Optical Devices From Semiconductor Physics And Devices 4th Edition

The book describes developments in the crystal growth of bulk II-VI semiconductor materials. A fundamental, systematic, and in-depth study of the physical vapor transport (PVT) growth process is the key to producing high-quality single crystals of semiconductors. As such, the book offers a comprehensive overview of the extensive studies on ZnSe and related II-VI wide bandgap compound semiconductors, such as CdS, CdTe, ZnTe, ZnSeTe and ZnSeS. Further, it shows the detailed steps for the growth of bulk crystals enabling optical devices which can operate in the visible spectrum for applications such as blue light emitting diodes, lasers for optical displays and in the mid-IR wavelength range, high density recording, and military communications. The book then discusses the advantages of crystallization from vapor compared to the conventional melt growth: lower processing temperatures, the purification process associated with PVT, and the improved surface morphology of the grown crystals, as well as the necessary drawbacks to the PVT process, such as the low and inconsistent growth rates and the low yield of single crystals. By presenting in-situ measurements of transport rate, partial pressures and interferometry, as well as visual observations, the book provides detailed insights into in the kinetics during the PVT process. This book is intended for graduate students and professionals in materials science as well as engineers preparing and developing optical devices with semiconductors.

Optical Nonlinearities and Instabilities in Semiconductors deals with various aspects of nonlinear optical phenomena and related optical instabilities in semiconductors. Measurements and explanations of the optical nonlinearities of various semiconductor materials and structures are presented, along with optical bistability and diode laser thresholds; self-oscillations; and chaos. This text consists of 17 chapters and begins with an introductory chapter to the historical background of investigations of the resonance-enhanced nonlinear optical properties of semiconductors and their manifestations in optical instabilities. The discussion then turns to the experimentally observed optical nonlinearities in homogeneous semiconductors and the microscopic theory of the optical band edge nonlinearities. This book considers the studies of the spectral region close to the band gap meant to exploit the resonance enhancement of the nonlinear optical behavior. The remaining chapters focus on nonlinear optical properties of semiconductor quantum wells; dense nonequilibrium excitations in gallium arsenide; optical decay and spatial relaxation; and optical bistability in semiconductor laser amplifiers. A chapter that describes instabilities in semiconductor lasers concludes the book. This book is intended for research students and active research workers who are interested in the basic physics or in the device applications of optical nonlinearities and instabilities in semiconductors.

The 3rd edition of this successful textbook contains ample material for a comprehensive upper-level undergraduate or beginning graduate course, guiding readers to the point where they can choose a special topic and begin supervised research. The textbook provides a balance between essential aspects of solid-state and semiconductor physics, on the one hand, and the principles of various semiconductor devices and their applications in electronic and photonic devices, on the other. It highlights many practical aspects of semiconductors such as alloys, strain, heterostructures, nanostructures, that are necessary in modern semiconductor research but typically omitted in textbooks. Coverage also includes additional advanced topics, such as Bragg mirrors, resonators, polarized and magnetic semiconductors, nanowires, quantum dots, multi-junction solar cells, thin film transistors, carbon-based nanostructures and transparent conductive oxides. The text derives explicit formulas for many results to support better understanding of the topics. The Physics of Semiconductors requires little or no prior knowledge of solid-state physics and evolved from a highly regarded two-semester course. In the third edition several topics are extended and treated in more depth including surfaces, disordered materials, amorphous semiconductors, polarons, thermopower and noise. More than 1800 references guide the reader to historic and current literature including original and review papers and books.

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

Low-dimensional semiconductor quantum structures are a major, high-technological development that has a considerable industrial potential. The field is developing extremely rapidly and the present book represents a timely guide to the latest developments in device technology, fundamental properties, and some remarkable applications. The content is largely tutorial, and the book could be used as a textbook. The book deals with the physics, fabrication, characteristics and performance of devices based on low-dimensional semiconductor structures. It opens with fabrication procedures. The fundamentals of quantum structures and electro-optical devices are dealt with extensively. Nonlinear optical devices are discussed from the point of view of physics and applications of exciton saturation in MQW structures. Waveguide-based devices are also described in terms of linear and nonlinear coupling. The basics of pseudomorphic HEMT technology, device physics and materials layer design are presented. Each aspect is reviewed from the elementary basics up to the latest developments. Audience: Undergraduates in electrical engineering, graduates in physics and engineering schools. Useful for active scientists and engineers wishing to update their knowledge and understanding of recent developments.

This book identifies opportunities, priorities, and challenges for the field of condensed-matter and materials physics. It highlights exciting recent scientific and technological developments and their societal impact and identifies outstanding questions for future research. Topics range from the science of modern technology to new materials and structures, novel quantum phenomena, nonequilibrium physics, soft condensed matter, and new experimental and computational tools. The book also addresses structural challenges for the field, including nurturing its intellectual vitality, maintaining a healthy mixture of large and small research facilities, improving the field's integration with other disciplines, and developing new ways for scientists in academia, government laboratories, and industry to work together. It will be of interest to scientists, educators, students, and policymakers.

This book describes the intrinsic optical processes occurring in semiconductor bulk and engineered semiconductor structures such as quantum wells, quantum wires, quantum dots, and superlattices. The topic has gained attention as all optoelectronic devices used in fibre-optic communication and optical computers are made of semiconductors and their engineered structures.

The subject of semiconductor physics today includes not only many of the aspects that constitute solid state physics, but also much more. It includes what happens at the nanoscale and at surfaces and interfaces, behavior with few interaction events and few carriers —- electrons and their quasi-particle holes —- in the valence bands, the exchange of energies in various forms, the coupling of energetic events over short and

long length scales, quantum reversibility tied to macroscale linearity and eventually to nonlinearities, the thermodynamic and statistical consequences of fluctuation-dissipation, and others. 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 what happens in its use. The collection of four textbooks in the Electroscience series culminates in a comprehensive understanding of nanoscale devices — electronic, magnetic, mechanical and optical — in the 4th volume. The series builds up to this last subject with volumes devoted to underlying semiconductor and solid-state physics.
The emerging field of semiconductor quantum optics combines semiconductor physics and quantum optics, with the aim of developing quantum devices with unprecedented performance. In this book researchers and graduate students alike will reach a new level of understanding to begin conducting state-of-the-art investigations. The book combines theoretical methods from quantum optics and solid-state physics to give a consistent microscopic description of light-matter- and many-body-interaction effects in low-dimensional semiconductor nanostructures. It develops the systematic theory needed to treat semiconductor quantum-optical effects, such as strong light-matter coupling, light-matter entanglement, squeezing, as well as quantum-optical semiconductor spectroscopy. Detailed derivations of key equations help readers learn the techniques and nearly 300 exercises help test their understanding of the materials covered. The book is accompanied by a website hosted by the authors, containing further discussions on topical issues, latest trends and publications on the field. The link can be found at www.cambridge.org/9780521875097.
Emphasizes the theory of semiconductor optoelectronic devices, demonstrating comparisons between theoretical and experimental results. Presents such important topics as semiconductor heterojunctions and band structure calculations near the band edges for bulk and quantum-well semiconductors. Details semiconductor lasers including double-heterostructure, stripe-geometry gain-guided semiconductor, distributed feedback and surface-emitting. Systematically investigates high-speed modulation of semiconductor lasers using linear and nonlinear gains. Features new subjects such as the theories on the band structures of strained semiconductors and strained quantum-well lasers. Covers key areas behind the operation of semiconductor lasers, modulators and photodetectors. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department
Semiconductorelectronicsiscommonplaceineveryhousehold.Semiconductor deviceshavealsoenabledeconomicallyreasonable?ber-basedopticalcom- nication, optical storage and high-frequency ampli?cation and have recently revolutionizedphotography,displaytechnologyandlighting.Alongwiththese tremendous technological developments, semiconductors have changed the way we work, communicate, entertain and think. The technological progress of semiconductor materials and devices is evolving continuously with a large worldwide e?ort in human and monetary capital. For students, semicond- tors o?er a rich, diverse and exciting ?eld with a great tradition and a bright future. This book introduces students to semiconductor physics and semicond- tor devices. It brings them to the point where they can specialize and enter

supervisedlaboratoryresearch.Itisbasedonthetwosemestersemiconductor physics course taught at Universit ? at Leipzig in its Master of Science physics curriculum. Since the book can be followed with little or no pre-existing knowledge in solid-state physics and quantum mechanics, it is also suitable for undergraduate students. For the interested reader some additional topics are included in the book that can be covered in subsequent, more speci- ized courses. The material is selected to provide a balance between aspects of solid-state and semiconductor physics, the concepts of various semiconductor devices and modern applications in electronics and photonics.

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

In recent years one has witnessed in physics a substantial increase in interest in carrying out fundamental studies in the nonlinear optics of condensed matter. At the Danish universities, this increase has been especially pronounced at the Institute of Physics at the University of Aalborg, where the main activities are centered around fundamental research within the domains of nonlinear quantum optics, nonlinear optics of metals and superconductors, and nonlinear surface optics. In recognition of this it was decided to arrange the first international summer school on nonlinear optics in Denmark at the Institute of Physics at the University of Aalborg. This book is based on the lectures and contributed papers presented at this international summer school, which was held in the period 31 July-4 Au gust 1989. About 60 experienced and younger scientists from 12 different countries participated. Twenty-eight lectures were given by 14 distinguished scientists from the United States, Italy, France, Germany, Scotland, England, and Denmark. In addition to the lectures given by the invited speakers, 11 contributed papers were presented. The programme of the summer school em phasized a treatment of basic physical properties of the nonlinear interaction of light and condensed matter and both theoretical and experimental aspects were covered. Furthermore, general principles as well as topics of current interest in the research literature were discussed.

Comprehensive text and reference covers all phenomena involving light in semiconductors, emphasizing modern applications in semiconductor lasers, electroluminescence, photodetectors, photoconductors, photoemitters, polarization effects, absorption spectroscopy, more. Numerous problems. 339 illustrations.

Since its inception in 1966, the series of numbered volumes known as Semiconductors and Semimetals has distinguished itself through the careful selection of well-known authors, editors, and contributors. The "Willardson and Beer" Series, as it is widely known, has succeeded in publishing numerous landmark volumes and chapters. Not only did many of these volumes make an impact at the time of their publication, but they continue to be well-cited years after their original release. Recently, Professor Eicke R. Weber of the University of California at Berkeley joined as a co-editor of the series. Professor Weber, a well-known expert in the field of semiconductor materials, will further contribute to continuing the series' tradition of publishing timely, highly relevant, and long-impacting volumes. Some of the recent volumes, such as Hydrogen in Semiconductors, Imperfections in III/V Materials, Epitaxial Microstructures, High-Speed Heterostructure Devices, Oxygen in Silicon, and others promise indeed that this tradition will be maintained and even expanded. Reflecting the truly interdisciplinary nature of the field that the series covers, the volumes in Semiconductors and Semimetals have been and will continue to be of great interest to physicists, chemists, materials scientists, and device engineers in modern industry. Volumes 54 and 55 present contributions by leading researchers in the field of high pressure semiconductors. Edited by T. Suski and W. Paul, these volumes continue the tradition of well-known but outdated publications such as Brigman's The Physics of High Pressure (1931 and 1949) and High Pressure Physics and Chemistry edited by Bradley. Volumes 54 and 55 reflect the industrially important recent developments in research and applications of semiconductor properties and behavior under desirable risk-free conditions at high pressures. These developments include the advent of the diamond anvil cell technique and the availability of commercial piston cylinder apparatus operating at high hydrostatic pressures. These much-needed books will be useful to both researchers and practitioners in applied physics, materials science, and engineering.

An international perspective on recent research, Compound Semiconductors 2001 provides an overview of important developments in III-V compound semiconductors, such as GaAs, InP, and GaN; II-VI compounds, such as ZnSe and CdTe; and IV-IV compounds, such as SiC and SiGe. The book contains 139 papers arranged in chapters on electronic devices, optical devices, magnetic materials, novel systems, quantum transport, optical characterization, quantum nanostructures, and material growth and characterization. The content encompasses the development of optical and electronic devices based on nitride semiconductors as well as the steady advances in traditional topics like III-V-based electronic and optical devices, growth and processing, and characterization. The book also includes novel research trends in quantum structures, such as quantum wires and dots, and spintronics, which are very promising for future developments in nanotechnology. As the primary forum for research into these materials and their device applications, this resource is an essential reference for researchers working on compound semiconductors in semiconductor physics, device physics, materials science, chemistry, and electronic and electrical engineering.

This book covers the technology of switching or modulating light in semiconductor optical waveguides. Currently a key function for optical communications systems is the conversion of data from an electrical signal to an optical signal for transmission in very low loss optical fibres and the converse process of optical to electrical conversion the O/E/O data conversion. This conversion between electronic and photonic signals imposes an energy consumption overhead on optical communication systems. So many research workers have been attracted to ultrafast all-optical switching of data in different formats. As a way of introduction to all-optical switching in semiconductor waveguides the book covers the electro-optic effect, electroabsorption and electrorefraction; effects that can be used in semiconductor optical modulation devices. But the book focuses on all-optical switching using second and third order optical nonlinearities in AlGaAs optical waveguides. It covers a variety of device configurations including integrated nonlinear couplers and Mach-Zehnder interferometers. Further, it provides design software in suit of Mathematica notebooks that can be used to explore the device design.

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This series, established in 1965, is concerned with recent developments in the general area of atomic, molecular and optical physics. The field is in a state of rapid growth, as new experimental and theoretical techniques are used on many old and new problems. Topics covered include related applied areas, such as atmospheric science, astrophysics, surface physics and laser physics. Articles are written by distinguished experts who are active in their research fields. The articles contain both relevant review material and detailed descriptions of important recent developments.

The updated and enlarged new edition of this book provides an introduction to and an overview of semiconductor optics from the IR through the visible to the UV. It includes coverage of linear and nonlinear optical properties, dynamics, magneto- and electrooptics, high-excitation effects, some applications, experimental techniques and group theory. The mathematics is kept as elementary as possible. The subjects covered extend from physics to materials science and optoelectronics. New or updated chapters add coverage of current topics, while the chapters on bulk materials have been revised and updated.

This revised and updated edition of the well-received book by C. Klingshirn provides an introduction to and an overview of all aspects of semiconductor optics, from IR to visible and UV. It has been split into two volumes and rearranged to offer a clearer structure of the course content. Inserts on important experimental techniques as well as sections on topical research have been added to support research-oriented teaching and learning. Volume 1 provides an introduction to the linear optical properties of semiconductors. The mathematical treatment has been kept as elementary as possible to allow an intuitive approach to the understanding of results of semiconductor spectroscopy. Building on the phenomenological model of the Lorentz oscillator, the book describes the interaction of light with fundamental optical excitations in semiconductors (phonons, free carriers, excitons). It also offers a broad review of seminal research results augmented by concise descriptions of the relevant experimental techniques, e.g., Fourier transform IR spectroscopy, ellipsometry, modulation spectroscopy and spatially resolved methods, to name a few. Further, it picks up on hot topics in current research, like quantum structures, mono-layer semiconductors or Perovskites. The experimental aspects of semiconductor optics are complemented by an in-depth discussion of group theory in solid-state optics. Covering subjects ranging from physics to materials science and optoelectronics, this book provides a lively and comprehensive introduction to semiconductor optics. With over 120 problems, more than 480 figures, abstracts to each chapter, as well as boxed inserts and a detailed index, it is intended for use in graduate courses in physics and neighboring sciences like material science and electrical engineering. It is also a valuable reference resource for doctoral and advanced researchers.

This book presents an overview of the current understanding of the physics of zero-dimensional semiconductors. It concentrates mainly on quantum dots of wide-gap semiconductors, but touches also on zero-dimensional systems based on silicon and III-V materials. After providing the reader with a theoretical background, the author illustrates the specific properties of three-dimensionally confined semiconductors, such as the size dependence of energy states, optical transitions, and dephasing mechanisms with the results from numerous experiments in linear and nonlinear spectroscopy. Technological concepts of the growth concepts and the potential of this new class of semiconductor materials for electro-optic and nonlinear optical devices are also discussed.

Leading young scientists give engaging reviews of their research areas and exciting visions of future developments.

It is widely recognized that an understanding of the optical pro perties of matter will give a great deal of important information re levant to the fundamental physical properties. This is especially true in semiconductor physics for which, due to the intrinsic low screening of these materials, the optical response is quite rich. Their spectra reflect indeed as well electronic as spin or phonon transitions. This is also in the semiconductor field that artificial structures have been recently developed, showing for the first time specific physical properties related to the low dimentionality of the electronic and vi bronic properties : with this respect the quantum and fractional quan tum Hall effects are among the most well known aspects. The associated reduced screening is also a clear manifestation of these aspects and as such favors new optical properties or at least significantly enhan ces some of them. For all these reasons, it appeared necessary to try to review in a global way what the optical investigation has brought today about the understanding of the physics of semiconductors. This volume collects the papers presented at the NATO Advanced study Inst i tut e on "Optical Properties of Semiconductors" held at the Ettore Majorana Centre, Erice, Sicily on March 9th to 20th, 1992. This school brought together 70 scientists active in research related to optical properties of semiconductors. There were 12 lecturers who pro vided the main contributions .

The two areas of experimental research explored in this volume are: the Hyperfine Interaction Methods, focusing on the microscopic configuration surrounding radioactive probe atoms in semiconductors, and Ion Beam Techniques using scattering, energy loss and channeling properties of highly energetic ions penetrating in semiconductors. A large area of interesting local defect studies is discussed. Less commonly used methods in the semiconductor field, such as nuclear magnetic resonance, electron nuclear double resonance, muon spin resonance and positron annihilation, are also reviewed. The broad scope of the contributions clearly demonstrates the growing interest in the use of sometimes fairly unconventional nuclear methods in the field of semiconductor physics.

An understanding of the interaction between light and matter on a quantum level is of fundamental interest and has many applications in optical technologies. The quantum nature of the interaction has recently attracted great attention for applications of semiconductor nanostructures in quantum information processing. Quantum optics with semiconductor nanostructures is a key guide to the theory, experimental realisation, and future potential of semiconductor nanostructures in the exploration of quantum optics. Part one provides a comprehensive overview of single quantum dot systems, beginning with a look at resonance fluorescence emission. Quantum optics with single quantum dots in photonic crystal and micro cavities are explored in detail, before part two goes on to review nanolasers with quantum dot emitters. Light-matter interaction in semiconductor nanostructures, including photon statistics and photoluminescence, is the focus of part three, whilst part four explores all-solid-state quantum optics, crystal nanobeam cavities and quantum-dot microcavity systems. Finally, part five investigates ultrafast phenomena, including femtosecond quantum optics and coherent optoelectronics with quantum dots. With its distinguished editor and international team of expert contributors, Quantum optics with semiconductor nanostructures is an essential guide for all those involved with the research, development, manufacture and use of semiconductors nanodevices, lasers and optical components, as well as scientists, researchers and students. A key guide to the theory, experimental realisation, and future potential of semiconductor nanostructures in the exploration of quantum optics Chapters provide a comprehensive overview of single quantum dot systems, nanolasers with quantum dot emitters, and light-matter interaction in semiconductor nanostructures Explores all-solid-state quantum optics, crystal nanobeam cavities and quantum-dot microcavity systems, and investigates ultrafast phenomena

Based on courses given at the Ecole Polytechnique in France, this book covers not only the fundamental physics of semiconductors, but also discusses the operation of electronic and optical devices based on semiconductors. It is aimed at students with a good background in mathematics and physics, and is equally suited for graduate-level courses in condensed-matter physics as for self-study by engineers interested in a basic understanding of semiconductor devices.

A detailed description of the basic physics of semiconductors. All the important equations describing the properties of these materials are derived without the help of other textbooks. The reader is assumed to have only a basic command of mathematics and some elementary semiconductor physics. The text covers a wide range of important semiconductor phenomena, from the simple to the advanced.

This book has grown out of a need for a beginning graduate level text which emphasizes the unifying concepts of the field of guided wave optics. Over the past twenty years, progress in this field has been so rapid, and therefore so helter-skelter, that it is hard, even for the fully involved practitioner no less the aspiring student, to see the unifying concepts. As will be discussed more fully below, there are at present quite a number of texts in the guided wave area. These texts vary in nature from the popular treatise to the voluminous scholarly work. I know of none, however, that treats the waveguide, semi conductor laser, fiber and fiber component, and integrated optic component all on equal footing using the forms of Maxwell's equations in polarizable media and coupled forms of Maxwell's equations as unifying tools. This book emphasizes basic concepts, yet is quantitative in nature and contains numerous applications. The book is designed to be used by the beginning graduate student or the professional who needs to review or catch up on the basics. Here at the University of Colorado, this text is generally used for a follow-up course to one in Physical Optics. The Physical Optics text employed, also written by the present author, primarily includes material which should be familiar to students with a strong background in optics or practitioners of guided waves.

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.

Materials and Reliability Handbook for Semiconductor Optical and Electron Devices provides comprehensive coverage of reliability procedures and approaches for electron and photonic devices. These include lasers and high speed electronics used in cell phones, satellites, data transmission systems and displays. Lifetime predictions for compound semiconductor devices are notoriously inaccurate due to the absence of standard protocols. Manufacturers have relied on extrapolation back to room temperature of accelerated testing at elevated temperature. This technique fails for scaled, high current density devices. Device failure is driven by electric field or current mechanisms or low activation energy processes that are masked by other mechanisms at high temperature. The Handbook addresses reliability engineering for III-V devices, including materials and electrical characterization, reliability testing, and electronic characterization. These are used to develop new simulation technologies for device operation and reliability, which allow accurate prediction of reliability as well as the design specifically for improved reliability. The Handbook emphasizes physical mechanisms rather than an electrical definition of reliability. Accelerated aging is useful only if the failure mechanism is known. The Handbook also focuses on voltage and current acceleration stress mechanisms.

Optoelectronics has become an important part of our lives. Wherever light is used to transmit information, tiny semiconductor devices are needed to transfer electrical current into optical signals and vice versa. Examples include light emitting diodes in radios and other appliances, photodetectors in elevator doors and digital cameras, and laser diodes that transmit phone calls through glass fibers. Such optoelectronic devices take advantage of sophisticated interactions between electrons and light. Nanometer scale semiconductor structures are often at the heart of modern optoelectronic devices. Their shrinking size and increasing complexity make computer simulation an important tool to design better devices that meet ever rising perfomance requirements. The current need to apply advanced design software in optoelectronics follows the trend observed in the 1980's with simulation software for silicon devices. Today, software for technology computer-aided design (TCAD) and electronic design automation (EDA) represents a fundamental part of the silicon industry. In optoelectronics, advanced commercial device software has emerged recently and it is expected to play an increasingly important role in the near future. This book will enable students, device engineers, and researchers to more effectively use advanced design software in optoelectronics. Provides fundamental knowledge in semiconductor physics and in electromagnetics, while helping to understand and use advanced device simulation software Demonstrates the combination of measurements and simulations in order to obtain realistic results and provides data on all required material parameters Gives deep insight into the physics of state-of-the-art devices and helps to design and analyze of modern optoelectronic devices

"The textbook combines a thorough theoretical treatment of the basic physics of semiconductors with applications to practical devices by putting special emphasis on the physical principles upon which these devices operate. - "Graduate students and lecturers in semiconductor physics, condensed matter physics, electromagnetic theory, and quantum mechanics will find this a useful textbook and reference work."--Jacket.

Photonic devices lie at the heart of the communications revolution, and have become a large and important part of the electronic engineering field, so much so that many colleges now treat this as a subject in its own right. With this in mind, the author has put together a unique textbook covering every major photonic device, and striking a careful balance between theoretical and practical concepts. The book assumes a basic knowledge of optics, semiconductors and electromagnetic waves. Many of the key background concepts are

reviewed in the first chapter. Devices covered include optical fibers, couplers, electro-optic devices, magneto-optic devices, lasers and photodetectors. Problems are included at the end of each chapter and a solutions set is available. The book is ideal for senior undergraduate and graduate courses, but being device driven it is also an excellent engineers' reference.
This book is devoted to optical semiconductor devices and their numerous applications in telecommunications, optoelectronics, and consumer electronics-areas where signal processing or the transmission of signals across fiber optic cables is paramount. It introduces a new generation of devices that includes optical modulators, quantum well (QW) lasers, and photodiodes and explores new applications of more established devices such as semiconductor lasers, light-emitting diodes, and photodiodes. Mitsuo Fukuda examines the material properties, operation principles, fabrication, packaging, reliability, and applications of each device and offers a unique industrial perspective, discussing everything engineers and scientists need to know at different phases of research, development, and production. This guide to the state-of-the-art of optical semiconductor devices: * Helps you choose the right device for a given application. * Covers important performance data such as temperature and optical feedback noise in lasers. * Highlights epitaxial growth techniques and fabrication for each device. * Features one hundred figures and an extensive bibliography. * Provides a clear and concise treatment, unencumbered by excessive theory Optical Semiconductor Devices is an essential resource for engineers and researchers in telecommunications and optoelectronics, equipment designers and manufacturers, and graduate students and scholars interested in this rapidly evolving field.