managers, engineering managers, program/project managers, and other executives who do not possess a current working knowledge of electrical engineering. Because of the simple explanations, analogies, and practical examples employed by the author, this book serves as an excellent learning tool for non-engineers, technical writers, attorneys, electrical

sales professionals, energy professionals, electrical equipment procurement agents, construction managers, facility managers, and maintenance managers.

Springer Handbook of Electronic and Photonic Materials - Safa Kasap 2017-10-04

The second, updated edition of this essential reference book provides a wealth of detail on a wide range of electronic and photonic materials, starting from fundamentals and building up to advanced topics and applications. Its extensive coverage, with clear illustrations and applications, carefully selected chapter sequencing and logical flow, makes it very different from other electronic materials handbooks. It has been written by professionals in the field and instructors who teach the subject at a university or in corporate laboratories. The Springer Handbook of Electronic and Photonic Materials, second edition, includes practical applications used as examples, details of experimental techniques, useful tables that

summarize equations, and, most importantly, properties of various materials, as well as an extensive glossary. Along with significant updates to the content and the references, the second edition includes a number of new chapters such as those covering novel materials and selected applications. This handbook is a valuable resource for graduate students, researchers and practicing professionals working in the area of electronic, optoelectronic and photonic materials.

Fundamentals of Electroceramics - R. K. Pandey 2019-01-07

The first textbook to provide in-depth treatment of electroceramics with emphasis on applications in microelectronics, magneto-electronics, spintronics, energy storage and harvesting, sensors and detectors, magnetics, and in electro-optics and acousto-optics Electroceramics is a class of ceramic materials used primarily for their electrical properties. This book covers the important topics relevant to this growing field

and places great emphasis on devices and applications. It provides sufficient background in theory and mathematics so that readers can gain insight into phenomena that are unique to electroceramics. Each chapter has its own brief introduction with an explanation of how the said content impacts technology. Multiple examples are provided to reinforce the content as well as numerous end-of-chapter problems for students to solve and learn. The book also includes suggestions for advanced study and key words relevant to each chapter. Fundamentals of Electroceramics: Materials, Devices and Applications offers eleven chapters covering: 1. Nature and types of solid materials; 2. Processing of Materials; 3. Methods for Materials Characterization; 4. Bonding Forces in Solids and Essential Elements of Crystallography; 5. Dominant Forces and Effects in Electroceramics; 6. Coupled Nonlinear Effects in Electroceramics; 7. Elements of Semiconductor; 8. Electroceramic

Semiconductor Devices; 9. Electroceramics and Green Energy; 10. Electroceramic Magnetics; and 11. Electro-optics and Acousto-optics. Provides an in-depth treatment of electroceramics with the emphasis on fundamental theoretical concepts, devices, and applications with focus on non-linear dielectrics. Emphasizes applications in microelectronics, magneto-electronics, spintronics, energy storage and harvesting, sensors and detectors, magnetics and in electro-optics and acousto-optics. Introductory textbook for students to learn and make an impact on technology. Motivates students to get interested in research on various aspects of electroceramics at undergraduate and graduate levels leading to a challenging career path. Includes examples and problem questions within every chapter that prepare students well for independent thinking and learning. Fundamentals of Electroceramics: Materials, Devices and Applications is an invaluable academic textbook that will benefit all

students, professors, researchers, scientists, engineers, and teachers of ceramic engineering, electrical engineering, applied physics, materials science, and engineering.

Principles of Electrical Engineering Materials and Devices - Safa Kasap 2000

This text offers comprehensive discussions of topics which are important to both electrical engineering and materials science students. The chapters are designed so that instructors can teach out of sequence or skip topics if desired.

High-Frequency Bipolar Transistors -

Michael Reisch 2012-12-06

This modern book-length treatment gives a detailed presentation of high-frequency bipolar transistors in silicon or silicon-germanium technology, with particular emphasis placed on today's advanced compact models and their physical foundations.

Molecular Electronics - Michael C. Petty
2007-12-26

This consistent and comprehensive text provides

an informed insight into molecular electronics by contrasting the prospects for molecular scale electronics with the continuing development of the inorganic semiconductor industry.

Electrical Properties of Miter ~~Lasslo~~
Solymar 2009-10-22

An informal and highly accessible writing style, a simple treatment of mathematics, and clear guide to applications, have made this book a classic text in electrical and electronic engineering. Students will find it both readable and comprehensive. The fundamental ideas relevant to the understanding of the electrical properties of materials are emphasized; in addition, topics are selected in order to explain the operation of devices having applications (or possible future applications) in engineering. The mathematics, kept deliberately to a minimum, is well within the grasp of a second-year student. This is achieved by choosing the simplest model that can display the essential properties of a phenomenon, and then examining the difference

between the ideal and the actual behaviour. The whole text is designed as an undergraduate course. However most individual sections are self contained and can be used as background reading in graduate courses, and for interested persons who want to explore advances in microelectronics, lasers, nanotechnology and several other topics that impinge on modern life. Microelectronics to Nanoelectronics - Anupama B. Kaul 2017-12-19

Composed of contributions from top experts, Microelectronics to Nanoelectronics: Materials, Devices and Manufacturability offers a detailed overview of important recent scientific and technological developments in the rapidly evolving nanoelectronics arena. Under the editorial guidance and technical expertise of noted materials scientist Anupama B. Kaul of California Institute of Technology's Jet Propulsion Lab, this book captures the ascent of microelectronics into the nanoscale realm. It addresses a wide variety of important scientific

and technological issues in nanoelectronics research and development. The book also showcases some key application areas of micro-electro-mechanical-systems (MEMS) that have reached the commercial realm. Capitalizing on Dr. Kaul's considerable technical experience with micro- and nanotechnologies and her extensive research in prestigious academic and industrial labs, the book offers a fresh perspective on application-driven research in micro- and nanoelectronics, including MEMS. Chapters explore how rapid developments in this area are transitioning from the lab to the market, where new and exciting materials, devices, and manufacturing technologies are revolutionizing the electronics industry. Although many micro- and nanotechnologies still face major scientific and technological challenges and remain within the realm of academic research labs, rapid advances in this area have led to the recent emergence of new applications and markets. This handbook

encapsulates that exciting recent progress by providing high-quality content contributed by international experts from academia, leading industrial institutions—such as Hewlett-Packard—and government laboratories including the U.S. Department of Energy's Sandia National Laboratory. Offering something for everyone, from students to scientists to entrepreneurs, this book showcases the broad spectrum of cutting-edge technologies that show significant promise for electronics and related applications in which nanotechnology plays a key role.

Introduction to Organic Electronic and Optoelectronic Materials and Devices - Sam-Shajing Sun 2016-10-03

This book covers the combined subjects of organic electronic and optoelectronic materials/devices. It is designed for classroom instruction at the senior college level. Highlighting emerging organic and polymeric optoelectronic materials and devices, it presents

the fundamentals, principle mechanisms, representative examples, and key data.

Vacuum Microelectronics - Wei Zhu
2004-04-07

Expert coverage of vacuum microelectronics—principles, devices, and applications The field of vacuum microelectronics has advanced so swiftly that commercial devices are being fabricated, and applications are being developed in displays, wireless communications, spacecraft, and electronics for use in harsh environments. It is a rapidly evolving, interdisciplinary field encompassing electrical engineering, materials science, vacuum engineering, and applied physics. This book surveys the fundamentals, technology, and device applications of this nascent field. Editor Wei Zhu brings together some of the world's foremost experts to provide comprehensive and in-depth coverage of the entire spectrum of vacuum microelectronics. Topics include: Field emission theory Metal and silicon field emitter

arrays Novel cold cathode materials Field emission flat panel displays Cold cathode microwave devices Vacuum Microelectronics is intended for practitioners in the display, microwave, telecommunications, and microelectronics industries and in government and university research laboratories, as well as for graduate students majoring in electrical engineering, materials science, and physics. It provides cutting-edge, expert coverage of the subject and serves as both an introductory text and a professional reference.

Electrical Engineering Principles for Technicians - K. M. Smith 2013-10-22

Electrical Engineering Principles for Technicians covers the syllabus of Electrical Engineering Principles III of the C.G.L.I. Course for Electrical Technicians. It provides a basic introduction to electrical principles and their practical application. Comprised of eight chapters, the book discusses a wide range of topics including magnetic circuits, rectifier and thermocouple

instruments, direct-current machines, transformers, and electric circuits. It also explains the alternating current theory and the generation of a three-phase supply system. The book ends by discussing the rate of change of current in an inductor and a capacitor. Students taking electrical engineering and technician courses will find this book very useful.

Fibrous Filter Media Philip Brown 2017-06-16
Fibrous Filter Media comprehensively covers the types, manufacture, applications, performance, and modeling of fibrous filter media. Part I introduces the principles of gas and liquid filtration, while Part II presents an overview of the types of fibrous filters, including details of fiber types, fabric construction, and applications. Part III covers a variety of filtration applications in which fibrous assemblies are used, with examples ranging from filtration for improving air quality, to medical filters, to industrial wastewater filtration. Finally, Part III covers the properties and performance of fibrous filters,

including chapters on filter performance and simulation. With its expert editors and international team of contributors, this important book provides information on fibrous filters relevant to fiber and textile scientists, and is also ideal for academics and industry professionals working in the field of filtration. Dr. Philip Brown is Sweetenburgh Professor of polymer and textile engineering at Clemson University, USA. Dr. Christopher Cox is Professor of mathematical sciences at Clemson University, USA. Systematic and comprehensive coverage of the trends and new technologies being developed in the field of fibrous filter media Focused on the needs of the textiles and filtration industries, with a clear emphasis on applied technology Contains contributions from an international team of authors edited by an expert in the field

Electrical Contacts - Paul G. Slade 1999-03-31
Covering the choice, attachment, and testing of contact materials, Electrical Contacts introduces

a thorough discussion on making electric contact and contact interface conduction, presents a general outline of, and measurement techniques for, important corrosion mechanisms, discusses the results of contact wear when plug-in connections are made and broken, investigates the effect of thin noble metal plating on electronic connections, relates crucial considerations for making high- and low-power contact joints, details arcing effects on contacts including contact erosion, welding, and contamination, and contains nearly 2800 references, tables, equations, drawings, and photographs.

Emerging 2D Materials and Devices for the Internet of Things - Li Tao 2020-06-12

Emerging 2D Materials and Devices for the Internet of Things: Information, Sensing and Energy Applications summarizes state-of-the-art technologies in applying 2D layered materials, discusses energy and sensing device applications as essential infrastructure solutions,

and explores designs that will make internet-of-things devices faster, more reliable and more accessible for the creation of mass-market products. The book focuses on information, energy and sensing applications, showing how different types of 2D materials are being used to create a new generation of products and devices that harness the capabilities of wireless technology in an eco-efficient, reliable way. This book is an important resource for both materials scientists and engineers, who are designing new wireless products in a variety of industry sectors. Explores how 2D materials are being used to create faster and more reliable wireless network solutions Discusses how graphene-based nanocomposites are being used for energy harvesting and storage applications Outlines the major challenges for integrating 2D materials in electronic sensing devices

Optoelectronics and Photonics Safa O. Kasap
2013

For one-semester, undergraduate-level courses

in Optoelectronics and Photonics, in the departments of electrical engineering, engineering physics, and materials science and engineering. This text takes a fresh look at the enormous developments in electro-optic devices and associated materials.

Thermoelectric Materials and Devices Xidong Chen
2020-09-25

Thermoelectric Materials and Devices summarizes the latest research achievements over the past 20 years of thermoelectric material and devices, most notably including new theory and strategies of thermoelectric materials design and the new technology of device integration. The book's author has provided a bridge between the knowledge of basic physical/chemical principles and the fabrication technology of thermoelectric materials and devices, providing readers with research and development strategies for high performance thermoelectric materials and devices. It will be a vital resource for graduate students, researchers

and technologists working in the field of energy conversion and the development of thermoelectric devices. Discusses the new theory and methods of thermoelectric materials design Combines scientific principles, along with synthesis and fabrication technologies in

thermoelectric materials Presents the design optimization and interface technology for thermoelectric devices Introduces thermoelectric polymers and organic-inorganic thermoelectric composites