

## Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

Solid-State Devices and Applications is an introduction to the solid-state theory and its devices and applications. The book also presents a summary of all major solid-state devices available, their theory, manufacture, and main applications. The text is divided into three sections. The first part deals with the semiconductor theory and discusses the fundamentals of semiconductors; the kinds of diodes and techniques in their manufacture; the types and modes of operation of bipolar transistors; and the basic principles of unipolar transistors and their difference with bipolar transistors. The second part talks about the kinds of integrated circuits and their future developments; amplifiers, including their fundamentals and different types; and the principles and categories of oscillators. The third part discusses the applications of solid-state devices; transistor parameters and equivalent circuits; and the fundamentals and applications of Boolean-algebra. The book is a good read for technicians and students who are about to enter or are currently in their final stages of their course, as well as those who have recently finished and would like to have their knowledge refreshed.

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

The aim of this book is to provide an overview of the various types of power semiconductor devices, to give an insight into how they function, and to explain and analyze the characteristics of the various components. All the important classes of power semiconductors are covered. Of particular interest, the author takes into account the role of plasma formation in the operation of highpower semiconductor devices.

Semiconductors have made an enormous impact on 20th century science and technology. This is because components made from semiconductors have very favorable properties such as low energy consumption, compactness, and high reliability, and so they now dominate electronics and radio engineering. Semiconductors are indispensable for space exploration and where the requirements of small size, low weight and low energy consumption are especially stringent. The book uses quantum-mechanical concepts and band theory to present the theory of semiconductors in a comprehensible form. It also describes how basic semiconductor devices (e.g. diodes, transistors, and lasers) operate. The book was written for senior high-school students interested in physics.

Excellent bridge between general solid-state physics textbook and research articles packed with providing detailed explanations of the electronic, vibrational, transport, and optical properties of

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

semiconductors "The most striking feature of the book is its modern outlook ... provides a wonderful foundation. The most wonderful feature is its efficient style of exposition ... an excellent book." Physics Today "Presents the theoretical derivations carefully and in detail and gives thorough discussions of the experimental results it presents. This makes it an excellent textbook both for learners and for more experienced researchers wishing to check facts. I have enjoyed reading it and strongly recommend it as a text for anyone working with semiconductors ... I know of no better text ... I am sure most semiconductor physicists will find this book useful and I recommend it to them." Contemporary Physics Offers much new material: an extensive appendix about the important and by now well-established, deep center known as the DX center, additional problems and the solutions to over fifty of the problems at the end of the various chapters.

Principles, Theory and Nanoscale

Semiconductor Basics

Principles of Semiconductor Devices

Semiconductor Optics and Transport Phenomena

Introductory Semiconductor Device Physics

*This book covers the physics of semiconductors on an introductory level, assuming that the reader already has some knowledge of condensed matter*

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*physics. Crystal structure, band structure, carrier transport, phonons, scattering processes and optical properties are presented for typical semiconductors such as silicon, but III-V and II-VI compounds are also included. In view of the increasing importance of wide-gap semiconductors, the electronic and optical properties of these materials are dealt with too. Fundamentals of III-V Semiconductor MOSFETs presents the fundamentals and current status of research of compound semiconductor metal-oxide-semiconductor field-effect transistors (MOSFETs) that are envisioned as a future replacement of silicon in digital circuits. The material covered begins with a review of specific properties of III-V semiconductors and available technologies making them attractive to MOSFET technology, such as band-engineered heterostructures, effect of strain, nanoscale control during epitaxial growth. Due to the lack of thermodynamically stable native oxides on III-V's (such as SiO<sub>2</sub> on Si), high-k oxides are the natural choice of dielectrics for III-V MOSFETs. The key challenge of the III-V MOSFET technology is a high-quality, thermodynamically stable gate dielectric that passivates the interface states, similar to SiO<sub>2</sub> on Si. Several chapters give a detailed description of materials science and electronic behavior of various dielectrics and related interfaces, as well as physics of fabricated devices and MOSFET fabrication technologies. Topics also include recent*

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*progress and understanding of various materials systems; specific issues for electrical measurement of gate stacks and FETs with low and wide bandgap channels and high interface trap density; possible paths of integration of different semiconductor materials on Si platform.*

*This Solution Manual, a companion volume of the book, Fundamentals of Solid-State Electronics, provides the solutions to selected problems listed in the book. Most of the solutions are for the selected problems that had been assigned to the engineering undergraduate students who were taking an introductory device core course using this book. This Solution Manual also contains an extensive appendix which illustrates the application of the fundamentals to solutions of state-of-the-art transistor reliability problems which have been taught to advanced undergraduate and graduate students. This book is also available as a set with Fundamentals of Solid-State Electronics and Fundamentals of Solid-State Electronics — Study Guide.*

*"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*

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*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"--*

*Fundamentals of Semiconductor Devices*

*Semiconductor Device Fundamentals*

*Quantum Theory of the Optical and Electronic Properties of Semiconductors*

*Modern Semiconductor Physics and Device Applications*

*Fundamentals of Semiconductor Theory and Device Physics*

Well-balanced and up-to-date introduction to the field of semiconductor optics, including transport phenomena in semiconductors. Starting with the theoretical fundamentals of this field the book develops, assuming a basic knowledge of solid-state physics. The application areas of the theory covered include semiconductor lasers, detectors, electro-optic modulators, single-electron transistors, microcavities and double-barrier resonant tunneling diodes. One hundred problems with hints for solution help the readers to deepen their knowledge.

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

'Fundamentals of Semiconductor Devices' is a comprehensively written text which deals with both qualitative and quantitative analysis of semiconductor theory & devices. This book is perfect for the first course on 'Semiconductor Physics and Devices' at th.

Provides a multidisciplinary introduction to quantum mechanics, solid state physics, advanced devices, and fabrication Covers wide range of topics in the same style and in the same notation Most up to date developments in semiconductor physics and nano-engineering Mathematical derivations are carried through in detail with emphasis on clarity Timely application areas such as biophotonics , bioelectronics

Developed from the authors' classroom-tested material, Semiconductor Laser Theory takes a semiclassical approach to teaching the principles, structure, and applications of semiconductor lasers. Designed for graduate students in physics, electrical engineering, and materials science, the text covers many recent developments, including diode lasers u

Fundamentals of Solid-State Electronics

Semiconductor-Laser Fundamentals

Fundamentals of Semiconductor Physics

Solution Manual

Semiconductor Devices

***Special Features \*Computer-based exercises and homework problems -- unique***

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*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*

*This text brings together traditional solid-state approaches from the 20th century with developments of the early part of the 21st century, to reach an understanding of semiconductor physics in its multifaceted forms. It reveals how an understanding of what happens within the material can lead to insights into*

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*what happens in its use.*

*This in-depth title discusses the underlying physics and operational principles of semiconductor lasers. It analyzes the optical and electronic properties of the semiconductor medium in detail, including quantum confinement and gain-engineering effects. The text also includes recent developments in blue-emitting semiconductor lasers.*

*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*

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*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.*

*Solid–State Devices and Applications  
Theory and Application  
Basic Principles*

### *Semiconductor Laser Theory*

*Bridging the gap between a general solid–state physics textbook and research articles, the renowned authors provide detailed explanations of the electronic, vibrational, transport, and optical properties of semiconductors. Their approach is a physical and intuitive one, rather than formal and pedantic. This textbook has been written with both students and researchers in mind, and the authors therefore present theories to explain experimental results. Throughout, the emphasis is on understanding the physical properties of Si, and similar tetrahedrally coordinated semiconductors, with explanations based on*

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*physical insights. Each chapter is enriched by an extensive collection of tables of material parameters, figures and problems -- many of the latter 'lead students by the hand' to arrive at the results.*

*"This dynamic text applies physics concepts and equations to practical, real-world applications of semiconductor device theory"-- This book presents those terms, concepts, equations, and models that are routinely used in describing the operational behavior of solid state devices. The second edition provides many new problems and illustrative examples.*

*Electrical Engineering Advanced Theory of Semiconductor Devices Semiconductor devices are ubiquitous in today's world and are found increasingly in cars, kitchens and electronic door locks, attesting to their presence in our daily lives. This comprehensive book provides the fundamentals of semiconductor device theory from basic quantum physics to computer-aided design. Advanced Theory of Semiconductor Devices will improve your understanding of computer simulation of devices through a thorough discussion of basic equations, their validity, and numerical solutions as they are contained in current simulation tools. You will gain state-of-the-art knowledge of devices used in both III-V compounds and silicon technology. Specially featured are novel approaches and explanations of electronic transport, particularly in p-n junction diodes. Close attention is*

# Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

*also given to innovative treatments of quantum-well laser diodes and hot electron effects in silicon technology. This in-depth book is written for engineers, graduate students, and research scientists in solid-state electronics who want to gain a better understanding of the principles underlying semiconductor devices.*

**INTRODUCTION TO SEMICONDUCTOR MATERIALS AND DEVICES**

*Fundamentals of Semiconductor Physics and Devices*

*Power Semiconductors*

*Strain Effect in Semiconductors*

*Third Edition*

This textbook presents the basic elements needed to understand and engage in research in semiconductor physics. It deals with elementary excitations in bulk and low-dimensional semiconductors, including quantum wells, quantum wires and quantum dots. The basic principles underlying optical nonlinearities are developed, including excitonic and many-body plasma effects. The fundamentals of optical bistability, semiconductor lasers, femtosecond excitation, optical Stark effect, semiconductor photon echo, magneto-optic effects, as well as bulk and quantum-confined Franz-Keldysh effects are covered. The material is presented in sufficient detail for graduate students and researchers who have a general background in quantum mechanics. Request Inspection Copy

Across 15 chapters, Semiconductor Devices covers the theory and application of discrete semiconductor devices including various types of diodes, bipolar junction transistors, JFETs, MOSFETs and IGBTs. Applications include rectifying, clipping, clamping, switching, small signal

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

amplifiers and followers, and class A, B and D power amplifiers. Focusing on practical aspects of analysis and design, interpretations of device data sheets are integrated throughout the chapters. Computer simulations of circuit responses are included as well. Each chapter features a set of learning objectives, numerous sample problems, and a variety of exercises designed to hone and test circuit design and analysis skills. A companion laboratory manual is available. This is the print version of the on-line OER.

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. Intended as a teaching vehicle, the book is written in an expository manner aimed at conveying a deep and coherent understanding of the field. It provides clear and complete derivations of the basic concepts of modern semiconductor physics. The mathematical arguments and physical interpretations are well balanced: they are presented in a measure designed to ensure the integrity of the delivery of the subject matter in a fully comprehensible form. Experimental procedures and measured data are included as well. The reader is generally not expected to have background in quantum mechanics and solid state physics beyond the most elementary level.

Nonetheless, the presentation of this book is planned to bring the student to the point of research/design capability as a scientist or engineer. Moreover, it is sufficiently well endowed with detailed knowledge of the field, including recent developments bearing on submicron semiconductor structures, that the book also constitutes a valuable reference resource. In Chapter 1,

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

basic features of the atomic structures, chemical nature and the macroscopic properties of semiconductors are discussed. The band structure of ideal semiconductor crystals is treated in Chapter 2, together with the underlying one-electron picture and other fundamental concepts. Chapter 2 also provides the requisite background of the tight binding method and the k.p-method, which are later used extensively. The electron states of shallow and deep centers, clean semiconductor surfaces, quantum wells and superlattices, as well as the effects of external electric and magnetic fields, are treated in Chapter 3. The one- or multi-band effective mass theory is used wherever this method is applicable. A summary of group theory for application in semiconductor physics is given in an Appendix. Chapter 4 deals with the statistical distribution of charge carriers over the band and localized states in thermodynamic equilibrium. Non-equilibrium processes in semiconductors are treated in Chapter 5. The physics of semiconductor junctions (pn-, hetero-, metal-, and insulator-) is developed in Chapter 6 under conditions of thermodynamic equilibrium, and in Chapter 7 under non-equilibrium conditions. On this basis, the most important electronic and opto-electronic semiconductor devices are treated, among them uni- and bi-polar transistors, photodetectors, solar cells, and injection lasers. A summary of group theory for applications in semiconductors is given in an Appendix. Contents: Characterization of Semiconductors Electronic Structure of Ideal Crystals Electronic Structure of Semiconductor Crystals with Perturbations Electron System in Thermodynamic Equilibrium Non-Equilibrium Processes in Semiconductors Semiconductor Junctions in Thermodynamic Equilibrium Semiconductor Junctions Under Non-Equilibrium Conditions Readership: Undergraduates, graduates and researchers in the

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

fields of physics and engineering. keywords: Semiconductors; Transistor; Devices; Heterojunctions; Microstructures; Band-Structure; Luttinger-Kohn-Model; Kane-Model; Deep-Levels; Transport; Semiconductor Physics; Fundamental Physical Phenomena; General Background; Characterization of Semiconductor; Electronic Structure of Semiconductors; Semiconductor Junctions the Thermodynamic Equilibrium; Semiconductor Junctions Under Non-Equilibrium Conductions; “ ... The reader who has only a first acquaintance with semiconductor physics will find that this book has fully detailed explanations of the fundamental physical phenomena, providing a good general background ... A brilliant discussion of artificial atomic superstructures of nanometer length scale establishes a link to the most active field of semiconductor physics ... In my opinion the book of R Enderlein and N J M Horing Fundamentals of Semiconductor Physics and Devices is a valuable contribution to the modern didactic literature on the physics of semiconductors. Moreover, it is of considerable value as a reference for specialists as well. ” J T Devreese Professor at the Physics Department University of Antwerpen, Belgium “ In Fundamentals of Semiconductor Physics and Devices, R Enderlein and N J M Horing have provided a very extensive and detailed text on the physics underlying semiconductor devices. More so than any other current text, this book provides a greatly expanded discussion of modern tight-binding methods, helping the students to understand these aspects of electronic structure in clear, simple terms. In connection with this the authors offer a very detailed discussion of deep levels in semiconductors, which are so important to semiconducting properties. Also, in the discussion of transport properties, the book goes into much greater depth about nonlinear and nonequilibrium

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

processes than is usual. It is quite a unique contribution, containing the basic physics which tends to be missing from device-oriented books, but going much further into the essentials needed for device development than any solid-state-physics text. ” Walter A Harrison Professor of Applied Physics Stanford University, USA

Strain Effect in Semiconductors: Theory and Device Applications presents the fundamentals and applications of strain in semiconductors and semiconductor devices that is relevant for strain-enhanced advanced CMOS technology and strain-based piezoresistive MEMS transducers.

Discusses relevant applications of strain while also focusing on the fundamental physics pertaining to bulk, planar, and scaled nano-devices. Hence, this book is relevant for current strained Si logic technology as well as for understanding the physics and scaling for future strained nano-scale devices.

Physics and Materials Properties

Fundamentals of Semiconductor Manufacturing and Process Control

Semiconductor Physics and Devices

Communications-electronics Fundamentals, Semiconductor Theory and Circuits

Fundamentals of Solid State Engineering

Market\_Desc: · Graduate and Advanced Undergraduate Students of Electrical Engineering  
About The Book: This comprehensive introduction to the elementary theory and properties of semiconductors describes the basic physics of semiconductor materials and technologies for fabrication of semiconductor

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

devices. Addresses approaches to modeling and provides details of measurement techniques. It also includes numerous illustrative examples and graded problems.

This text aims to provide the fundamentals necessary to understand semiconductor device characteristics, operations and limitations. Quantum mechanics and quantum theory are explored, and this background helps give students a deeper understanding of the essentials of physics, semiconductor material physics and semiconductor device physics and how they interrelate. Throughout the text new computer-driven problems and examples have been added using numerical techniques, MATLAB, Mathcad and PSpice, and the whole edition emphasizes the value of the computer as a tool in design and problem solving.

A practical guide to semiconductor manufacturing from process control to yield modeling and experimental design Fundamentals of Semiconductor Manufacturing and Process Control covers all issues involved in manufacturing microelectronic devices and circuits, including fabrication sequences, process control, experimental design, process modeling, yield modeling, and CIM/CAM systems. Readers are introduced to both the theory and practice of all basic manufacturing concepts. Following an overview of manufacturing and

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

technology, the text explores process monitoring methods, including those that focus on product wafers and those that focus on the equipment used to produce wafers. Next, the text sets forth some fundamentals of statistics and yield modeling, which set the foundation for a detailed discussion of how statistical process control is used to analyze quality and improve yields. The discussion of statistical experimental design offers readers a powerful approach for systematically varying controllable process conditions and determining their impact on output parameters that measure quality. The authors introduce process modeling concepts, including several advanced process control topics such as run-by-run, supervisory control, and process and equipment diagnosis. Critical coverage includes the following:

- \* Combines process control and semiconductor manufacturing
- \* Unique treatment of system and software technology and management of overall manufacturing systems
- \* Chapters include case studies, sample problems, and suggested exercises
- \* Instructor support includes electronic copies of the figures and an instructor's manual

Graduate-level students and industrial practitioners will benefit from the detailed examination of how electronic materials and supplies are converted into finished integrated circuits and electronic products in a high-volume manufacturing environment. An Instructor's Manual presenting detailed solutions to all the problems in the book

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

available from the Wiley editorialdepartment. An Instructor Support FTP site is also available.

Fundamentals of Semiconductor Physics and DevicesWorld Scientific

Advanced Theory of Semiconductor Devices

Introduction to Semiconductor Physics

Physics of Semiconductor Devices

A Qualitative, Non-mathematical Explanation of How Semiconductors Work and How They are Used

Fundamentals of Semiconductor Fabrication

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. Offers a basic, up-to-date introduction to semiconductor fabrication technology, including both the theoretical and practical aspects of all major steps in the fabrication sequence Presents comprehensive coverage of process sequences Introduces readers to modern simulation tools Addresses the practical aspects of integrated circuit fabrication Clearly explains basic processing theory An accessible guide to how semiconductor electronics work and how they are manufactured, for professionals and interested readers with

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

no electronics engineering background Semiconductor Basics is an accessible guide to how semiconductors work. It is written for readers without an electronic engineering background. Semiconductors are the basis for almost all modern electronic devices. The author—an expert on the topic—explores the fundamental concepts of what a semiconductor is, the different types in use, and how they are different from conductors and insulators. The book has a large number of helpful and illustrative drawings, photos, and figures. The author uses only simple arithmetic to help understand the device operation and applications. The book reviews the key devices that can be constructed using semiconductor materials such as diodes and transistors and all the large electronic systems based on these two component such as computers, memories, LCDs and related technology like Lasers LEDs and infrared detectors. The text also explores integrated circuits and explains how they are fabricated. The author concludes with some projections about what can be expected in the future. This important book: Offers an accessible guide to semiconductors using qualitative explanations and analogies, with minimal mathematics and equations Presents the material in a well-

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

structured and logical format Explores topics from device physics fundamentals to transistor formation and fabrication and the operation of the circuits to build electronic devices and systems Includes information on practical applications of p-n junctions, transistors, and integrated circuits to link theory and practice Written for anyone interested in the technology, working in semiconductor labs or in the semiconductor industry, Semiconductor Basics offers clear explanations about how semiconductors work and its manufacturing process.

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

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

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.

Theory and Device Applications

Physics of the Gain Materials

Semiconductor Physics

Fundamentals of Semiconductor

Semiconductor Fundamentals

This text aims to provide the fundamentals necessary to understand semiconductor device characteristics, operations and limitations. Quantum mechanics and quantum theory are explored, and this background helps give students a deeper understanding of the essentials of physics and semiconductors.

This book is an introduction to the principles of semiconductor physics,

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

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. Intended as a teaching vehicle, the book is written in an expository manner aimed at conveying a deep and coherent understanding of the field. It provides clear and complete derivations of the basic concepts of modern semiconductor physics. The mathematical arguments and physical interpretations are well balanced: they are presented in a measure designed to ensure the integrity of the delivery of the subject matter in a fully comprehensible form. Experimental procedures and measured data are included as well. The reader is generally not expected to have background in quantum mechanics and solid state physics beyond the most elementary level. Nonetheless, the presentation of this book is planned to bring the student to the point of research/design capability as a scientist or engineer. Moreover, it is sufficiently well endowed with detailed knowledge of the field, including recent developments bearing on submicron semiconductor structures, that the book also constitutes a valuable reference resource. In Chapter 1, basic features of the atomic structures, chemical nature and the macroscopic properties of semiconductors are discussed. The band structure of ideal semiconductor

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

crystals is treated in Chapter 2, together with the underlying one-electron picture and other fundamental concepts. Chapter 2 also provides the requisite background of the tight binding method and the k.p-method, which are later used extensively. The electron states of shallow and deep centers, clean semiconductor surfaces, quantum wells and superlattices, as well as the effects of external electric and magnetic fields, are treated in Chapter 3. The one- or multi-band effective mass theory is used wherever this method is applicable. A summary of group theory for application in semiconductor physics is given in an Appendix. Chapter 4 deals with the statistical distribution of charge carriers over the band and localized states in thermodynamic equilibrium. Non-equilibrium processes in semiconductors are treated in Chapter 5. The physics of semiconductor junctions (pn-, hetero-, metal-, and insulator-) is developed in Chapter 6 under conditions of thermodynamic equilibrium, and in Chapter 7 under non-equilibrium conditions. On this basis, the most important electronic and opto-electronic semiconductor devices are treated, among them uni- and bi-polar transistors, photodetectors, solar cells, and injection lasers. A summary of group theory for applications in semiconductors is given in an Appendix. This book is an introduction to the principles of semiconductor physics, linking its scientific aspects with practical applications. It is addressed to

## Bookmark File PDF Fundamentals Of Semiconductor Theory And Device Physics Prentice Hall Series In Electrical And Computer Engineering

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.

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

Fundamentals of III-V Semiconductor MOSFETs

Fundamentals of Semiconductors