Laser Diodes And Their Applications To Communications And Information Processing

The emergence of highly efficient short-wavelength laser diodes based on the III-V compound semiconductor GaN has not only enabled high-density optical data storage, but is also expected to revolutionize display applications. Moreover, a variety of scientific applications in biophotonics, materials research and quantum optics can benefit from these versatile and cost-efficient laser light sources in the near-UV to green spectral range. This thesis describes the device physics of GaN-based laser diodes, together with recent efforts to achieve longer emission wavelengths and short-pulse emission. Experimental and theoretical approaches are employed to address the individual device properties and optimize the laser diodes toward the requirements of specific applications.

In order to develop excellent photonic devices, we have to fully understand the physics behind operations of photonic devices. This book thoroughly teaches the fundamental physics currently applied to the development of photonics devices such as energy bands of semiconductors, optical transitions, optical waveguides, and semiconductor junctions. The book also reviews the characteristics of laser diodes, optical filters, and optical functional devices, which have been developed based on the above physics. These photonic devices have been demonstrated in system applications, and several experimental results are described.

The invention of the laser was one of the towering achievements of the twentieth century. At the opening of the twenty-first century we are witnessing the burgeoning of the myriad technical innovations to which that invention has led. The Handbook of Laser Technology and Applications is a practical and long-lasting reference source for scientists a

The phenomenal growth in Internet traffic has lead to a huge increase in demand for data transmission capacity on a worldwide level. As a result, wavelength division multiplexing (WDM) technology emerged, which makes it possible to transmit a large number of optical channels on a single optical fiber. An equally significant development occurred in optical networks, where switching and routing of signals takes place in the optical domain. This technology places special demands on the optical sources (lasers) used in the system. This text offers a description of the optical sources (equipment and devices) designed to meet these demands. Sources for DWDM Systems is intended for the engineers and graduate students working on optical networks. There is currently a nearly explosive interest in optical networks and the components required for such networks, but there is presently no single work which covers the variety of optical sources which may be used. This book will cover a particular component, tunable lasers, which is the next "big thing" in DWDM. The primary market are engineers developing tuneable lasers for optical networks, as well as graduate students enrolled in the optical engineering curriculum, especially: optical communication, semiconductor lasers, optical networks, and/or components for optical networks.

InP and Related Compounds

The Blue Laser Diode

Handbook of Self Assembled Semiconductor Nanostructures for Novel Devices in Photonics and Electronics

Physical Agents in Rehabilitation - E Book

Laser Diode Modulation and Noise

Handbook of Laser Technology and Applications

"Lasers are the stuff of science fiction: big, heavy boxes that make blazing blasts of light. If you've ever seen an ordinary laser in a laboratory, you'll know it's quite a hefty beast: typically about as long as your forearm, fairly heavy, quite hot, and capable of producing a very intense beam of light. But if lasers are that big, how come we can use them in small things like portable CD players and handheld barcode scanners? These things use a very different kind of laser that's about the same size as (and works in a similar way to) an ordinary LED; known as semiconductor lasers or laser diode. A laser diode, or LD also known as injection laser diode or ILD, is an electrically pumped semiconductor laser in which the active laser medium is formed by a p-n junction of a semiconductor diode similar to that found in a light-emitting diode. The laser diode is the most common type of laser produced with a wide range of uses that include fiber optic communications, barcode readers, laser pointers, CD/DVD/Blu-ray Disc reading and recording, laser printing, laser scanning and increasingly directional lighting sources. Semiconductor Laser Diode Technology and Applications signifies the latest developments in the rapidly developing world of semiconductor laser diode technology and applications. Semiconductor lasers or laser diodes play an important part in our everyday lives by providing cheap and compact-size lasers. They consist of complex multi-layer structures requiring nanometer scale accuracy and an elaborate design. Their theoretical description is important not only from a fundamental point of view, but also in order to generate new and improved designs. This book will be of considerable interest to engineers, scientists, technologists and physicists working in research and development in the field of semiconductor laser diode, as well as to young researchers who are at the beginning of their career."

Advances in optical fibre based communications systems have played a crucial role in the development of the information highway. By offering a single mode oscillation and narrow spectral output, distributed feedback (DFB) semiconductor laser diodes offer excellent optical light sources as well as optical filters for fibre based communications and dense wavelength division multiplexing (DWDM) systems. This comprehensive text focuses on the basic working principles of DFB laser diodes and optical filters and details the development of a new technique for enhanced system performance. Considers the optical waveguiding characteristics and properties of semiconductor materials and the physics of DFB semiconductor lasers. Presents a powerful modelling technique based on the transfer matrix method which can be used to improve the design of laser diodes, optical fibres and amplifiers. Examines the effect of the various corrugation shapes on the coupling coefficients and lasing characteristics of DFB laser diodes. Technical advice to improve immunity against the spatial hole burning effect. Extensive referencing throughout and a comprehensive glossary of symbols and abbreviations. Suitable for both introductory and advanced levels This is an indispensable textbook for undergraduate and postgraduate students of electrical and electronic engineering and physics as it consolidates their knowledge in this rapidly growing field. As a technical guide for the structural design of DFB laser diodes and optical filters, the book will serve as an invaluable reference for researchers in opto-electronics, and semi conductor device physics.

Laser Diodes and Their Applications to Communications and Information ProcessingJohn Wiley & Sons

The book "Nitride Semiconductor Technology" provides an overview of nitride semiconductors and their uses in optoelectronics and power electronics devices. It explains the physical properties of those materials as well as their growth methods. Their applications in high electron mobility transistors, vertical power devices, LEDs, laser diodes, and vertical-cavity surface-emitting lasers are discussed in detail. The book further examines reliability issues in these materials and puts forward perspectives of integrating them with 2D materials for novel high-frequency and high-power devices. In summary, it covers nitride semiconductor technology from materials to devices and provides the basis for further research.

Frequency Stabilization of Semiconductor Laser Diodes

An Evidence-Based Approach to Practice

Physics of Semiconductor Devices

Laser Diodes and Applications

Harnessing Light

Semiconductor Laser Diodes Handbook

This reference describes in detail the critical issue of frequency stabilization of semiconductor laser diodes, with emphasis on the practical frequency stabilization schemes of laser diodes and laser modules, and their applications to optical transmission systems, optical measurements, photonics switching systems, and more.

With straightforward, in-depth coverage of the use of physical agents to improve patient outcomes, Physical Agents in Rehabilitation: An Evidence-Based Approach to Practice, 5th Edition reflects how physical agents and modalities are being discussed in the classroom. This new edition brings the ideal balance of evidence and practical instruction to the learning and practice of physical agents in rehabilitation. Comprehensive coverage of all physical agents includes the mechanisms, clinical effects, and application techniques for thermal agents, ultrasound, electrical currents, electromagnetic radiation, hydrotherapy, traction, and compression. Plus, each chapter includes a scientific rationale and step-by-step instructions in the use of the agent(s), as well as up-to-date research support and new Find the Evidence tables. The new edition is supported with electronic ancillaries including review questions for students, PowerPoints®, and links to all references on Medline. Comprehensive coverage of all physical agents includes the mechanisms, clinical effects, and application techniques for thermal agents, ultrasound, electrical currents, electromagnetic radiation, hydrotherapy, traction, and compression. Find the Evidence tables guide the reader in finding up-to-date, patient-specific evidence using the PICO framework. UNIQUE Step-by-step illustrated application techniques boxes guide you in reproducing effective treatment options. Electronic ancillaries Electrical Stimulation, Ultrasound & Laser Light Handbook helps you to understand the material and can be printed out for quick reference to use in the clinical setting. NEW! Chapter on biofeedback complements the coverage of powered devices used in rehabilitation. UNIQUE! New Find the Evidence tables guide the reader in finding up-to-date, patient-specific evidence using the PICO framework.

InP is a key semiconductor for the production of optoelectronic and photonic devices. Its related compounds, such as InGaAsP alloy, have been realized as very important materials for communication in the 1.3 and 1.55 micron spectral regions. Furthermore, the applications on InP and related compounds have extended to other areas that include laser diodes, light emitting diodes, photodetectors, waveguides, photocathodes, solar cells, and many other applications. The topics presented in this book have been chosen to achieve a balance between the properties of bulk materials, doping, characterization, applications, and devices. This unique volume, featuring chapters written by experts in the field, provides a good starting point for those who are new to the subject and contains detailed results and in depth discussions for those who are experts in the field.

This volume of trends in optical amplifiers and their applications includes such topics as: progess in optical fibre amplifiers; reliability of high-power pump lasers for erbium-doped fibre amplifiers; and inP-based optical switch array using semiconductor optical amplifiers.

Optical Amplifiers and Their Applications

Materials, Applications and Devices

Design and fabrication of GaN-based laser diodes for single-mode and narrow-linewidth applications

Distributed Feedback Laser Diodes and Optical Tunable Filters

GaN-based Distributed Feedback Laser Diodes and Their Applications

Advanced Laser Diode Reliability

Optical science and engineering affect almost every aspect of our lives. Millions of miles of optical fiber carry voice and data signals around the world. Lasers are used in surgery of the retina, kidneys, and heart. New high-efficiency light sources promise dramatic reductions in electricity consumption. Night-vision equipment and satellite surveillance are changing how wars are fought. Industry uses optical methods in everything from the production of computer chips to the construction of tunnels. Harnessing Light surveys this multitude of applications, as well as the status of the optics industry and of research and education in optics, and identifies actions that could enhance the field's contributions to society and facilitate its continued technical development.

Diode lasers use nearly microscopic chips of gallium-arsenide or other exotic semiconductor material to generate coherent light in a very small package. Their compact size, reliability, and low cost means that they find applications in all aspects of modern technology-most importantly they drive modern optical telecommunication systems. Diod

*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.*

The first part of this book overviews the physics of lasers and describes some of the more common types of lasers and their applications. Applications of lasers include CD/DVD players, laser printers and fiber optic communication devices. Part II of this book describes the phenomenon of Bose-Einstein condensation. The experimental techniques used to create a Bose-Einstein condensate provide an interesting and unconventional application of lasers; that is, the cooling and confinement of a dilute gas at very low temperature.

Lasers and Their Application to the Observation of Bose-Einstein Condensates

Power Electronics and Optoelectronic Devices

Laser Design and Laser Systems (Volume Two)

The Principles of Semiconductor Laser Diodes and Amplifiers

Nitride Semiconductor Technology

The self-assembled nanostructured materials described in this book offer a number of advantages over conventional material technologies in a wide range of sectors. World leaders in the field of self-organisation of nanostructures review the current status of research and development in the field, and give an account of the formation, properties, and self-organisation of semiconductor nanostructures. Chapters on structural, electronic and optical properties, and devices based on self-organised nanostructures are also included. Future research work on self-assembled nanostructures will connect diverse areas of material science, physics, chemistry, electronics and optoelectronics. This book will provide an excellent starting point for workers entering the field and a useful reference to the nanostructured materials research community. It will be useful to any scientist who is involved in nanotechnology and those wishing to gain a view of what is possible with modern fabrication technology. Mohamed Henini is a Professor of Applied Physics at the University of Nottingham. He has authored and co-authored over 750 papers in international journals and conference proceedings and is the founder of two international conferences. He is the Editor-in-Chief of Microelectronics Journal and has edited three previous Elsevier books. Contributors are world leaders in the field Brings together all the factors which are essential in self-organisation of quantum nanostructures Reviews the current status of research and development in self-organised nanostructured materials Provides a ready source of information on a wide range of topics Useful to any scientist who is involved in nanotechnology Excellent starting point for workers entering the field Serves as an excellent reference manual

Since the first edition of this book was published in 1997, the photonics landscape has evolved considerably and so has the role of distributed feedback (DFB) laser diodes. Although tunable laser diodes continue to be introduced in advanced optical communication systems, DFB laser diodes are still widely applied in many deployed systems. This also includes wavelength tunable DFB laser diodes and DFB laser diode arrays, usually integrated with intensity or phase modulators and semiconductor optical amplifiers. This valuable resource gives professionals a comprehensive description of the different effects that determine the behavior of a DFB laser diode. Special attention is given to two new chapters on wavelength tunable DFB laser diodes and bistable and unstable DFB laser diodes. Among many other updates throughout the reference, semi-conductor and electromagnetic professionals are also provided two new appendices. This book fully covers the underlying theory, commercial applications, necessary design criteria, and future direction of this technology.

In this work, several aspects concerning (In,Al,Ga)N laser diodes with high spectral purity, designed for applications in spectroscopy, were studied. A complete fabrication process for ridgewaveguide laser diodes on GaN substrate was developed. The lateral size of the ridge waveguides was as narrow as 1.5 ?m: this is necessary in order to achieve lateral single-mode lasing in (In,Al,Ga)N laser diodes. A peculiar property of (In,Al,Ga)N laser diodes is that, when the ridge is narrow, the threshold current strongly depends on the ridge etch depth. This phenomenon was investigated by fabricating laser diodes with different etch depths. For ridge widths below 2 ?m, the threshold current of shallow-ridge devices was found to be more than two times larger than that of comparable deep-ridge devices. Moreover, in the lateral far-field patterns of shallow-ridge laser diodes, side-lobes were observed, which would support the hypothesis of strong index-antiguiding. The antiguiding factor at threshold was experimentally determined to be about 10, which is among the largest values ever published for (In,Al,Ga)N laser diodes. The devices were further studied by simulation, and the results confirmed that the carrier-induced index change in the quantum wells can compensate the lateral index step if the ridge is shallow. This, in turn, reduces the lateral optical confi nement, which increases the threshold current and generates side lobes in the far-fi eld patterns. Based on this research, blue and violet laser diodes suitable for packaging in TO cans and continuous-wave (CW) operation exceeding 50 mW were fabricated. An external cavity diode laser (ECDL) was also realized, which could be tuned over the spectral range 435 nm - 444 nm and provided a peak emission power of more than 27 mW CW at 439 nm. As an alternative approach to obtain a narrow spectral linewidth, the feasibility of monolithically integrated Bragg-gratings was studied.

Advanced Laser Diode Reliability focuses on causes and effects of degradations of state-of-the-art semiconductor laser diodes. It aims to provide a tool for linking practical measurements to physical diagnostics. To this purpose, it reviews the current technologies, addressing their peculiar details that can promote specific failure mechanisms. Two sections will support this kernel: a) Failure Analysis techniques, procedures and examples; b) Device-oriented laser modelling and parameter extraction. Talk about Natural continuity with the most widespread existing textbooks, published by Mitsuo Fukuda Present the extension to new failure mechanisms, new technologies, new application fields, new environments Introduce a specific self-consistent model for the physical description of a laser diode, expressed in terms of practically measurable quantities

GaN-Based Laser Diodes

Sensors and Their Applications VIII, Proceedings of the eighth conference on Sensors and their Applications, held in Glasgow, UK, 7-10 September 1997

High Power Diode Lasers

Advances in Optical Communications

Handbook of Laser Technology and Applications: Laser design and laser systems

Handbook of Distributed Feedback Laser Diodes, Second Edition

Laser diodes represent a key element in the emerging field of opto electronics which includes, for example, optical communication, optical sensors or optical disc systems. For all these applications, information is either transmitted, stored or read out. The performance of these systems depends to a great deal on the performance of the laser diode with regard to its modulation and noise characteristics. Since the modulation and noise characteristics of laser diodes are of vital importance for optoelectronic systems, the need for a book arises that concentrates on this subject. This book thus closes the gap between books on the device physics of semiconductor lasers and books on system design. Complementary to the specific topics concerning modulation and noise, the first part of this book reviews the basic laser characteristics, so that even a reader without detailed knowledge of laser diodes may follow the text. In order to understand the book, the reader should have a basic knowledge of electronics, semiconductor physics and optical communica tions. The work is primarily written for the engineer or scientist working in the field of optoelectronics; however, since the book is self-contained and since it contains a lot of numerical examples, it may serve as a textbook for graduate students. In the field of laser diode modulation and noise a vast amount has been published during recent years. Even though the book contains more than 600 references, only a small part of the existing literature is included.

Starting from the basics of semiconductor lasers with emphasis on the generation of high optical output power the reader is introduced in a tutorial way to all key technologies required to fabricate high-power diode-laser sources. Various applications are exemplified.

Laser Diode Microsystems provides the reader with the basic knowledge and understanding required for using semiconductor laser diodes in optical microsystems and micro-optical electromechanic systems. This tutorial addresses the fundamentals of semiconductor laser operation and design, coupled with an overview of the types of laser diodes suitable for use in Microsystems, along with their distinguishing characteristics. Emphasis is placed on laser diode characterization and measurement as well as the assembly techniques and optical accessories required for incorporation of semiconductor lasers into complex microsystems. Equipped with typical results and calculation examples, this hand-on text helps readers to develop a feel for how to choose a laser diode, characterize it and incorporate it into a microsystem.

Recent improvements in LED technology have made them as ubiquitous as cell phones. In fact, LEDs light up almost all cell phones screens. The technology’s myriad applications and low energy use have made it nearly impossible to get through daily chores without coming in contact with LEDs. Probable advances include increased ability of the technology to support more efficient lighting and enhanced communications. With balanced coverage of the basics and future developments, Introduction to Light Emitting Diode Technology and Applications takes you on a tour of the LED evolution. The book begins with a brief history of the effort to enable the device that generates light through modern organic LEDs and reviews the fundamentals and principles of light prior to a detailed explanation of how LEDs generate different colors. After forming this basic foundation, the book examines the key LEDs in lighting and communications. It then discusses the latest opportunities and advancements in high brightness (HB) LED technology, solid state lighting, and handheld electronic applications. As we approach a new decade the role of LEDs is literally set to explode, with organic light emitting diodes emerging as a leading next generation technology for electronic displays and lighting. Challenges still exist, including light extraction, luminosity, and white light generation, not to mention non-technical obstacles such as IP disputes and the lack of standards. This book provides a foundation for resolving these issues and developing new applications for LEDs in the promising general illumination market.

High-Power Diode Lasers

Handbook of Laser Technology and Applications (Three- Volume Set)

Laser Diode Microsystems

Principal of Optical Communication and Opto Electronics

Laser Diodes and Their Applications to Communications and Information Processing

Introduction to Light Emitting Diode Technology and Applications

Sensors and Their Applications VIII provides a valuable forum for individuals from all over the world working in all areas of sensors to meet and discuss the developments and applications of transducers and sensor systems. The strength of the sensor community in the UK reinforces the importance of this volume as a valuable reference for all workers in the field.

This comprehensive handbook gives a fully updated guide to lasers and laser systems, including the complete range of their technical applications. The first volume outlines the fundamental components of lasers, their properties and working principles. The second volume gives exhaustive coverage of all major categories of lasers, from solid-state and semiconductor diode to fiber, waveguide, gas, chemical, and dye lasers. The third volume covers modern applications in engineering and technology, including all new and updated case studies spanning telecommunications and data storage to medicine, optical measurement, defense and security, nanomaterials processing and characterization.

The new edition of the most detailed and comprehensive single-volume reference on major semiconductor devices The Fourth Edition of Physics of Semiconductor Devices remains the standard reference work on the fundamental physics and operational characteristics of all major bipolar, unipolar, special microwave, and optoelectronic devices. This fully updated and expanded edition includes approximately 1,000 references to original research papers and review articles, more than 650 high-quality technical illustrations, and over two dozen tables of material parameters. Divided into five parts, the text first provides a summary of semiconductor properties, covering energy band, carrier concentration, and transport properties. The second part surveys the basic building blocks of semiconductor devices, including p-n junctions, metal-semiconductor contacts, and metal-insulator-semiconductor (MIS) capacitors. Part III examines bipolar transistors, MOSFETs (MOS field-effect transistors), and other field-effect transistors such as JFETs (junction field-effect-transistors) and MESFETs (metal-semiconductor field-effect transistors). Part IV focuses on negative-resistance and power devices. The book concludes with coverage of photonic devices and sensors, including light-emitting diodes (LEDs), solar cells, and various photodetectors and semiconductor sensors. This classic volume, the standard textbook and reference in the field of semiconductor devices: Provides the practical foundation necessary for understanding the devices currently in use and evaluating the performance and limitations of future devices Offers completely updated and revised information that reflects advances in device concepts, performance, and application Features discussions of topics of contemporary interest, such as applications of photonic devices that convert optical energy to electric energy Includes numerous problem sets, real-world examples, tables, figures, and illustrations; several useful appendices; and a detailed solutions manual Explores new work on leading-edge technologies such as MODFETs, resonant-tunneling diodes, quantum-cascade lasers, single-electron transistors, real-space-transfer devices, and MOS-controlled thyristors Physics of Semiconductor Devices, Fourth Edition is an indispensable resource for design engineers, research scientists, industrial and electronics engineering managers, and graduate students in the field.

This comprehensive handbook gives a fully updated guide to lasers and laser technologies, including the complete range of their technical applications. This forth volume covers laser applications in the medical, metrology and communications fields. Key Features: • Offers a complete update of the original, bestselling work, including many brand-new chapters. • Deepens the introduction to fundamentals, from laser design and fabrication to host matrices for solid-state lasers, energy level diagrams, hosting materials, dopant energy levels, and lasers based on nonlinear effects. • Covers new laser types, including quantum cascade lasers, silicon-based lasers, titanium sapphire lasers, terahertz lasers, bismuth-doped fiber lasers, and diode-pumped alkali lasers. • Discusses the latest applications, e.g., lasers in microscopy, high-speed imaging, attosecond metrology, 3D printing, optical atomic clocks, time-resolved spectroscopy, polarization and profile measurements, pulse measurements, and laser-induced fluorescence detection. • Adds new sections on laser materials processing, laser spectroscopy, lasers in imaging, lasers in environmental sciences, and lasers in communications. This handbook is the ideal companion for scientists, engineers, and students working with lasers, including those in optics, electrical engineering, physics, chemistry, biomedicine, and other relevant areas.

Current Trends in Optical Amplifiers and Their Applications

Towards Longer Wavelengths and Short Pulses

Laser Applications: Medical, Metrology and Communication (Volume Four)

Diode Laser Materials and Devices - A Worldwide Market and Technology Overview to 2005

Technology and Applications

Fundamentals, Technology, Applications

The day when fiber will deliver new, yet now only foreseeable, broadband ser vices to the end user is getting nearer and nearer as we make our way towards the prophetic year 2000. Step by step, as we move from first generation lasers and fibers to the by now common erbium-doped fiber amplifiers, looking forward to such things as wavelength multiplexing and solitons, photonic switching and optical storage, the community of researchers in optical communications has stepped into the era of photonic networks. It is not just a question of terminology. Optical communication means tech nology to the same extent that photonic network means services. If it is true that information is just as marketable a product as oil or coke, the providing of an extensive global information infrastructure may end up having an even greater impact than the setting up of a world-wide railroad network did at the beginning of the industrial era. Just like wagons, bandwidth will be responsible for carrying and delivering goods to customers. The challenge for all of us in this field is for it to function in every section of the overall network, transport, access and customer area, in the best possible way: the fastest, most economical and most flexible. New services provided by a new network that exploits the potential and peculiarities of photonics surely requires a rethinking of solutions, new ideas, new architec tures, new design, especially where electronics is still dominant, as in transport and access networks.

A descriptive account based on semiconductor laser diodes has been presented in this book. It presents recent advances and research in the fast growing field of semiconductor laser diode technology and applications. Prominent researchers and experts from all over the world have made valuable contributions in this book. The book provides detailed discussions on optimization of semiconductor laser diode parameters for extensive applications across various fields. It aims to assist physicists, scientists, engineers and technologists in their research and academic activities associated with the field of semiconductor laser diodes.

From the reviews of the first edition: "The technical chapters will be lapped up by semiconductor specialists keen to know more [...] the book includes fascinating material that answers the question: why did Nakamura succeed where many, much larger, research groups failed." New Scientist

This report examines the development of the diode laser industry over a six-year period, 2000 to 2005, incorporating analysis of trends in markets, technologies and industry structure. It is designed to provide key information to users and manufacturers of substrates, epitaxial wafers (epiwafers) and devices. The coverage includes components, laser diodes, and the semiconducting (SC) wafers and epiwafers on which most of these devices are made. The geographical coverage of the report includes North America, Japan and Europe, which together will account for over 90% of the production and consumption of diode laser materials and devices over the next five years. However, many other countries have activities in this field including South-East Asia (Taiwan, South Korea, Singapore, Malaysia etc), China, India, Australia and Eastern Europe (Russia, Poland, Hungary, the Czech Republic) amongst others. Activities in these countries are commented on in the text where relevant, but are not quantified in the market data. Chapter 1 is an introduction to the market study. Chapter 2 contains an executive summary. Chapter 3 overviews materials markets. The size, quality, and particularly the price, of substrates and wafers are key factors in determining the ability of companies to produce competitive laser products. Chapter 3 also examines trends in materials technologies for laser diodes, the impact of the device markets on wafer demand, and the main suppliers. This chapter introduces the semiconductor materials that are presently or will likely become important to the fabrication of diode laser devices. The principal distinguishing properties of these materials are explained with reference to their application. Chapter 4 chapter examines the basic application sectors for laser diode devices as well as the basic commercial opportunities, changes and forces acting within each sector. The chapter also examines the market for the basic types of device as well as the promising newer types. For each type of device, market data and forecasts are provided and future prospects described. The application data are presented for the following industrial groups: • Automotive • Computers • Consumer • Industrial • Military and Aerospace • Telecommunications • Others A full 5-year forecast and analysis is provided by application and region. Chapter 5 is a technology overview. In this chapter a background and overview of developments in the principal technological R&D and production processes for devices is provided. The main focus is on the most important enabling technology for the production of the present and future generations of laser diodes and related devices. This process is crystal growth and involves the following sequence: • Bulk growth of single crystals • Epitaxial growth of semiconductor single crystal layers • Ion implantation • Device fabrication, ie gate and contact formation, etc • Packaging & test Chapter 6 profiles substrate suppliers, epiwafers suppliers and merchant and captive producers of GaAs devices. Chapter 7 lists universities and selected industrial labs involved in the areas of diode laser research. Chapter 8 is a directory of suppliers. Chapter 9 provides acronyms and exchange rates. For a PDF version of the report please call Tina Enright on +44 (0) 1865 843008 for price details.

Optical Semiconductor Devices

Photonic Networks

Semiconductor Laser Diode Technology and Applications

Diode Lasers

Studies of Self Mixing Interference Effects in Laser Diodes and Their Applications

The Complete Story

This volume covers optical amplifiers, one of the most important areas of study in optical telecommunications. The authors combine detailed coverage of the design and construction of semiconductor laser amplifiers and EDFAs with details of a wide range of system applications.

This book summarizes a five year research project, as well as subsequent results regarding high power diode laser systems and their application in materials processing. The text explores the entire chain of technology, from the semiconductor technology, through cooling mounting and assembly, beam shaping and system technology, to applications in the processing of such materials as metals and polymers. Includes theoretical models, a range of important parameters and practical tips.

Laser Diode Technology and Applications

Tunable Laser Diodes and Related Optical Sources

Optical Science and Engineering for the 21st Century