# Physics Of Optoelectronic Devices

*Optoelectronic devices transform electrical signals into optical signals (and vice versa) by utilizing the interaction of electrons and light. Advanced software tools for the design and analysis of such devices have been developed in recent years. However, the large variety of materials, devices, physical mechanisms, and modeling approaches often makes it difficult to select appropriate theoretical models or software packages. This book presents a review of devices and advanced simulation approaches written by leading researchers and software developers. It is intended for scientists and device engineers in optoelectronics who are interested in using advanced software tools. Each chapter includes the theoretical background as well as practical simulation results that help the reader to better understand internal device physics. Real-world devices such as edge-emitting or surface-emitting laser diodes, light-emitting diodes, solar cells, photodetectors, and integrated optoelectronic circuits are investigated. The software packages described in the book are available to the public, on a commercial or noncommercial basis, so that the interested reader is quickly able to perform similar simulations.*

*Get hands-on experience of optoelectronic*

*device design and simulation using numerical methods.*

*Learn the essential skills of laboratory optics and its underlying theoretical framework with seven key experiments.*

*In a very short time, lasers advanced from research interest to increasingly useful, commercially available tools for material processing, precision measurements, surgery, communication, and even entertainment. This 1996 book provides the background in theoretical physics necessary to understand engineering applications. It summarises relevant theories of geometrical optics, physical optics, quantum optics, and laser physics and ties them to applications in such areas as fluid mechanics, combustion, surface analysis, material processing and laser machining. Advanced topics such as laser Doppler velocimetry, laser-induced fluorescence, and holography are clearly and thoroughly explained. The book includes numerous examples and homework problems. A unique feature is the advanced research problems in each chapter that simulate real-world research and encourage independent reading and analysis.*

*Physics of Optoelectronic Devices*

*Electronic and Optoelectronic Properties of Semiconductor Structures*

*Lasers, Modulators, Photodetectors, Solar Cells, and Numerical Methods - Volume Two*

*Integrated Silicon Optoelectronics*

*Recent Development in Optoelectronic Devices*

*Optoelectronic devices are now ubiquitous in our daily lives, from light emitting diodes (LEDs) in many household appliances to solar cells for energy. This handbook shows how we can probe the underlying and highly complex physical processes using modern mathematical models and numerical simulation for optoelectronic device design, analysis, and performance optimization. It reflects the wide availability of powerful computers and advanced commercial software, which have opened the door for non-specialists to perform sophisticated modeling and simulation tasks. The chapters comprise the know-how of more than a hundred experts from all over the world. The handbook is an ideal starting point for beginners but also gives experienced researchers the opportunity to renew and broaden their knowledge in this expanding field.*

*This book presents a novel approach to the teaching of dynamic aspects of the operation of semiconductor and opto-electronic devices. Such dynamic aspects often determine the steady state conditions. Also, the dynamical operation of such devices is of increasing importance as modern methods of communicating data and information require electronic devices that switch electrical or optical signals at ever faster rates. The author discusses the rates at which electrons and holes can reach equilibrium, the rates at which transistors and diodes can switch, and the rates at which electrons and holes can interact with photons, and with protons. He also applies the rate equations in a unified way to models of light-emitting diodes, injection lasers and photodiodes. Finally, the author discusses more-advanced topics on the photon statistics of injection lasers, mode-locking and the application of rate equations and Maxwell's equations to opto-electronic devices.*

*This volume brings together contributions from world*

*renowned researchers on molecular nonlinear optics. It takes as its impetus work done over the last five years in which newly developed optoelectronic devices havedeepened our understanding of the fundamental physics and chemistry underlying these materials. Organic materials involving thin films, polymers, and resulting devices will be emphasized.*

*Fully revised and in its second edition, this standard reference on nano-optics is ideal for graduate students and researchers alike.*

*Introduction to Optical and Optoelectronic Properties of Nanostructures*

*Physics of Optoelectronics*

*Compound Semiconductors*

*Introduction to Optics and Lasers in Engineering*

*Molecular Nonlinear Optics*

Graphene is a single-layer crystal of carbon, the thinnest two-dimensional material. It has unique electronic and photonic properties.

A graduate textbook presenting the underlying physics behind devices that drive today's technologies. The book covers important details of structural properties, bandstructure, transport, optical and magnetic properties of semiconductor structures. Effects of low-dimensional physics and strain - two important driving forces in modern device technology - are also discussed. In addition to conventional semiconductor physics the book discusses self-assembled structures, mesoscopic structures and the developing field of spintronics. The book utilizes carefully chosen solved examples to convey important concepts and has over 250 figures and 200 homework exercises. Real-world applications are highlighted throughout the book, stressing the links between physical principles and actual devices. Electronic and Optoelectronic Properties of Semiconductor Structures provides engineering and physics students and practitioners with complete

and coherent coverage of key modern semiconductor concepts. A solutions manual and set of viewgraphs for use in lectures are available for instructors, from solutions@cambridge.org.
Semiconductor optelectronic devices are at the heart of all information generation and processing systems and are likely to be essential components of future optical computers. With more emphasis on optoelectronics and photonics in graduate programmes in physics and engineering, there is a need for a text providing a basic understanding of the important physical phenomena involved. Such a training is necessary for the design, optimization and search for new materials, devices, and application areas. This book provides a simple quantum mechanical theory of important optical processes, i.e., band-to- band, intersubband and excitonic absorption and recombination in bulk, quantum wells, wires, dots, superlattices and strained layers including electro-optic effects. The classical theory of absorption, quantization of radiation, and band picture based on k.p perturbation has been included to provide the necessary background. Prerequisites for the book are a knowledge of quantum mechanics and solid state theory. Problems have been set at the end of each chapter, some of which may guide the reader to study processes not covered in the book. The application areas of the phenomena are also indicated. This book is intended for use by graduate students in physics and engineering, beginners in the field and engineers. The use of simple one-electron theory throughout may also make parts of it useful for second- and third-year undergraduates.
Optoelectronic devices impact many areas of society, from simple household appliances and multimedia systems to communications, computing, spatial scanning, optical monitoring, 3D measurements and medical instruments. This is the most complete book about optoelectromechanic systems and semiconductor optoelectronic devices; it provides an accessible, well-organized overview of optoelectronic devices and properties that emphasizes basic principles.

Physics, Devices, Circuits, and Applications
From Quantum Physics to Smart Devices
Reliability of Semiconductor Lasers and Optoelectronic Devices
Advanced Simulation and Analysis
Theory of Optical Processes in Semiconductors

This self-contained text describes the underlying theory and approximate quantum models of real nanodevices for nanotechnology applications.

Graduate text with comprehensive treatment of semiconductor device physics and engineering, and descriptions of real optoelectronic devices.

The most up-to-date book available on the physics of photonicdevices This new edition of Physics of Photonic Devices incorporatessignificant advancements in the field of photonics that haveoccurred since publication of the first edition (Physics ofOptoelectronic Devices). New topics covered include a brief historyof the invention of semiconductor lasers, the Lorentz dipole methodand metal plasmas, matrix optics, surface plasma waveguides,optical ring resonators, integrated electroabsorptionmodulator-lasers, and solar cells. It also introduces exciting newfields of research such as: surface plasmonics and micro-ringresonators; the theory of optical gain and absorption in quantumdots and quantum wires and their applications in semiconductorlasers; and novel microcavity and photonic crystal lasers,quantum-cascade lasers, and GaN blue-green lasers within

thecontext of advanced semiconductor lasers. Physics of Photonic Devices, Second Edition presents novelinformation that is not yet available in book form elsewhere. Manyproblem sets have been updated, the answers to which are availablein an all-new Solutions Manual for instructors. Comprehensive,timely, and practical, Physics of Photonic Devices is an invaluabletextbook for advanced undergraduate and graduate courses inphotonics and an indispensable tool for researchers working in thisrapidly growing field.
Physics and Modeling of Tera- and Nano-Devices is a compilation of papers by well-respected researchers working in the field of physics and modeling of novel electronic and optoelectronic devices. The topics covered include devices based on carbon nanotubes, generation and detection of terahertz radiation in semiconductor structures including terahertz plasma oscillations and instabilities, terahertz photomixing in semiconductor heterostructures, spin and microwave-induced phenomena in low-dimensional systems, and various computational aspects of device modeling. Researchers as well as graduate and postgraduate students working in this field will benefit from reading this book.
Physics, Technology, and Device Concepts
Power Electronics and Optoelectronic Devices
Design, Modeling, and Simulation

Optoelectronics
Materials, Physics, and Devices

**Integrated Silicon Optoelectronics synthesizes topics from optoelectronics and microelectronics. The book concentrates on silicon as the major base of modern semiconductor devices and circuits. Starting from the basics of optical emission and absorption, as well as from the device physics of photodetectors, the aspects of the integration of photodetectors in modern bipolar, CMOS, and BiCMOS technologies are discussed. Detailed descriptions of fabrication technologies and applications of optoelectronic integrated circuits are included. The book, furthermore, contains a review of the newest state of research on eagerly anticipated silicon light emitters. In order to cover the topics comprehensively, also included are integrated waveguides, gratings, and optoelectronic power devices. Numerous elaborate illustrations facilitate and enhance comprehension. This extended edition will be of value to engineers, physicists, and scientists in industry and at universities. The book is also recommended to graduate students specializing on microelectronics or optoelectronics. Organized as a mini-encyclopedia of infrared optoelectronic applications, this long awaited new edition of an industry standard**

**updates and expands on the groundbreaking work of its predecessor. Pioneering experts, responsible for many advancements in the field, provide engineers with a fundamental understanding of semiconductor physics and the technical information needed to design infrared optoelectronic devices. Fully revised to reflect current developments in the field, Optoelectronics: Infrared-Visible-Ultraviolet Devices and Applications, Second Edition reviews relevant semiconductor fundamentals, including device physics, from an optoelectronic industry perspective. This easy-reading text provides a practical engineering introduction to optoelectronic LEDs and silicon sensor technology for the infrared, visible, and ultraviolet portion of the electromagnetic spectrum. Utilizing a practical and efficient engineering approach throughout, the text supplies design engineers and technical management with quick and uncluttered access to the technical information needed to design new systems.**

**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**

**Reliability of Semiconductor Lasers and Optoelectronic Devices simplifies complex concepts of optoelectronics reliability through a focus on case studies and structured methods. The book provides a brief look at the fundamentals of laser diodes and presents real world case studies that discuss the principles of reliability and what occurs when rules are broken. In addition, the book comprehensively looks at optoelectronics devices and their reliability principles to avoid the most common failure mechanisms and presents key materials and devices, including silicon photonics, high**

**power laser diodes, VCSELS, InGaN LEDs and Lasers, and AlGaN LEDs, and more.**
**Handbook of Optoelectronic Device Modeling and Simulation**
**A Practical Guide to Laboratory Optics**
**III-nitrides**
**Introduction to Physics and Simulation**
**Nitride Semiconductor Technology**

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. Annotation Tiny structures measurable on the nanometer scale (one-billionth of a meter) are known as nanostructures, and nanotechnology is the emerging application of these nanostructures into useful nanoscale devices. As we enter the 21st century, more and more

professional are using nanotechnology to create semiconductors for a variety of applications, including communications, information technology, medical, and transportation devices. Written by today's best researchers of semiconductor nanostructures, this cutting-edge resource provides a snapshot of this exciting and fast-changing field. The book covers the latest advances in nanotechnology and discusses the applications of nanostructures to optoelectronics, photonics, and electronics.

Tremendous progress has been made in the last few years in the growth, doping and processing technologies of the wide bandgap semiconductors. As a result, this class of materials now holds significant promis for semiconductor electronics in a broad range of applications. The principal driver for the current revival of interest in III-V Nitrides is their potential use in high power, high temperature, high frequency and optical devices resistant to radiation damage. This book provides a wide number of optoelectronic applications of III-V nitrides and covers the entire process from growth to devices and applications making it essential reading for those working in the semiconductors or microelectronics. Broad review of optoelectronic applications of III-V nitrides

The book "Recent Developments in Optoelectronic Devices" is about the latest developments in optoelectronics. This book is divided into three categories: light emitting devices, sensors, and light harvesters. This book also discusses the theoretical

aspects of device design for iridium complexes as organic light emitting diodes (OLEDs), strategies for developing novel nanostructured materials, silicon-rich oxide (SRO) electroluminescent devices, and multifunctional optoelectronic devices developed on resistive switching effects. The worldwide participation of authors has contributed to the unifying effect of science. Furthermore, interested readers will also find information on the screen printed technology using semiconductor devices, nonlinear phenomena in quantum devices, experimental set up of optoelectronics flexible logic gate to realize logic operations, autonomous vehicles, and the latest developments in perovskites as solar cells.

Principles of Nano-Optics

Nano-Optoelectronics

Photonic Devices

Physics of Optoelectronic Devices, Solutions Manual

Optoelectronic Devices

The development and application of low-dimensional semiconductors have been rapid and spectacular during the past decade. Ever improving epitaxial growth and device fabrication techniques have allowed access to some remarkable new physics in quantum confined structures while a plethora of new devices has emerged. The field of optoelectronics in particular has benefited from these advances both in terms of improved performance and the invention of fundamentally new types of device, at a time when the use of optics and lasers in telecommunications, broadcasting, the Internet, signal processing, and computing has been rapidly expanding. An appreciation of the physics of quantum and dynamic electronic processes in confined structures is key to the understanding of many of the latest devices and their continued

development. Semiconductor Quantum Optoelectronics covers new physics and the latest device developments in low-dimensional semiconductors. It allows those who already have some familiarity with semiconductor physics and devices to broaden and expand their knowledge into new and expanding topics in low-dimensional semiconductors. The book provides pedagogical coverage of selected areas of new and pertinent physics of low-dimensional structures and presents some optoelectronic devices presently under development. Coverage includes material and band structure issues and the physics of ultrafast, nonlinear, coherent, intersubband, and intracavity phenomena. The book emphasizes various devices, including quantum wells, visible, quantum cascade, and mode-locked lasers; microcavity LEDs and VCSELs; and detectors and logic elements. An underlying theme is high-speed phenomena and devices for increased system bandwidths.

The first true introduction to semiconductor optoelectronic devices, this book provides an accessible, well-organized overview of optoelectric devices that emphasizes basic principles.Coverage begins with an optional review of key concepts—such as properties of compound semiconductor, quantum mechanics, semiconductor statistics, carrier transport properties, optical processes, and junction theory—then progress gradually through more advanced topics. The Second Edition has been both updated and expanded to include the recent developments in the field.

Low Temperature Electronics: Physics, Devices, Circuits, and Applications summarizes the recent advances in cryoelectronics starting from the fundamentals in physics and semiconductor devices to electronic systems, hybrid superconductor-semiconductor technologies, photonic devices, cryocoolers and thermal management. Furthermore, this book provides an exploration of the currently available theory, research, and technologies related to cryoelectronics, including treatment of the solid state physical properties of the materials used in these systems. Current applications are found in infrared systems, satellite communications

and medical equipment. There are opportunities to expand in newer fields such as wireless and mobile communications, computers, and measurement and scientific equipment. Low temperature operations can offer certain advantages such as higher operational speeds, lower power dissipation, shorter signal transmission times, higher semiconductor and metal thermal conductivities, and improved digital and analog circuit performance. The computer, telecommunication, and cellular phone market is pushing the semiconductor industry towards the development of very aggressive device and integrated circuit fabrication technologies. This is taking these technologies towards the physical miniaturization limit, where quantum effects and fabrication costs are becoming a technological and economical barrier for further development. In view of these limitations, operation of semiconductor devices and circuits at low temperature (cryogenic temperature) is studied in this book. * It is a book intended for a wide audience: students, scientists, technology development engineers, private companies, universities, etc. * It contains information which is for the first time available as an all-in-one source; Interdisciplinary material is arranged and made compatible in this book * It is a must as reference source

Presents recent developments in theoretical and experimental research of nanophotonics Discusses properties and features of nanophotonic devices, e.g. scanning near-field optical microscopy, nanofi ber/nanowire based photonic devices Illustrates the most promising nanophotonic devices and instruments and their application Suits well for researchers and graduates in nanophotonics field Contents Scanning near-field optical microscopy Nanofibers/nanowires and their applications in photonic components and devices Micro/nano-optoelectronic devices based on photonic crystal

Optoelectronic Devices and Properties

Handbook of Optoelectronics

The Physics of Semiconductors

With Applications to Optoelectronic Devices

Semiconductor Quantum Optoelectronics

***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*
*Handbook of Optoelectronics offers a self-contained reference from the basic science and light sources to devices and modern applications across the entire spectrum of disciplines utilizing optoelectronic technologies. This second edition gives a complete update of the original work with a focus on systems and applications. Volume I covers the details of optoelectronic devices and techniques including semiconductor lasers, optical detectors and receivers, optical fiber devices, modulators, amplifiers, integrated optics, LEDs, and engineered optical materials with brand new chapters on silicon photonics, nanophotonics, and graphene optoelectronics. Volume II addresses the underlying system technologies enabling state-of-the-art communications, imaging, displays, sensing, data processing, energy conversion, and actuation. Volume III is brand new to this edition, focusing on applications in infrastructure, transport, security, surveillance, environmental monitoring, military, industrial, oil and gas, energy generation and distribution, medicine, and free space. No other resource in the field comes close to its breadth and depth, with*

*contributions from leading industrial and academic institutions around the world. Whether used as a reference, research tool, or broad-based introduction to the field, the Handbook offers everything you need to get started. John P. Dakin, PhD, is professor (emeritus) at the Optoelectronics Research Centre, University of Southampton, UK. Robert G. W. Brown, PhD, is chief executive officer of the American Institute of Physics and an adjunct full professor in the Beckman Laser Institute and Medical Clinic at the University of California, Irvine.*

*This book combines new physics and the latest device developments in low dimensional semiconductors. The development and application of low dimensional semiconductors has been rapid and spectacular during the past decade. Ever improving epitaxial growth and device fabrication techniques have allowed access to some remarkable new physics in quantum confined structures, while in parallel, a plethora of new devices have emerged. The field of optoelectronics in particular has benefited from these advances both in terms of improved performance and the invention of fundamentally new types of device, at a time when the use of optics and lasers in telecommunications, broadcasting, the internet, signal processing and computing has been rapidly expanding. An appreciation of the physics of quantum and dynamical electronic processes in confined structures in key to the understanding of many of the latest devices and*

*involvement in their continued development. This book allows those who already have somefamiliarity with semiconductor physics and devices, to broaden and expand their knowledge into new and expanding topics in low dimensional semic*

*Physics of Optoelectronics focuses on the properties of optical fields and their interaction with matter. Understanding that lasers, LEDs, and photodetectors clearly exemplify this interaction, the author begins with an introduction to lasers, LEDs, and the rate equations, then describes the emission and detection processes. The book summarizes and reviews the mathematical background of the quantum theory embodied in the Hilbert space. These concepts highlight the abstract form of the linear algebra for vectors and operators, supplying the "pictures" that make the subject more intuitive. A chapter on dynamics includes a brief review of the formalism for discrete sets of particles and continuous media. It also covers the quantum theory necessary for the study of optical fields, transitions, and semiconductor gain. This volume supplements the description of lasers and LEDs by examining the fundamental nature of the light that these devices produce. It includes an analysis of quantized electromagnetic fields and illustrates inherent quantum noise in terms of Poisson and sub-Poisson statistics. It explains matter-light interaction in terms of time-dependent perturbation theory and Fermi's golden rule, and concludes with a detailed discussion of*

***semiconductor emitters and detectors.***
***Rate Equations in Semiconductor Electronics***
***Applied Optical Electronics (Volume Three)***
***Infrared-Visable-Ultraviolet Devices and Applications, Second Edition***
***Low Temperature Electronics***
***Bulk and Microstructures***

*A rigorous guide providing a unified, multidisciplinary treatment of the fundamentals of optical and optoelectronic nanostructures.*
*Traces the quest to use nanostructured media for novel and improved optoelectronic devices. Leading experts - among them Nobel laureate Zhores Alferov - write here about the fundamental concepts behind nano-optoelectronics, the material basis, physical phenomena, device physics and systems.*
*The most up-to-date book available on the physics of photonic devices This new edition of Physics of Photonic Devices incorporates significant advancements in the field of photonics that have occurred since publication of the first edition (Physics of Optoelectronic Devices). New topics covered include a brief history of the*

*invention of semiconductor lasers, the Lorentz dipole method and metal plasmas, matrix optics, surface plasma waveguides, optical ring resonators, integrated electroabsorption modulator-lasers, and solar cells. It also introduces exciting new fields of research such as: surface plasmonics and micro-ring resonators; the theory of optical gain and absorption in quantum dots and quantum wires and their applications in semiconductor lasers; and novel microcavity and photonic crystal lasers, quantum-cascade lasers, and GaN blue-green lasers within the context of advanced semiconductor lasers. Physics of Photonic Devices, Second Edition presents novel information that is not yet available in book form elsewhere. Many problem sets have been updated, the answers to which are available in an all-new Solutions Manual for instructors. Comprehensive, timely, and practical, Physics of Photonic Devices is an invaluable textbook for advanced undergraduate and graduate courses in photonics and an indispensable tool for researchers working in this rapidly*

*growing field.*
*Optoelectronics, first published in 2002, is a practical and self-contained textbook written for graduate students and engineers.*
*Concepts, Physics and Devices*
*Theoretical Foundations of Nanoscale Quantum Devices*
*Graphene Photonics*
*Semiconductor Optoelectronic Devices*
*Physics of Photonic Devices*

*This book provides an overview of compound semiconductor materials and their technology. After presenting a theoretical background, it describes the relevant material preparation technologies for bulk and thin-layer epitaxial growth. It then briefly discusses the electrical, optical, and structural properties of semiconductors, complemented by a description of the most popular characterization tools, before more complex hetero- and low-dimensional structures are discussed. A special chapter is devoted to GaN and related materials, owing to their huge importance in modern optoelectronic and electronic devices, on the one hand,*

*and their particular properties compared to other compound semiconductors, on the other. In the last part of the book, the physics and functionality of optoelectronic and electronic device structures (LEDs, laser diodes, solar cells, field-effect and heterojunction bipolar transistors) are discussed on the basis of the specific properties of compound semiconductors presented in the preceding chapters of the book. Compound semiconductors form the back-bone of all opto-electronic and electronic devices besides the classical Si electronics. Currently the most important field is solid state lighting with highly efficient LEDs emitting visible light. Also laser diodes of all wavelength ranges between mid-infrared and near ultraviolet have been the enabler for a huge number of unprecedented applications like CDs and DVDs for entertainment and data storage, not to speak about the internet, which would be impossible without optical data communications with infrared laser diodes as key elements. This book provides a concise*

*overview over this class of materials, including the most important technological aspects for their fabrication and characterisation, also covering the most relevant devices based on compound semiconductors. It presents therefore an excellent introduction into this subject not only for students, but also for engineers and scientist who intend to put their focus on this field of science. Groundbreaking book that combines information on power electronics and optoelectronic applications of nitride semiconductors With contributions from a panel of international experts, Nitride Semiconductor Technology: Power Electronics and Optoelectronic Devices offers a state-of-the-art review of GaN-based technologies that covers the fields of both power electronics and optoelectronic devices. The authors present detailed explanations of the physical properties of materials and their growth methods. They also include information on GaN-based technology applications in high electron mobility transistors, vertical power devices, LEDs, laser diodes, and vertical-cavity*

*surface-emitting lasers. Nitride Semiconductor Technology contains an in-depth examination of reliability issues with the materials and offers advice on integrating them with 2D materials for novel high-frequency and high-power devices. The book also contains a review of the most recent advances in the field. This important book: Presents an in-depth overview of properties, growth techniques, and applicability of nitride semiconductors Offers a one-stop resource that covers nitride semiconductor technology from materials to devices Reviews a widerange of nitride semiconductor applications in high-power and high-frequency devices Written for materials scientists, semiconductor physicists, semiconductor industry professionals, electrical engineers, and electrotechnical industry professionals, Nitride Semiconductor Technology: Power Electronics and Optoelectronic Devices combines the most recent information on power electronics and optoelectronic applications of nitride semiconductors. Semiconductor Nanostructures for*

*Optoelectronic Applications*
*Physics and Simulation of Optoelectronic Devices*
*From Quantum Physics to Smart Devices : Proceedings of the Fiftieth Scottish Universities Summer School in Physics, St. Andrews, June 1998*
*Physics and Modeling of Tera-and Nano-devices*
*Advances in Nanophotonics*