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Semiconductor Physics And Devices [Semiconductor Physics and Devices](#) Physics of Semiconductor Devices Semiconductor Physics and Devices Physics of Semiconductor Devices Hot Electrons in Semiconductors [Introduction to Semiconductor Physics and Devices](#) PHYSICS OF SEMICONDUCTOR DEVICES, 3RD ED [Physics of Semiconductor Devices](#) [Physics and Technology of Semiconductor Devices](#) Physics of Semiconductor Devices [Introductory Semiconductor Device Physics](#) Physics of Quantum Electron Devices [Physics of Semiconductor Devices](#) [The Physics of Semiconductors](#) [Modern Semiconductor Physics and Device Applications](#) [Semiconductor Device Physics and Simulation](#) Quantum Physics of Semiconductor Materials and Devices Semiconductor Device Physics and Simulation Physics of Semiconductor Devices [Semiconductor Device Physics and Design III-V Compound Semiconductors and Devices](#) [Semiconductor Physics And Devices](#) [Fundamentals of Semiconductor Physics and Devices](#) Compound Semiconductors [SEMICONDUCTOR DEVICES: PHYSICS AND TECHNOLOGY, 2ND ED](#) [Modern Devices](#) [Semiconductor Physics and Devices](#) [Physics of Submicron Devices](#) Emerging Trends in Terahertz Solid-State Physics and Devices [Semiconductor Devices](#) Nano-Optoelectronics Physics and Technology of Heterojunction Devices [High Speed Semiconductor Physics. Theoretical Approaches and Device Physics](#) The Physics of Semiconductor Devices Physics of Semiconductor Devices [Semiconductor Devices](#) Handbook of Nitride Semiconductors and Devices, Materials Properties, Physics and Growth [Physics of Quantum Well Devices](#) Semiconductor Device Fundamentals

III-V Compound Semiconductors and Devices Jan 13 2021 This textbook gives a complete and fundamental introduction to the properties of III-V compound semiconductor devices, highlighting the theoretical and practical aspects of their device physics. Beginning with an introduction to the basics of semiconductor physics, it presents an overview of the physics and preparation of compound semiconductor materials, as well as a detailed look at the electrical and optical properties of compound semiconductor heterostructures. The book concludes with chapters dedicated to a number of heterostructure electronic and photonic devices, including the high-electron-mobility transistor, the heterojunction bipolar transistor, lasers, unipolar photonic devices, and integrated optoelectronic devices. Featuring chapter-end problems, suggested references for further reading, as well as clear, didactic schematics accompanied by six information-rich appendices, this textbook is ideal for graduate students in the areas of semiconductor physics or electrical engineering. In addition, up-to-date results from published research make this textbook especially well-suited as a self-study and reference guide for engineers and researchers in related industries.

Quantum Physics of Semiconductor Materials and Devices May 17 2021 "Quantum Phenomena do not occur in a Hilbert space. They occur in a laboratory". - Asher Peres Semiconductor physics is a laboratory to learn and discover the concepts of quantum mechanics and thermodynamics, condensed matter physics, and materials science, and the payoffs are almost immediate in the form of useful semiconductor devices. Debdeep Jena has had the opportunity to work on both sides of the fence - on the fundamental materials science and quantum physics of semiconductors, and in their applications in semiconductor electronic and photonic devices. In Quantum Physics of Semiconductors and Nanostructures, Jena uses this experience to make each topic as tangible and accessible as possible to students at all levels. Consider the simplest physical processes that occur in semiconductors: electron or hole transport in bands and over barriers, collision of electrons with the atoms in the crystal, or when electrons and holes annihilate each other to produce a photon. The correct explanation of these processes require a quantum mechanical treatment. Any shortcuts lead to misconceptions that can take years to dispel, and sometimes become roadblocks towards a deeper understanding and appreciation of the richness of the subject. A typical introductory course on semiconductor physics would then require prerequisites of quantum mechanics, statistical physics and thermodynamics, materials science, and electromagnetism. Rarely would a student have all this background when (s)he takes a course of this nature in most universities. Jena's work fills in these gaps and gives students the background and deeper understanding of the quantum physics of semiconductors and nanostructures.

[Physics of Quantum Well Devices](#) Jul 27 2019 Quantum well devices have been the objects of intensive research during the last two decades. Some of the devices have matured into commercially useful products and form part of modern electronic circuits. Some others require further development, but have the promise of being useful commercially in the near future. Study of the devices is, therefore, gradually becoming compulsory for electronics specialists. The functioning of the devices, however, involve aspects of physics which are not dealt with in the available text books on the physics of semiconductor devices. There is, therefore, a need for a book to cover all these aspects at an introductory level. The present book has been written with the aim of meeting this need. In fact, the book grew out of introductory lectures given by the author to graduate students and researchers interested in this rapidly developing area of electron devices. The book covers the subjects of heterostructure growth techniques, band-offset theory and experiments, electron states, electron-photon interaction and related phenomena, electron transport and the operation of electronic, optoelectronic and photonic quantum well devices. The theory as well as the practical aspects of the devices are discussed at length. The aim of the book is to provide a comprehensive treatment of the physics underlying the various devices. A reader after going through the book should find himself equipped to deal with all kinds of quantum well devices.

[Physics of Semiconductor Devices](#) Feb 23 2022 Physics of Semiconductor Devices covers both basic classic topics such as energy band theory and the gradual-channel model of the MOSFET as well as advanced concepts and devices such as MOSFET short-channel effects, low-dimensional devices and single-electron transistors. Concepts are introduced to the reader in a simple way, often using comparisons to everyday-life experiences such as simple fluid mechanics. They are then explained in depth and mathematical developments are fully described. Physics of Semiconductor Devices contains a list of problems that can be used as homework assignments or can be solved in class to exemplify the theory. Many of these problems make use of Matlab and are aimed at illustrating theoretical concepts in a graphical manner.

[High Speed Semiconductor Physics. Theoretical Approaches and Device Physics](#) Jan 01 2020 Solid state physics is a fascinating sub-genre of condensed matter physics - though some graduate students consider it a very boring and tedious subject area in Physics and others even call it a "squalid state". Topics covered in this book are built on standard solid state physics references available in most online libraries or in other books on solid state physics. The complexity of high speed semiconductor physics and related devices arose from condensed solid state matter. The content covered in this book gives a deep coverage on some topics or sections that may be covered only superficially in other literature. Therefore, these topics are likely to differ a great deal from what is deemed important elsewhere in other books or available literature. There are many extremely good books on solid-state physics and condensed matter physics but very few of these books are restricted to high speed semiconductor physics though. Chapter one covers the general semiconductor qualities that make high speed semiconductor devices effect and includes the theory of crystals, diffusion and its mechanisms, while chapter two covers solid state materials, material processing for high speed semiconductor devices and an introduction to quantum theory for materials in relation to density of states of the radiation for a black body and its radiation properties. Chapter three discuss high speed semiconductor energy band theory, energy bands in general solid semiconductor materials, the Debye model, the Einstein model the Debye model and semiconductor transport carriers in 3D semiconductors while chapter four discuss effect of external force on current flow based on the concept of holes valence band, and lattice scattering in high speed devices. Chapter five briefly describes solid state thermoelectric fundamentals, thermoelectric material and thermoelectric theory of solids in lattice and phonons while chapter six scattering in high field effect in semiconductors in inter-valley electron scattering and the associated Fermi Dirac statistics and Maxwell-Boltzmann approximation on their carrier concentration variation with energy in extrinsic doping chapter seven covers p-n junction diodes, varactor diode, pin diode Schottky diode and their transient response of diode in multi-valley semiconductors. Chapter eight discusses high speed metal semiconductor field effect transistors.

[Modern Devices](#) Aug 08 2020 Focuses on the common recurring physical principles behind sophisticated modern devices This book discusses the principles of physics through applications of state-of-the-art technologies and advanced instruments. The authors use diagrams, sketches, and graphs coupled with equations and mathematical analysis to enhance the reader's understanding of modern devices. Readers will learn to identify common underlying physical principles that govern several types of devices, while gaining an understanding of the performance trade-off imposed by the physical limitations of various processing methods. The topics discussed in the book assume readers have taken an introductory physics course, college algebra, and have a basic understanding of calculus. Describes the basic physics behind a large number of devices encountered in everyday life, from the air conditioner to Blu-ray discs Covers state-of-the-art devices such as spectrographs, photoelectric image sensors, spacecraft systems, astronomical and planetary observatories, biomedical imaging instruments, particle accelerators, and jet engines Includes access to a book companion site that houses Power Point slides [Modern Devices: The Simple Physics of Sophisticated Technology](#) is designed as a reference for professionals that would like to gain a basic understanding of the operation of complex technologies. The book is also suitable as a textbook for upper-level undergraduate non-major students interested in physics.

Physics of Quantum Electron Devices Oct 22 2021 The ability to engineer the bandstructure and the wavefunction over length scales previously inaccessible to

technology using artificially structured materials and nanolithography has led to a new class of electron semiconductor devices whose operation is controlled by quantum effects. These structures not only represent exciting tools for investigating new quantum phenomena in semiconductors, but also offer exciting opportunities for applications. This book gives the first comprehensive treatment of the physics of quantum electron devices. This interdisciplinary field, at the junction between material science, physics and technology, has witnessed an explosive growth in recent years. This volume presents a detailed coverage of the physics of the underlying phenomena, and their device and circuit applications, together with fabrication and growth technology.

Semiconductor Device Physics and Simulation Jun 17 2021 The advent of the microelectronics technology has made ever-increasing numbers of small devices on a same chip. The rapid emergence of ultra-large-scaled-integrated (ULSI) technology has moved device dimension into the sub-quarter-micron regime and put more than 10 million transistors on a single chip. While traditional closed-form analytical models furnish useful intuition into how semiconductor devices behave, they no longer provide consistently accurate results for all modes of operation of these very small devices. The reason is that, in such devices, various physical mechanisms affect the device performance in a complex manner, and the conventional assumptions (i. e. , one-dimensional treatment, low-level injection, quasi-static approximation, etc.) employed in developing analytical models become questionable. Thus, the use of numerical device simulation becomes important in device modeling. Researchers and engineers will rely even more on device simulation for device design and analysis in the future. This book provides comprehensive coverage of device simulation and analysis for various modern semiconductor devices. It will serve as a reference for researchers, engineers, and students who require in-depth, up-to-date information and understanding of semiconductor device physics and characteristics. The materials of the book are limited to conventional and mainstream semiconductor devices; photonic devices such as light emitting and laser diodes are not included, nor does the book cover device modeling, device fabrication, and circuit applications.

Hot Electrons in Semiconductors May 29 2022 Under certain conditions electrons in a semiconductor become much hotter than the surrounding crystal lattice. When this happens, Ohm's Law breaks down: current no longer increases linearly with voltage and may even decrease. Hot electrons have long been a challenging problem in condensed matter physics and remain important in semiconductor research. Recent advances in technology have led to semiconductor devices with submicron dimensions, where electrons can be confined to two (quantum well), one (quantum wire), or zero (quantum dot) dimensions. In these devices small voltages heat electrons rapidly, inducing complex nonlinear behavior; the study of hot electrons is central to their further development. This book is the only comprehensive and up-to-date coverage of hot electrons. Intended for both established researchers and graduate students, it gives a complete account of the historical development of the subject, together with current research and future trends, and covers the physics of hot electrons in bulk and low-dimensional device technology. The contributions are from leading scientists in the field and are grouped broadly into five categories: introduction and overview; hot electron-phonon interactions and ultra-fast phenomena in bulk and two-dimensional structures; hot electrons in quantum wires and dots; hot electron tunneling and transport in superlattices; and novel devices based on hot electron transport.

Physics of Semiconductor Devices Sep 01 2022 The new edition of the most detailed and comprehensive single-volume reference on major semiconductor devices The Fourth Edition of *Physics of Semiconductor Devices* remains the standard reference work on the fundamental physics and operational characteristics of all major bipolar, unipolar, special microwave, and optoelectronic devices. This fully updated and expanded edition includes approximately 1,000 references to original research papers and review articles, more than 650 high-quality technical illustrations, and over two dozen tables of material parameters. Divided into five parts, the text first provides a summary of semiconductor properties, covering energy band, carrier concentration, and transport properties. The second part surveys the basic building blocks of semiconductor devices, including p-n junctions, metal-semiconductor contacts, and metal-insulator-semiconductor (MIS) capacitors. Part III examines bipolar transistors, MOSFETs (MOS field-effect transistors), and other field-effect transistors such as JFETs (junction field-effect-transistors) and MESFETs (metal-semiconductor field-effect transistors). Part IV focuses on negative-resistance and power devices. The book concludes with coverage of photonic devices and sensors, including light-emitting diodes (LEDs), solar cells, and various photodetectors and semiconductor sensors. This classic volume, the standard textbook and reference in the field of semiconductor devices: Provides the practical foundation necessary for understanding the devices currently in use and evaluating the performance and limitations of future devices Offers completely updated and revised information that reflects advances in device concepts, performance, and application Features discussions of topics of contemporary interest, such as applications of photonic devices that convert optical energy to electric energy Includes numerous problem sets, real-world examples, tables, figures, and illustrations; several useful appendices; and a detailed solutions manual for Instructor's only Explores new work on leading-edge technologies such as MODFETs, resonant-tunneling diodes, quantum-cascade lasers, single-electron transistors, real-space-transfer devices, and MOS-controlled thyristors *Physics of Semiconductor Devices, Fourth Edition* is an indispensable resource for design engineers, research scientists, industrial and electronics engineering managers, and graduate students in the field.

Semiconductor Physics And Devices Nov 03 2022 Neamen's *Semiconductor Physics and Devices, Third Edition*, deals with the electrical properties and characteristics of semiconductor materials and devices. The goal of this book is to bring together quantum mechanics, the quantum theory of solids, semiconductor material physics, and semiconductor device physics in a clear and understandable way.

Physics and Technology of Semiconductor Devices Jan 25 2022 Provides a comprehensive treatment of semiconductor device physics and technology, with emphasis on modern planar silicon devices. Physical principles are explained by the use of simple physical models and illustrated by experimental measurements.

Physics of Semiconductor Devices Sep 20 2021 This textbook describes the basic physics of semiconductors, including the hierarchy of transport models, and connects the theory with the functioning of actual semiconductor devices. Details are worked out carefully and derived from the basic physical concepts, while keeping the internal coherence of the analysis and explaining the different levels of approximation. Coverage includes the main steps used in the fabrication process of integrated circuits: diffusion, thermal oxidation, epitaxy, and ion implantation. Examples are based on silicon due to its industrial importance. Several chapters are included that provide the reader with the quantum-mechanical concepts necessary for understanding the transport properties of crystals. The behavior of crystals incorporating a position-dependent impurity distribution is described, and the different hierarchical transport models for semiconductor devices are derived (from the Boltzmann transport equation to the hydrodynamic and drift-diffusion models). The transport models are then applied to a detailed description of the main semiconductor-device architectures (bipolar, MOS, CMOS), including a number of solid-state sensors. The final chapters are devoted to the measuring methods for semiconductor-device parameters, and to a brief illustration of the scaling rules and numerical methods applied to the design of semiconductor devices.

Modern Semiconductor Physics and Device Applications Jul 19 2021 This textbook provides a theoretical background for contemporary trends in solid-state theory and semiconductor device physics. It discusses advanced methods of quantum mechanics and field theory and is therefore primarily intended for graduate students in theoretical and experimental physics who have already studied electrodynamics, statistical physics, and quantum mechanics. It also relates solid-state physics fundamentals to semiconductor device applications and includes auxiliary results from mathematics and quantum mechanics, making the book useful also for graduate students in electrical engineering and material science. Key Features: Explores concepts common in textbooks on semiconductors, in addition to topics not included in similar books currently available on the market, such as the topology of Hilbert space in crystals Contains the latest research and developments in the field Written in an accessible yet rigorous manner

Semiconductor Physics and Devices Jul 31 2022 *Semiconductor Physics and Devices* provides an introduction to the physics of semiconductor materials and devices. The text is supported by a large number of examples and exercises to test the understanding of topics.

Semiconductor Physics and Devices Oct 02 2022 Provides a basis for understanding the characteristics, operation, and limitations of semiconductor devices. This title deals with the electrical properties and characteristics of semiconductor materials and devices. It intends to bring together quantum mechanics, the quantum theory of solids, and semiconductor material physics.

SEMICONDUCTOR DEVICES: PHYSICS AND TECHNOLOGY, 2ND ED Sep 08 2020 Market_Desc: · Electrical Engineers· Scientists Special Features: · Provides strong coverage of all key semiconductor devices. Includes basic physics and material properties of key semiconductors· Covers all important processing technologies About The Book: This book is an introduction to the physical principles of modern semiconductor devices and their advanced fabrication technology. It begins with a brief historical review of major devices and key technologies and is then divided into three sections: semiconductor material properties, physics of semiconductor devices and processing technology to fabricate these semiconductor devices.

The Physics of Semiconductor Devices Nov 30 2019 This book disseminates the current knowledge of semiconductor physics and its applications across the scientific community. It is based on a biennial workshop that provides the participating research groups with a stimulating platform for interaction and collaboration with colleagues from the same scientific community. The book discusses the latest developments in the field of III-nitrides; materials & devices, compound semiconductors, VLSI technology, optoelectronics, sensors, photovoltaics, crystal growth, epitaxy and characterization, graphene and other 2D materials and organic semiconductors.

Physics of Submicron Devices Jun 05 2020 A compendium of otherwise scattered information on the physics involved in the construction and operation of semiconductor devices at the submicron level. Addressed to people who make such devices, and assumes a solid understanding of solid state physics and electronics, and at least a familiarity w

Semiconductor Device Physics and Simulation Apr 15 2021 The advent of the microelectronics technology has made ever-increasing numbers of small devices on a same chip. The rapid emergence of ultra-large-scaled-integrated (ULSI) technology has moved device dimension into the sub-quarter-micron regime and put more than 10 million transistors on a single chip. While traditional closed-form analytical models furnish useful intuition into how semiconductor devices behave, they no longer provide consistently accurate results for all modes of operation of these very small devices. The reason is that, in such devices, various physical mechanisms affect the device performance in a complex manner, and the conventional assumptions (i. e. , one-dimensional treatment, low-level injection, quasi-static approximation, etc.) employed in developing analytical models become questionable. Thus, the use of numerical device simulation becomes important in device modeling. Researchers and engineers will rely even more on device simulation for device design and analysis in the future. This book provides comprehensive coverage of device simulation and analysis for various modem semiconductor devices. It will serve as a reference for researchers, engineers, and students who require in-depth, up-to-date information and understanding of semiconductor device physics and characteristics. The materials of the book are limited to conventional and mainstream semiconductor devices; photonic devices such as light emitting and laser diodes are not included, nor does the book cover device modeling, device fabrication, and circuit applications.

PHYSICS OF SEMICONDUCTOR DEVICES, 3RD ED Mar 27 2022 Market_Desc: · Design Engineers· Research Scientists· Industrial and Electronics Engineering Managers· Graduate Students Special Features: · Completely updated with 30-50% revisions· Will include worked examples and end-of-the-chapter problems (with a solutions manual)· First edition was the most cited work in contemporary engineering and applied science publications (over 12000 citations since 1969) About The Book: This classic reference provides detailed information on the underlying physics and operational characteristics of all major bipolar, unipolar, special microwave, and optoelectronic devices. It integrates nearly 1,000 references to important original research papers and review articles, and includes more than 650 high-quality technical illustrations and 25 tables of material parameters for device analysis.

Semiconductor Devices Sep 28 2019 This book is an introduction to the physical principles of modern semiconductor devices and their advanced fabrication technology. It begins with a brief historical review of major devices and key technologies and is then divided into three sections: semiconductor material properties, physics of semiconductor devices and processing technology to fabricate these semiconductor devices.

Semiconductor Physics and Devices Jul 07 2020

Physics of Semiconductor Devices Oct 29 2019 This manual contains the PLOT software, user's guide and program description to accompany Michael Shur's 'Physics of semiconductor devices' - rear cover.

Semiconductor Device Physics and Design Feb 11 2021 Semiconductor Device Physics and Design teaches readers how to approach device design from the point of view of someone who wants to improve devices and can see the opportunity and challenges. It begins with coverage of basic physics concepts, including the physics behind polar heterostructures and strained heterostructures. The book then details the important devices ranging from p-n diodes to bipolar and field effect devices. By relating device design to device performance and then relating device needs to system use the student can see how device design works in the real world.

Physics of Semiconductor Devices Jun 29 2022 Semiconductor physics; Bipolar devices; Unipolar devices; Special microwave devices; Photonic devices; International system of units; Unit prefixes; Greek alphabet; Physical constants; Lattice constants; Properties of important semiconductors; Properties of Ge, Si, and GaAs at 300K; Properties of SiO₂ and Si₃N₄ at 300K.

Physics of Semiconductor Devices Dec 24 2021 The Third Edition of the standard textbook and reference in the field of semiconductor devices This classic book has set the standard for advanced study and reference in the semiconductor device field. Now completely updated and reorganized to reflect the tremendous advances in device concepts and performance, this Third Edition remains the most detailed and exhaustive single source of information on the most important semiconductor devices. It gives readers immediate access to detailed descriptions of the underlying physics and performance characteristics of all major bipolar, field-effect, microwave, photonic, and sensor devices. Designed for graduate textbook adoptions and reference needs, this new edition includes: A complete update of the latest developments New devices such as three-dimensional MOSFETs, MODFETs, resonant-tunneling diodes, semiconductor sensors, quantum-cascade lasers, single-electron transistors, real-space transfer devices, and more Materials completely reorganized Problem sets at the end of each chapter All figures reproduced at the highest quality Physics of Semiconductor Devices, Third Edition offers engineers, research scientists, faculty, and students a practical basis for understanding the most important devices in use today and for evaluating future device performance and limitations. A Solutions Manual is available from the editorial department.

Semiconductor Devices Apr 03 2020 Semiconductor Devices: Physics and Technology, Third Edition is an introduction to the physical principles of modern semiconductor devices and their advanced fabrication technology. It begins with a brief historical review of major devices and key technologies and is then divided into three sections: semiconductor material properties, physics of semiconductor devices and processing technology to fabricate these semiconductor devices.

Semiconductor Physics And Devices Dec 12 2020

Physics of Semiconductor Devices Mar 15 2021 The purpose of this workshop is to spread the vast amount of information available on semiconductor physics to every possible field throughout the scientific community. As a result, the latest findings, research and discoveries can be quickly disseminated. This workshop provides all participating research groups with an excellent platform for interaction and collaboration with other members of their respective scientific community. This workshop's technical sessions include various current and significant topics for applications and scientific developments, including • Optoelectronics • VLSI & ULSI Technology • Photovoltaics • MEMS & Sensors • Device Modeling and Simulation • High Frequency/ Power Devices • Nanotechnology and Emerging Areas • Organic Electronics • Displays and Lighting Many eminent scientists from various national and international organizations are actively participating with their latest research works and also equally supporting this mega event by joining the various organizing committees.

Semiconductor Device Fundamentals Jun 25 2019 Special Features *Computer-based exercises and homework problems -- unique to this text and comprising 25% of the total number of problems -- encourage students to address realistic and challenging problems, experiment with what if scenarios, and easily obtain graphical outputs. Problems are designed to progressively enhance MATLAB-use proficiency, so students need not be familiar with MATLAB at the start of your course. Program scripts that are answers to exercises in the text are available at no charge in electronic form (see Teaching Resources below). *Supplement and Review Mini-Chapters after each of the text's three parts contain an extensive review list of terms, test-like problem sets with answers, and detailed suggestions on supplemental reading to reinforce students' learning and help them prepare for exams. *Read-Only Chapters, strategically placed to provide a change of pace during the course, provide informative, yet enjoyable reading for students. *Measurement Details and Results samples offer students a realistic perspective on the seldom-perfect nature of device characteristics, contrary to the way they are often represented in introductory texts. Content Highlig

Introduction to Semiconductor Physics and Devices Apr 27 2022 This classroom-tested textbook provides a self-contained one-semester course in semiconductor physics and devices that is ideal preparation for students to enter burgeoning quantum industries. Unlike other textbooks on semiconductor device physics, it provides a brief but comprehensive introduction to quantum physics and statistical physics, with derivations and explanations of the key facts that are suitable for second-year undergraduates, rather than simply postulating the main results. The book is structured into three parts, each of which can be covered in around ten lectures. The first part covers fundamental background material such as quantum and statistical physics, and elements of crystallography and band theory of solids. Since this provides a vital foundation for the rest of the text, concepts are explained and derived in more detail than in comparable texts. For example, the concepts of measurement and collapse of the wave function, which are typically omitted, are presented in this text in language accessible to second-year students. The second part covers semiconductors in and out of equilibrium, and gives details which are not commonly presented, such as a derivation of the density of states using dimensional analysis, and calculation of the concentration of ionized impurities from the grand canonical distribution. Special attention is paid to the solution of Poisson's equation, a topic that is feared by many undergraduates but is brought back down to earth by techniques and analogies from first-year physics. Finally, in the third part, the material in parts 2 and 3 is applied to describe simple semiconductor devices, including the MOSFET, the Schottky and PN-junction diodes, and optoelectronic devices. With a wide range of exercises, this textbook is readily adoptable for an undergraduate course on semiconductor physics devices, and with its emphasis on consolidating and applying knowledge of fundamental physics, it will leave students in engineering and the physical sciences well prepared for a future where quantum industries proliferate.

The Physics of Semiconductors Aug 20 2021 Graduate text with comprehensive treatment of semiconductor device physics and engineering, and descriptions of real optoelectronic devices.

Nano-Optoelectronics Mar 03 2020 Traces the quest to use nanostructured media for novel and improved optoelectronic devices. Leading experts - among them Nobel laureate Zhores Alferov - write here about the fundamental concepts behind nano-optoelectronics, the material basis, physical phenomena, device physics and systems.

Introductory Semiconductor Device Physics Nov 22 2021 Introduction to Semiconductor Device Physics is a popular and established text that offers a thorough introduction to the underlying physics of semiconductor devices. It begins with a review of basic solid state physics, then goes on to describe the properties of semiconductors including energy bands, the concept of effective mass, carrier concentration, and conduction in more detail. Thereafter the book is concerned with the principles of operation of specific devices, beginning with the Gunn Diode and the p-n junction. The remaining chapters cover the on specific devices, including the

LED, the bipolar transistor, the field-effect transistor, and the semiconductor laser. The book concludes with a chapter providing a brief introduction to quantum theory. Not overtly mathematical, *Introduction to Semiconductor Device Physics* introduces only those physical concepts required for an understanding of the semiconductor devices being considered. The author's intuitive style, coupled with an extensive set of worked problems, make this the ideal introductory text for those concerned with understanding electrical and electronic engineering, applied physics, and related subjects.

Physics and Technology of Heterojunction Devices Jan 31 2020 The demand for liquid crystals with better display parameters and lower power consumption has stimulated much research into their properties and characterization. A large team of over 50 leading researchers from the USA, Europe and Japan have focused their expertise to extract and review data on a wide range of properties of nematics, including those which are essential to the development of all types of liquid crystal device. Where appropriate these properties are also explained with expert commentary. The book is fully illustrated and structured for reference.

Emerging Trends in Terahertz Solid-State Physics and Devices May 05 2020 This book highlights recent advances and applications in terahertz (THz) technology, addressing advanced topics such as THz biomedical imaging, pattern recognition and tomographic reconstruction for THz biomedical imaging by machine learning and artificial intelligence, THz imaging radars for autonomous vehicle applications, and THz imaging systems for security and surveillance. It also discusses theoretical, experimental, established and validated empirical work on these topics.

Handbook of Nitride Semiconductors and Devices, Materials Properties, Physics and Growth Aug 27 2019 The three volumes of this handbook treat the fundamentals, technology and nanotechnology of nitride semiconductors with an extraordinary clarity and depth. They present all the necessary basics of semiconductor and device physics and engineering together with an extensive reference section. Volume 1 deals with the properties and growth of GaN. The deposition methods considered are: hydride VPE, organometallic CVD, MBE, and liquid/high pressure growth. Additionally, extended defects and their electrical nature, point defects, and doping are reviewed.

Compound Semiconductors Oct 10 2020 This book provides an overview of compound semiconductor materials and their technology. After presenting a theoretical background, it describes the relevant material preparation technologies for bulk and thin-layer epitaxial growth. It then briefly discusses the electrical, optical, and structural properties of semiconductors, complemented by a description of the most popular characterization tools, before more complex hetero- and low-dimensional structures are discussed. A special chapter is devoted to GaN and related materials, owing to their huge importance in modern optoelectronic and electronic devices, on the one hand, and their particular properties compared to other compound semiconductors, on the other. In the last part of the book, the physics and functionality of optoelectronic and electronic device structures (LEDs, laser diodes, solar cells, field-effect and heterojunction bipolar transistors) are discussed on the basis of the specific properties of compound semiconductors presented in the preceding chapters of the book. Compound semiconductors form the back-bone of all opto-electronic and electronic devices besides the classical Si electronics. Currently the most important field is solid state lighting with highly efficient LEDs emitting visible light. Also laser diodes of all wavelength ranges between mid-infrared and near ultraviolet have been the enabler for a huge number of unprecedented applications like CDs and DVDs for entertainment and data storage, not to speak about the internet, which would be impossible without optical data communications with infrared laser diodes as key elements. This book provides a concise overview over this class of materials, including the most important technological aspects for their fabrication and characterisation, also covering the most relevant devices based on compound semiconductors. It presents therefore an excellent introduction into this subject not only for students, but also for engineers and scientist who intend to put their focus on this field of science.

Fundamentals of Semiconductor Physics and Devices Nov 10 2020 This book is an introduction to the principles of semiconductor physics, linking its scientific aspects with practical applications. It is addressed to both readers who wish to learn semiconductor physics and those seeking to understand semiconductor devices. It is particularly well suited for those who want to do both.

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