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Optoelectronic Devices
Quantum Heterostructures
Semiconductor Optoelectronics
Principles of Electrical Engineering Materials and Devices
Photonic Sensing
Fiber Optics Handbook: Fiber, Devices, and Systems for Optical Communications

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OMB No. 9003489273572 edited by

DANIELA SCARLET

Quantum Well Lasers Cambridge University Press

This textbook, now in the second edition, offers a completely up-to-date and in-depth introduction to the principles and applications of optoelectronic devices and systems. The text gives a detailed description of optical fibre waveguides, optical fibre cables and their characteristics, manufacturing process and

drawing of optical fibres. In addition, it deals with photon sources, photon detectors, fibre optics as a medium and LAN and WAN systems, short and long haul optical fibre communication systems, electro-optic modulators and their characteristics. The second edition possesses a new section on Optical Fibre Based Broadband High Speed Network in Chapter 8, thus highlighting an updated version. Apart from this, a new chapter on Intensity Dependent Refractive Index Effect has been introduced into the text that discusses the effect of focusing on spatial and temperature profiles in a non-linear crystal medium. This chapter

further explains the various physical phenomena like the creation of sharp opaque filaments, irradiation induced damaging of the crystal, oscillatory waveguide propagation, saturation effects and other properties in detail. Primarily intended for the undergraduate students of electronics and communication engineering, the book should also prove extremely useful for the postgraduate students of physics. Key features

- Provides comprehensive explanation of optical fibre communication with illustrations.
- Gives extensive theory and experimental and holographic applications.
- Discusses the applications of lasers in

industry, military and medical as well as fibre optics applications.

- Describes optical computing, optical gates and their applications with illustrations.
- Includes solved numericals at the end of book for better understanding of topics.

Molecular Beam Epitaxy New Age International

Fiber optics is the hottest topic in communications and this book from the world's leading experts clearly lays out all the details of optical communications engineering * Essential technical guide and solutions kit for the super-fast, super-broad fiber systems and devices powering the fastest-growing communications infrastructure * Methods for generating above peak performance * Clear explanations and answers to tough challenges for WDM, DWDM, amplifiers, solitons, and other key technologies McGraw Hill Professional

Semiconductors are at the heart of modern living. Almost everything we do, be it work, travel, communication, or entertainment, all depend on some feature of semiconductor technology. Comprehensive Semiconductor Science and Technology, Six Volume Set captures the breadth of this important field, and presents it in a single source to the large audience who study, make, and exploit semiconductors. Previous attempts at this achievement have been abbreviated, and have omitted important topics. Written and Edited by a truly international team of experts, this work delivers an objective yet cohesive global review of the semiconductor world. The work is divided into three sections. The first section is concerned with the fundamental physics of semiconductors, showing how the electronic features and the lattice dynamics change drastically when systems vary from bulk to a low-dimensional structure and further to a nanometer size. Throughout this section there is an emphasis on the full understanding of the underlying physics. The second section deals largely with the transformation of the conceptual framework of solid state physics into devices and systems which require the growth of extremely high purity, nearly defect-free bulk and epitaxial materials. The last section is devoted to exploitation of the knowledge described in the previous sections to highlight the spectrum of devices we see all around us. Provides a comprehensive global picture of the semiconductor world Each of the work's three sections presents a complete description of one aspect of the whole Written and Edited by a truly international team of experts

Introduction to Nanoelectronics Prentice Hall

Microsupercapacitors systematically guides the reader through the key materials, characterization techniques, performance factors and potential applications and benefits to society of this emerging electrical energy storage solution. The book reviews the technical challenges in scaling down supercapacitors, covering materials, performance, design and applications perspectives. Sections provide a fundamental understanding of microsupercapacitors and compare them to existing energy storage technologies. Final discussions consider the factors that impact performance, potential tactics to improve performance, barriers to implementation, emerging solutions to those barriers, and a future outlook. This book will be of particular interest to materials scientists and engineers working in academia, research and development. Provides a concise introduction of the fundamental science, related technological challenges, and solutions that microsupercapacitors can offer Compares microsupercapacitors with current technologies Reviews the applications of new strategies and the challenge of scaling down supercapacitors Covers the most relevant applications, including energy storage, energy harvesting, sensors and biomedical devices

Phonons in Nanostructures Wiley-Interscience

Semiconductor nanowires promise to provide the building blocks for a new generation of nanoscale electronic and optoelectronic devices. Semiconductor Nanowires: Materials, Synthesis, Characterization and Applications covers advanced materials for nanowires, the growth and synthesis of semiconductor nanowires—including methods such as solution growth, MOVPE, MBE, and self-organization. Characterizing the properties of semiconductor nanowires is covered in chapters describing studies using TEM, SPM, and Raman scattering. Applications of semiconductor nanowires are discussed in chapters focusing on solar cells, battery electrodes, sensors, optoelectronics and biology. Explores a selection of advanced materials for semiconductor nanowires Outlines key techniques for the property assessment and characterization of semiconductor nanowires Covers a broad range of applications across a number of fields

QUANTUM-BASED ELECTRONIC DEVICES AND SYSTEMS

IET

A unique and comprehensive resource covering the fundamentals of nanolasers, with details of design, fabrication, and applications.

B.Sc. PRACTICAL PHYSICS

John Wiley & Sons

This book provides comprehensive coverage of the new wide-bandgap semiconductor gallium oxide (Ga₂O₃). Ga₂O₃ has been attracting much attention due to its excellent materials properties. It features an extremely large bandgap of greater than 4.5 eV and availability of large-size, high-quality native substrates produced from melt-grown bulk single crystals. Ga₂O₃ is thus a rising star among ultra-wide-bandgap semiconductors and represents a key emerging research field for the worldwide semiconductor community. Expert chapters cover physical properties, synthesis, and state-of-the-art applications, including materials properties, growth techniques of melt-grown bulk single crystals and epitaxial thin films, and many types of devices. The book is an essential resource for academic and industry readers who have an interest in, or plan to start, a new R&D project related to Ga₂O₃.

Crystal Growth and Evaluation of Silicon for VLSI and ULSI John Wiley & Sons

The Third Edition of the standard textbook and reference in the field of semiconductor devices This classic book has set the standard for advanced study and reference in the semiconductor device field. Now completely updated and reorganized to reflect the tremendous advances in device concepts and performance, this Third Edition remains the most detailed and exhaustive single source of information on the most important semiconductor devices. It gives readers immediate access to detailed descriptions of the underlying physics and performance characteristics of all major bipolar, field-effect, microwave, photonic, and sensor devices. Designed for graduate textbook adoptions and reference needs, this new edition includes: A complete update of the latest developments New devices such as three-dimensional MOSFETs, MODFETs, resonant-tunneling diodes, semiconductor sensors, quantum-cascade lasers, single-electron transistors, real-space transfer devices, and more

Materials completely reorganized Problem sets at the end of each chapter All figures reproduced at the highest quality Physics of Semiconductor Devices, Third Edition offers engineers, research scientists, faculty, and students a practical basis for understanding the most important devices in use today and for evaluating future device performance and limitations. A Solutions Manual is available from the editorial department.

Molecular Beam Epitaxy Oxford University Press, USA

Principles of Electrical Engineering Materials and Devices has been developed to bridge the gap between traditional electronic circuits texts and semiconductor texts

Gallium Oxide Cambridge University Press

B.Sc. Practical Physics

Semiconductor Devices for High-Speed Optoelectronics

Cambridge University Press

PHOTONIC SENSING A cutting-edge look at safety and security applications of photonic sensors With its many superior qualities, photonic sensing technology is increasingly used in early-detection and early-warning systems for biological hazards, structural flaws, and security threats. Photonic Sensing provides for the first time a comprehensive review of this exciting and rapidly evolving field, focusing on the development of cutting-edge applications in diverse areas of safety and security, from biodetection to biometrics. The book brings together contributions from leading experts in the field, fostering effective solutions for the development of specialized materials, novel optical devices, and networking algorithms and platforms. A number of specific areas of safety and security monitoring are covered, including background information, operation principles, analytical techniques, and applications. Topics include: Document security and structural integrity monitoring, as well as the detection of food pathogens and bacteria Surface plasmon sensors, micro-based cytometry, optofluidic techniques, and optical coherence tomography Optic fiber sensors for explosive detection and photonic liquid crystal fiber sensors for security monitoring Photonics-assisted frequency measurement with promising electronic warfare applications An invaluable, multidisciplinary resource for researchers and professionals in photonic sensing, as well as safety and security monitoring, this book will help readers jump-start their own research and development in areas of physics, chemistry, biology, medicine, mechanics, electronics,

and defense.

Materials Development for Active/Passive Components of a Supercapacitor Elsevier

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.

Comprehensive Semiconductor Science and Technology Springer

Annotation -- A new volume in the field's bestselling optics reference -- an entirely new opus focusing on x-ray, nonlinear, and vision optics -- Provides the same mix of tutorial writing with in-depth reference material that distinguished Volumes I & II.

Electronics Fundamentals and Applications John Wiley & Sons

This book focuses on the theory of phonon interactions in nanoscale structures with particular emphasis on modern electronic and optoelectronic devices. The continuing progress in the fabrication of semiconductor nanostructures with lower dimensional features has led to devices with enhanced functionality and even novel devices with new operating principles. The critical role of phonon effects in such semiconductor devices is well known. There is therefore a great need for a greater awareness and understanding of confined phonon effects. A key goal of this book is to describe tractable models of confined phonons and how these are applied to

calculations of basic properties and phenomena of semiconductor heterostructures. The level of presentation is appropriate for undergraduate and graduate students in physics and engineering with some background in quantum mechanics and solid state physics or devices. A basic understanding of electromagnetism and classical acoustics is assumed.

Optoelectronic Devices Cambridge University Press

This brief deals with various forms of supercapacitors starting from traditional carbon based supercapacitors to advanced next generation hybrid supercapacitors. The primary focus is to investigate the successive evolution in the core components of a typical supercapacitor which will bring significant observations regarding their feasibility and overall impact on the charge storage capacity so as to reach at par with the current battery technology. The authors present a critical review of the current collectors, electrode materials and electrolytic components which have distinctive impact on both the power and energy density of a supercapacitor. Emerging trends in the fabrication of hybrid supercapacitor technology bring together the exceptional power density of a double layer capacitor and energy density of a rechargeable battery, which promises a brighter future for the electrical energy storage system.

Quantum Heterostructures McGraw-Hill College

In recent years, photonics has found increasing applications in such areas as communications, signal processing, computing, sensing, display, printing, and energy transport. Now, Fundamentals of Photonics is the first self-contained introductory-level textbook to offer a thorough survey of this rapidly expanding area of engineering and applied physics. Featuring a logical blend of theory and applications, coverage includes detailed accounts of the primary theories of light, including ray optics, wave optics, electromagnetic optics, and photon optics, as well as the interaction of light with matter, and the theory of semiconductor materials and their optical properties. Presented at increasing levels of complexity, these sections serve as building blocks for the treatment of more advanced topics, such as Fourier optics and holography, guidedwave and fiber optics, photon sources and detectors, electro-optic and acousto-optic devices, nonlinear optical devices, fiber-optic communications, and photonic switching and computing. Included are such vital topics as: Generation of coherent light by lasers, and incoherent light by

luminescence sources such as light-emitting diodes Transmission of light through optical components (lenses, apertures, and imaging systems), waveguides, and fibers Modulation, switching, and scanning of light through the use of electrically, acoustically, and optically controlled devices Amplification and frequency conversion of light by the use of wave interactions in nonlinear materials Detection of light by means of semiconductor photodetectors Each chapter contains summaries, highlighted equations, problem sets and exercises, and selected reading lists. Examples of real systems are included to emphasize the concepts governing applications of current interest, and appendices summarize the properties of one- and two-dimensional Fourier transforms, linear-systems theory, and modes of linear systems. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Semiconductor Optoelectronics Cambridge University Press

The third edition of this popular text and reference book presents the fundamental principles for understanding and applying optical fiber technology to sophisticated modern telecommunication systems. Optical-fiber-based telecommunication networks have become a major information-transmission-system, with high capacity links encircling the globe in both terrestrial and undersea installations. Numerous passive and active optical devices within these links perform complex transmission and networking functions in the optical domain, such as signal amplification, restoration, routing, and switching. Along with the need to understand the functions of these devices comes the necessity to measure both component and network performance, and to model and stimulate the complex behavior of reliable high-capacity networks.

Principles of Electrical Engineering Materials and Devices BoD – Books on Demand

This book aims to provide a brief update on the functions of

purinergic receptors in various systems, in addition to the signaling pathway activated to mediate these functions. We address the influence of hypoxia by modulating the activity of these receptors under physiological and pathophysiological conditions. Additionally, we describe the mechanisms of induction of pain and inflammation in different systems. Finally, the book discusses some of the main bioinformatics tools currently used to improve or discover new prototypes capable of selectively acting on these receptors with estimated parameters of satisfactory solubility and toxicity for possible commercial implementation.

PHOTONIC SENSING

Irwin Professional Publishing

Describing and evaluating the basic principles and methods of subsurface sensing and imaging, *Introduction to Subsurface Imaging* is a clear and comprehensive treatment that links theory to a wide range of real-world applications in medicine, biology, security and geophysical/environmental exploration. It integrates the different sensing techniques (acoustic, electric, electromagnetic, optical, x-ray or particle beams) by unifying the underlying physical and mathematical similarities, and computational and algorithmic methods. Time-domain, spectral and multisensor methods are also covered, whilst all the necessary mathematical, statistical and linear systems tools are given in useful appendices to make the book self-contained. Featuring a logical blend of theory and applications, a wealth of color illustrations, homework problems and numerous case studies, this is suitable for use as both a course text and as a professional reference.

Fiber Optics Handbook: Fiber, Devices, and Systems for Optical Communications Newnes

Covers both the fundamentals and the state-of-the-art technology used for MBE Written by expert researchers working on the

frontlines of the field, this book covers fundamentals of Molecular Beam Epitaxy (MBE) technology and science, as well as state-of-the-art MBE technology for electronic and optoelectronic device applications. MBE applications to magnetic semiconductor materials are also included for future magnetic and spintronic device applications. *Molecular Beam Epitaxy: Materials and Applications for Electronics and Optoelectronics* is presented in five parts: Fundamentals of MBE; MBE technology for electronic devices application; MBE for optoelectronic devices; Magnetic semiconductors and spintronics devices; and Challenge of MBE to new materials and new researches. The book offers chapters covering the history of MBE; principles of MBE and fundamental mechanism of MBE growth; migration enhanced epitaxy and its application; quantum dot formation and selective area growth by MBE; MBE of III-nitride semiconductors for electronic devices; MBE for Tunnel-FETs; applications of III-V semiconductor quantum dots in optoelectronic devices; MBE of III-V and III-nitride heterostructures for optoelectronic devices with emission wavelengths from THz to ultraviolet; MBE of III-V semiconductors for mid-infrared photodetectors and solar cells; dilute magnetic semiconductor materials and ferromagnet/semiconductor heterostructures and their application to spintronic devices; applications of bismuth-containing III-V semiconductors in devices; MBE growth and device applications of Ga₂O₃; Heterovalent semiconductor structures and their device applications; and more. Includes chapters on the fundamentals of MBE Covers new challenging researches in MBE and new technologies Edited by two pioneers in the field of MBE with contributions from well-known MBE authors including three AI Cho MBE Award winners Part of the Materials for Electronic and Optoelectronic Applications series *Molecular Beam Epitaxy: Materials and Applications for Electronics and Optoelectronics* will appeal to graduate students, researchers in academia and industry, and others interested in the area of epitaxial growth.

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