

## Fundamentals Of Solid State Engineering 3rd Edition

*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.*

*A modern and thorough treatment of the field for upper-level undergraduate and graduate courses in materials science and chemistry.*

*Solid state composites and hybrid systems offer multifunctional applications in various fields of human life, demonstrating solutions to the key problems of the environment, human health, biology, medicine, electronics, energy harvesting and storage. Exploring this innovative field of research, this book details the wide range of materials, techniques, and approaches utilised in composite and hybrid structures in recent years. It will be of interest not only for experienced researchers but also for postgraduate students and young researchers entering the fields of nanoscience, material sciences, and bioengineering. Features: Contains the latest research developments in the materials, techniques, patents, and approaches in the field Includes both fundamental aspects and applied research Edited by two highly experienced researchers*

*The most current guide to solid state polymerization Solid State Polymerization (SSP)is an indispensable tool in the design, manufacture, and study of polymers, plastics, and fibers. SSP presents significant advantages over other polymerization techniques due to low operating temperatures, inexpensive equipment, and simple and environmentally sound procedures. Combining fundamentals of polymer science, chemistry, physical chemistry, and engineering, SSP also offers many research applications for a wide range of students and investigators. Gathering and filtering the latest literature on SSP, Solid Solid State Polymerization offers a unique, one-stop resource on this important process.*

*With chapters contributed by leaders in the field, this text summarizes SSP, and provides essential coverage that includes: An introduction to SSP, with chemical and physical steps, apparatus, advantages, and parameters SSP physical chemistry and mechanisms Kinetic aspects of polyesters and polyamides SSP Catalysis in SSP processes*

*Application of SSP under high pressure conditions in the laboratory Engineering aspects regarding process modeling and industrial application Recent developments and future possibilities Solid State Polymerization provides the most up-to-date coverage of this constantly developing field to academic and industry professionals, as well as graduate and postgraduate-level students in chemical engineering, materials science and engineering, polymer chemistry, polymer processing and polymer engineering.*

*Fundamentals of Shock Wave Propagation in Solids*

*Materials in Mechanical Extremes*

*Solid State Electronic Devices*

*Fundamentals of Materials Science*

*Relativistic Electronic Structure Theory*

Updated and improved, this revised edition of Michel Barsoum's classic text Fundamentals of Ceramics presents readers with an exceptionally clear and comprehensive introduction to ceramic science. Barsoum offers introductory coverage of ceramics, their structures, and properties, with a distinct emphasis on solid state physics and chemistry. Key equations are derived from first principles to the concepts involved. The book divides naturally into two parts. Chapters 1 to 9 consider bonding in ceramics and their resultant physical structures, and the electrical, thermal, and other properties that are dependent on bonding type. The second part (Chapters 11 to 16) deals with those factors that are determined by microstructure, such as fracture and fatigue, and thermal, dielectric, magnetic, and piezoelectric properties. The final two sections is Chapter 10, which describes sintering, grain growth, and the development of microstructure. Fundamentals of Ceramics is ideally suited to senior undergraduate and graduate students of materials science and engineering and related subjects.

This book is designed to help readers gain a basic understanding of semiconductor devices and the physical operating principles behind them. This two-fold approach 1) provides the user with a sound understanding of existing devices, and 2) helps them develop the basic tools with which they can later learn about applications and the latest devices. The piece provides one of the most comprehensive treatments of semiconductor devices, and reflects the most current trends in the technology and theoretical understanding of the devices. FEATURES/BENEFITS \*NEW--Thoroughly updated to reflect the most current trends in the technology and theoretical understanding of devices. \*NEW--Expanded description of silicon Czochralski growth, wafer production, and vapor phase epitaxy (Ch. 1). \*NEW--Clearer discussion of energy band formation and hole transport (Chs. 2, 3 and 4). \*NEW--Consolidated coverage of p-n junction diodes and its applications (Ch. 5). \*NEW--Greatly expanded/updated discussion of device fabrication processes (Ch. 5 and appendices). \*NEW--Earlier discussion of MOS devices (Ch. complementary MOS field effect transistors (MOSFETs) in integrated circuits today. \*NEW--Major revision of Transistors (Ch. 6)--Both in the underlying theory as well as discussion of a variety of short channel, high field and hot carrier effects in scaled, ultra-small MOSFETs. Includes extensive discussions of the current-voltage and capacitance-voltage characteristics of these devices--and the information that can be gleaned from such measurements. \*NEW--Updated chapter on Bipolar Junction Transistors (BJTs) and current technology. Describes higher-order effects (including the Kirk effect and Webster effect); discusses the Gummel-Poon model (which is more elaborate and physically more accurate than the Ebers-Moll model); and updates the fabrication aspects of BJTs. \*NEW--Consolidated coverage of optoelectronic devices in a single chapter (Ch. 8)--Brings the discussion of semiconductor lasers into one chapter. \*NEW--Reflects the growing importance of optoelectronics. \*NEW--Updated coverage of integrated circuits (Ch. concerted shift to CMOS applications, such as logic and memory integrated circuits. \*NEW--A section on the insulated gate bipolar transistor (Ch. 11)--A device that is gradually supplanting the semiconductor-controlled rectifier. \*NEW--Real data--Wherever feasible, replaces idealized voltage plots with real data.

This book presents the underlying functional formalism routinely used in describing the operational behavior of solid state devices.

Engineering Solid Mechanics bridges the gap between elementary approaches to strength of materials and more advanced, specialized versions on the subject. The book provides a basic understanding of the fundamentals of elasticity and plasticity, applies these fundamentals to solve analytically a spectrum of engineering problems, and introduces advanced topics of mechanics of materials - including viscoplasticity, fiber reinforced composites, powder compacts, and porous solids. Text includes: stress and strain, equilibrium, and compatibility elastic stress-strain relations the elastic problem and the stress function approach to solving plane elastic problems applications of the stress function solution in Cartesian and polar coordinates Problems of elastic rods, plates, and shells through formulations as well as applying energy methods Elastic and elastic-plastic fracture mechanics Plastic and creep deformation Inelastic deformation and its applications This book presents the material in an instructive manner, suitable for individual self-study. It emphasizes analytical treatment of the subject, which is essential for handling modern numerical methods as well as assessing and creating software. The book includes generous explanations, systematic derivations, and detailed discussions, supplemented by a vast variety of problems and solved examples. Primarily written for professionals and students in mechanical engineering, Engineering Solid Mechanics also serves persons in other fields of engineering, such as aerospace, civil, and material engineering.

Principles and Methods

Fundamentals of Semiconductor Physics and Devices

Fundamentals of Design and Operation

Fundamentals Of Solid State Engineering, 2E

LEDs, OLEDs, and Their Applications in Illumination and Displays

*Compared to traditional electrical filaments, arc lamps, and fluorescent lamps, solid-state lighting offers higher efficiency, reliability, and environmentally friendly technology. LED / solid-state lighting is poised to take over conventional lighting due to cost savings—there is pretty much no debate about this. In response to the recent activity in this field, Fundamentals of Solid-State Lighting: LEDs, OLEDs, and Their Applications in Illumination and Displays covers a range of solid-state devices, technologies, and materials used for lighting and displays. It also examines auxiliary but critical requirements of efficient applications, such as modeling, thermal management, reliability, and smart lighting. The book discusses performance metrics of LEDs such as efficiency, efficacy, current–voltage characteristics, optical parameters like spectral distribution, color temperature, and beam angle before moving on to luminescence theory, injection luminescence, radiative and non-radiative recombination mechanisms, recombination rates, carrier lifetimes, and related topics. This lays down the groundwork for understanding LED operation. The book then discusses energy gaps, light emission, semiconductor material, special equipment, and laboratory facilities. It also covers production and applications of high-brightness LEDs (HBLEDs) and organic LEDs (OLEDs). LEDs represent the landmark development in lighting since the invention of electric lighting, allowing us to create unique, low-energy lighting solutions, not to talk about their minor maintenance expenses. The rapid strides of LED lighting technology over the last few years have changed the dynamics of the global lighting market, and LEDs are expected to be the mainstream light source in the near future. In a nutshell, the book traces the advances in LEDs, OLEDs, and their applications, and presents an up-to-date and analytical perspective of the scenario for audiences of different backgrounds and interests.*

*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 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.*

*This book describes the central aspects of diffusion in solids, and goes on to provide easy access to important information about diffusion in metals, alloys, semiconductors, ion-conducting materials, glasses and nanomaterials. Coverage includes diffusion-controlled phenomena including ionic conduction, grain-boundary and dislocation pipe diffusion. This book will benefit graduate students in such disciplines as solid-state physics, physical metallurgy, materials science, and geophysics, as well as scientists in academic and industrial research laboratories.*

*Introduction to Solid-State Theory is a textbook for graduate students of physics and materials science. It also provides the theoretical background needed by physicists doing research in pure solid-state physics and its applications to electrical engineering. The fundamentals of solid-state theory are based on a description by delocalized and localized states and - within the concept of delocalized states - by elementary excitations. The development of solid-state theory within the last ten years has shown that by a systematic introduction of these concepts, large parts of the theory can be described in a unified way. This form of description gives a "pictorial" formulation of many elementary processes in solids, which facilitates their understanding.*

*The Microstructure–Property Relationship Using Metals as Model Systems*

*Fundamentals of Ceramics*

*FUNDAMENTALS OF SOLID STATE ENGINEERING*

*Physics of Semiconductor Devices*

*Solid State Fundamentals for Electricians*

Written in lucid language, the book offers a detailed treatment of fundamental concepts of chemistry and its engineering applications.

This textbook offers a strong introduction to the fundamental concepts of materials science. It conveys the quintessence of this interdisciplinary field, distinguishing it from merely solid-state physics and solid-state chemistry, using metals as model systems to elucidate the relation between microstructure and materials properties. Mittemeijer's Fundamentals of Materials Science provides a consistent treatment of the subject matter with a special focus on the microstructure-property relationship. Richly illustrated and thoroughly referenced, it is the ideal adoption for an entire undergraduate, and even graduate, course of study in materials science and engineering. It delivers a solid background against which more specialized texts can be studied, covering the necessary breadth of key topics such as crystallography, structure defects, phase equilibria and transformations, diffusion and kinetics, and mechanical properties. The success of the first edition has led to this updated and extended second edition, featuring detailed discussion of electron microscopy, supermicroscopy and diffraction methods, an extended treatment of diffusion in solids, and a separate chapter on phase transformation kinetics. "In a lucid and masterly manner, the ways in which the microstructure can affect a host of basic phenomena in metals are described.... By consistently staying with the postulated topic of the microstructure - property relationship, this book occupies a singular position within the broad spectrum of comparable materials science literature .... it will also be of permanent value as a reference book for background refreshing, not least because of its unique annotated intermezzi; an ambitious, remarkable work." G. Petzow in International Journal of Materials Research. "The biggest strength of the book is the discussion of the structure-property relationships, which the author has accomplished admirably.... In a nutshell, the book should not be looked at as a quick 'cook book' type text, but as a serious, critical treatise for some significant time to come." G.S. Upadhyaya in Science of Sintering. "The role of lattice defects in deformation processes is clearly illustrated using excellent diagrams . Included are many footnotes, 'Intermezzos', 'Epilogues' and asides within the text from the author's experience. This ..... soon becomes valued for the interesting insights into the subject and shows the human side of its history. Overall this book provides a refreshing treatment of this important subject and should prove a useful addition to the existing text books available to undergraduate and graduate students and researchers in the field of materials science." M. Davies in Materials World.

Fundamentals of Solid State Engineering, 2nd Edition, provides a multi-disciplinary introduction to Solid State Engineering, combining concepts from physics, chemistry, electrical engineering, materials science and mechanical engineering. Basic physics concepts are introduced, followed by a thorough treatment of the technology for solid state engineering. Topics include compound semiconductor bulk and epitaxial thin films growth techniques, current semiconductor device processing and nano-fabrication technologies. Examples of semiconductor devices and a description of their theory of operation are then discussed, including transistors, semiconductor lasers and photodetectors. Revised throughout, this second edition includes new chapters on the reciprocal lattice, optical properties of semiconductors, semiconductor heterostructures, semiconductor characterization techniques, and an introduction to lasers. Additions and improvements have been made to the material on photodetectors and quantum mechanics as well as to the problem sections.

This book covers the complete spectrum of nonlinear optics and all solid state lasers.The book integrates theory, calculations and practical design, technology, experimental schemes and applications. With the expansion and further development of Laser technology, the wavelength spectrum of Lasers had to be enlarged, even to be tunable which requires the use of nonlinear optical and Laser tunable technology. It systematically summarizes and integrates the analysis of international achievements within the last 20 years in this field. It will be helpful for university teachers, graduate students as well as engineers.

Fundamentals of Condensed Matter Physics

Fundamentals of Many-body Physics

Fundamentals of Solid-State Electronics

Engineering Fundamentals: An Introduction to Engineering, SI Edition

Introduction to Solid-State Theory

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.

The only comprehensive handbook on this important and rapidly developing topic combines fundamental information with a brief overview of recent advances in solid state electrochemistry, primarily targeting specialists working in this scientific field. Particular attention is focused on the most important developments performed during the last decade, methodological and theoretical aspects of solid state electrochemistry, as well as practical applications. The highly experienced editor has included chapters with critical reviews of theoretical approaches, experimental methods and modeling techniques, providing definitions and explaining relevant terminology as necessary.

Several other chapters cover all the key groups of the ion-conducting solids important for practice, namely cationic, protonic, oxygen-anionic and mixed conductors, but also conducting polymer and hybrid materials. Finally, the whole is rounded off by brief surveys of advances in the fields of fuel cells, solid-state batteries, electrochemical sensors, and other applications of ion-conducting solids. Due to the very interdisciplinary nature of this topic, this is of great interest to material scientists, polymer chemists, physicists, and industrial scientists, too.

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 textbooks and 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.

The goal of the present course on "Fundamentals of Theoretical Physics" is to be a direct accompaniment to the lower-division study of physics, and it aims at providing the physical tools in the most straightforward and compact form as needed by the students in order to master theoretically more complex topics and problems in advanced studies and in research. The presentation is thus intentionally designed to be sufficiently detailed and self-contained – sometimes, admittedly, at the cost of a certain elegance – to permit individual study without reference to the secondary literature. This volume deals with the quantum theory of many-body systems. Building upon a basic knowledge of quantum mechanics and of statistical physics, modern techniques for the description of interacting many-particle systems are developed and applied to various real problems, mainly from the area of solid-state physics. A thorough revision should guarantee that the reader can access the relevant research literature without experiencing major problems in terms of the concepts and vocabulary, techniques and deductive methods found there. The world which surrounds us consists of very many particles interacting with one another, and their description requires in principle the solution of a corresponding number of coupled quantum-mechanical equations of motion (Schrödinger ? equations), which, however, is possible only in exceptional cases in a mathematically strict sense. The concepts of elementary quantum mechanics and quantum statistics are therefore not directly applicable in the form in which we have thus far encountered them. They require an extension and restructuring, which is termed "many-body theory".

Solution Manual

Fundamentals of Solid-state Electronics

Engineering Solid Mechanics

Fundamentals of Solid-State Lighting

Part 2. Applications

*The basic concepts of quantum mechanics are explained in this book in a concise and easy-to-read manner, leading toward applications in solid-state electronics and optics. Following a logical sequence, the book focuses on key ideas and is conceptually and mathematically self-contained.*

*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.*

*My intent in writing this book is to present an introduction to the thermo- chemical theory required to conduct research and pursue applications of shock physics in solid materials. Emphasis is on the range of moderate compression that can be produced by high-velocity impact or detonation of chemical explosives and in which elastoplastic responses are observed and simple equations of state are applicable. In the interest of simplicity, the presentation is restricted to plane waves producing uniaxial deformation. Although applications often involve complex multidimensional deformation fields it is necessary to begin with the simpler case. This is also the most important case because it is the usual setting of experimental research. The presentation is also restricted to theories of material response that are simple enough to permit illustrative problems to be solved with minimal recourse to numerical analysis. The discussions are set in the context of established continuum-mechanical principles. I have endeavored to define the quantities encountered with some care and to provide equations in several convenient forms and in a way that lends itself to easy reference. Thermodynamic analysis plays an important role in continuum mechanics, and I have included a presentation of aspects of this subject that are particularly relevant to shock physics. The notation adopted is that conventional in expositions of modern continuum mechanics, insofar as possible, and variables are explained as they are encountered. Those experienced in shock physics may find some of the notation unconventional.*

*The Century has witnessed the phenomenal rise of natural science and technology into all aspects of human life. Three major sciences have emerged and marked this century, physical science which has strived to understand the structure of atoms through quantum mechanics, life science which has attempted to understand the structure of cells and the mechanisms of life through biology and genetics, and information science which has symbiotically developed the communicative and computational means to advance natural science. Microelectronics has become one of today's principle enabling technologies supporting these three major sciences and touches every aspect of human life, such as food, transportation, communication, entertainment, health and exploration. This textbook presents the basic physics concepts and thorough treatment of semiconductor characterization technology, designed for solid state engineers. The text gives an overview of the basic multidisciplinary aspects of physical science. In the area of Solid State Physics in particular, it aims at teaching all the fundamental scientific concepts essential to solid state engineering. The book is primarily emphasized in a variety of fundamental scientific concepts essential to solid state engineering, as well as the latest technological advances and modern applications in this area. Fundamentals of Solid State Engineering, delivers a multi-disciplinary introduction to solid state engineering, combining concepts from physics, chemistry, electrical engineering, materials science and mechanical engineering.*

**Physics and Materials Properties**

**Solid State Materials Chemistry**

**Solid State Polymerization**

**Fundamentals of Solid State Engineering**

**Advanced Semiconductor Fundamentals**

*This unified guide brings together the underlying principles, and predictable material responses, that connect metals, polymers, brittle solids and energetic materials as they respond to extreme external stresses. Previously disparate scientific principles, concepts and terminology are combined within a single theoretical framework, across different materials and scales, to provide all the tools necessary to understand, and calculate, the responses of materials and structures to extreme static and dynamic loading. Real-world examples illustrate how material behaviours produce a component response, enabling recognition – and avoidance – of the deformation mechanisms that contribute to mechanical failure. A final synoptic chapter presents a case study of extreme conditions brought about by the infamous Chicxulub impact event. Bringing together simple concepts from diverse fields into a single, accessible, rigorous text, this is an indispensable reference for all researchers and practitioners in materials science, mechanical engineering, physics, physical chemistry and geophysics.*

*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.*

*This concise professional reference provides a fundamental framework for the design and operation of solid-state fermentation bioreactors, enabling researchers currently working at laboratory scale to scale up their processes. The authors survey bioreactor types in common use, and describe in depth how to plan a project, and model heat transfer phenomena. The book includes case studies, and a review of practical issues involved in bioreactor performance.*

*Based on an established course and covering the fundamentals, central areas and contemporary topics of this diverse field, Fundamentals of Condensed Matter Physics is a much-needed textbook for graduate students. The book begins with an introduction to the modern conceptual models of a solid from the points of view of interacting atoms and elementary excitations. It then provides students with a thorough grounding in electronic structure and many-body interactions as a starting point to understand many properties of condensed matter systems - electronic, structural, vibrational, thermal, optical, transport, magnetic and superconducting - and methods to calculate them. Taking readers through the concepts and techniques, the text gives both theoretically and experimentally inclined students the knowledge needed for research and teaching careers in this field. It features 246 illustrations, 9 tables and 100 homework problems, as well as numerous worked examples, for students to test their understanding. Solutions to the problems for instructors are available at [www.cambridge.org/cohenlouie](http://www.cambridge.org/cohenlouie).*

**Solid-State Fermentation Bioreactors**

**Engineering Chemistry**

**Fundamentals of Nuclear Science and Engineering Second Edition**

**Solid State Composites and Hybrid Systems**

**Semiconductor Fundamentals**

Specifically designed as an introduction to the exciting world of engineering, ENGINEERING FUNDAMENTALS: AN INTRODUCTION TO ENGINEERING encourages students to become engineers and prepares them with a solid foundation in the fundamental principles and physical laws. The book begins with a discovery of what engineers do as well as an inside look into the various areas of specialization. An explanation on good study habits and what it takes to succeed is included as well as an introduction to design and problem solving, communication, and ethics. Once this foundation is established, the book moves on to the basic physical concepts and laws that students will encounter regularly. The framework of this text teaches students that engineers apply physical and chemical laws and principles as well as mathematics to design, test, and supervise the production of millions of parts, products, and services that people use every day. By gaining problem solving skills and an understanding of fundamental principles, students are on their way to becoming analytical, detail-oriented, and creative engineers. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Fundamentals of Solid State Engineering is structured in two major parts. It first addresses the basic physics concepts, which are at the base of solid state matter in general and semiconductors in particular. The second part reviews the technology for modern Solid State Engineering. This includes a review of compound semiconductor bulk and epitaxial thin films growth techniques, followed by a description of current semiconductor device processing and nano-fabrication technologies. A few examples of semiconductor devices and a description of their theory of operational are then discussed, including transistors, semiconductor lasers, and photodetectors.

Fundamentals of Solid State EngineeringSpringer

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.

Fundamentals of Semiconductors

Advanced Concepts, Tuning-Fundamentals and Applications

Fundamentals, Methods, Materials, Diffusion-Controlled Processes

Fundamentals and Applications

For Solid State Electronics and Optics

The field of relativistic electronic structure theory is generally not part of theoretical chemistry education, and is therefore not covered in most quantum chemistry textbooks. This is due to the fact that only in the last two decades have we learned about the importance of relativistic effects in the chemistry of heavy and superheavy elements. Developments in computer hardware together with sophisticated computer algorithms make it now possible to perform four-component relativistic calculations for larger molecules. Two-component and scalar all-electron relativistic schemes are also becoming part of standard ab-initio and density functional program packages for molecules and the solid state. The second volume of this two-part book series is therefore devoted to applications in this area of quantum chemistry and physics of atoms, molecules and the solid state. Part 1 was devoted to fundamental aspects of relativistic electronic structure theory whereas Part 2 covers more of the applications side. This volume opens with a section on the Chemistry of the Superheavy Elements and contains chapters dealing with Accurate Relativistic Fock-Space Calculations for Many-Electron Atoms, Accurate Relativistic Calculations Including QED, Parity-Violation Effects in Molecules, Accurate Determination of Electric Field Gradients for Heavy Atoms and Molecules, Two-Component Relativistic Effective Core Potential Calculations for Molecules, Relativistic Ab-Initio Model Potential Calculations for Molecules and Embedded Clusters, Relativistic Pseudopotential Calculations for Electronic Excited States, Relativistic Effects on NMR Chemical Shifts, Relativistic Density Functional Calculations on Small Molecules, Quantum Chemistry with the Douglas-Kroll-Hess Approach to Relativistic Density Functional Theory, and Relativistic Solid State Calculations. - Comprehensive publication which focuses on new developments in relativistic quantum electronic structure theory - Many leaders from the field of theoretical chemistry have contributed to the TCC series - Will no doubt become a standard text for scientists in this field.

"Fundamentals of Solid State Engineering, 2nd Edition, provides a multi-disciplinary introduction to solid state engineering, combining concepts from physics, chemistry, electrical engineering, materials science and mechanical engineering. Revised throughout, this third edition includes new topics such as electron-electron and electron-phonon interactions, in addition to the Kane effective mass method. A chapter devoted to quantum mechanics has been expanded to cover topics such as the harmonic oscillator, the hydrogen atom, the quantum mechanical description of angular momentum and the origin of spin. This textbook also features an improved transport theory description, which now goes beyond Drude theory, discussing the Boltzmann approach. Introducing students to the rigorous quantum mechanical way of thinking about and formulating transport processes, this textbook presents the basic physics concepts and thorough treatment of semiconductor characterization technology, designed for solid state engineers."--Publisher's website.

Since the publication of the bestselling first edition, there have been numerous advances in the field of nuclear science. In medicine, accelerator based teletherapy and electron-beam therapy have become standard. New demands in national security have stimulated major advances in nuclear instrumentation.An ideal introduction to the fundamentals of nuclear science and engineering, this book presents the basic nuclear science needed to understand and quantify an extensive range of nuclear phenomena. New to the Second Edition— A chapter on radiation detection by Douglas McGregor Up-to-date coverage of radiation hazards, reactor designs, and medical applications Flexible organization of material that allows for quick reference This edition also takes an in-depth look at particle accelerators, nuclear fusion reactions and devices, and nuclear technology in medical diagnostics and treatment. In addition, the author discusses applications such as the direct conversion of nuclear energy into electricity. The breadth of coverage is unparalleled, ranging from the theory and design characteristics of nuclear reactors to the identification of biological risks associated with ionizing radiation. All topics are supplemented with extensive nuclear data compilations to perform a wealth of calculations. Providing extensive coverage of physics, nuclear science, and nuclear technology of all types, this up-to-date second edition of Fundamentals of Nuclear Science and Engineering is a key reference for any physicists or engineer.

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

Diffusion in Solids

Solid State Electrochemistry I

Fundamentals of Quantum Mechanics

Fundamentals, Materials and their Applications