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Principles of Lasers Principles of Lasers Principles of Lasers Principles of Lasers and Optics Principles of Lasers Principles of Lasers Principles of Lasers Principles of Laser Dynamics Lasers:Principles, Types and Applications Principles Of Lasers, 4E Lasers Principles of Free-Electron Lasers Principles of Laser Spectroscopy and Quantum Optics Principles of Laser Materials Processing Principles of lasers Laser Physics Handbook of Laser Technology and Applications Principles and Practice of Laser Dentistry - E-Book Laser Fundamentals Basics of Laser Physics Dye Laser Principles Lasers, Principles and Applications Laser Light Scattering Laser Physics Laser Therapy in Veterinary Medicine Principles of Medical and Dental Lasers Laser-Beam Interactions with Materials Advanced Laser Surgery in Dentistry Fundamentals of Light Sources and Lasers Femtosecond Laser Pulses Lasers in the Preservation of Cultural Heritage Introduction to Laser Spectroscopy Field Guide to Lasers Quantum Well Lasers Principles and Practices in Cutaneous Laser Surgery Heterostructure Lasers X-Ray Lasers Laser Processing of Engineering Materials Principles of Laser Dynamics Principles and Choice of Laser Treatment in Dermatology

Coverage of the most recent advancements and applications in laser materials processing This book provides state-of-the-art coverage of the field of laser materials processing, from fundamentals to applications to the latest research topics. The content is divided into three succinct parts: Principles of laser engineering-an introduction to the basic concepts and characteristics of lasers, design of their components, and beam delivery Engineering background&-a review of engineering concepts needed to analyze different processes: thermal analysis and fluid flow; solidification of molten metal; and residual stresses that evolve during processes Laser materials processing-a rigorous and detailed treatment of laser materials processing and its principle applications, including laser cutting and drilling, welding, surface modification, laser forming, and rapid prototyping Each chapter includes an outline, summary, and example sets to help readers reinforce their understanding of the material. This book is designed to prepare graduate students who will be entering industry; researchers interested in initiating a research program; and practicing engineers who need to stay abreast of the latest developments in this rapidly evolving field. This fifth edition of Principles of Lasers includes corrections to the previous edition as well as being the first available as an ebook. Its mission remains to provide a broad, unified description of laser behavior, physics, technology, and applications. Principles of Laser Spectroscopy and Quantum Optics is an essential textbook for graduate students studying the interaction of optical fields with atoms. It also serves as an ideal reference text for researchers working in the fields of laser spectroscopy and quantum optics. The book provides a rigorous introduction to the prototypical problems of radiation fields interacting with two- and three-level atomic systems. It examines the interaction of radiation with both atomic vapors and condensed matter systems, the density matrix and the Bloch vector, and applications involving linear absorption and saturation spectroscopy. Other topics include hole burning, dark states, slow light, and coherent transient spectroscopy, as well as atom optics and atom interferometry. In the second half of the text, the authors consider applications in which the radiation field is quantized. Topics include spontaneous decay, optical pumping, sub-Doppler laser cooling, the Heisenberg equations of motion for atomic and field operators, and light scattering by atoms in both weak and strong external fields. The concluding chapter offers methods for creating entangled and spin-squeezed states of matter. Instructors can create a one-semester course based on this book by combining the introductory chapters with a selection of the more advanced material. A solutions manual is available to teachers. Rigorous introduction to the interaction of optical fields with atoms Applications include linear and nonlinear spectroscopy, dark states, and slow light Extensive chapter on atom optics and atom interferometry Conclusion explores entangled and spin-squeezed states of matter Solutions manual (available only to teachers) The first in its field, this book is both an introduction to x-ray lasers and a how-to guide for specialists. It provides new entrants and others interested in the field with a comprehensive overview and describes useful examples of analysis and experiments as background and guidance for researchers undertaking new laser designs. In one succinct volume, X-Ray Lasers collects the knowledge and experience gained in two decades of x-ray laser development and conveys the exciting challenges and possibilities still to come. The reader is first introduced to the technical challenges unique to the design and operation of lasers in the "vacuum" region of the spectrum, where the atmosphere is highly absorbent and optics are--at best--unconventional. A discussion of the basic principles for and limitations in achieving significant x-ray amplification, as well as descriptions of gain measurement techniques and instrumentation follows. Various approaches for pumping media to x-ray gain conditions are also analyzed, and descriptions of experimental progress are included wherever possible. The book concludes with a description and comparison with alternate sources and applications for an x-ray laser. This work is both an introduction to x-ray lasers and a how-to guide for specialists. It provides new entrants and others interested in the field with a comprehensive overview and describes useful analyses and experiments as guidance for researchers undertaking new laser designs. Provides first comprehensive treatment of lasers for wavelengths shorter than the near-ultraviolet 2000 Contains descriptions and comparisons with alternate sources Includes a section describing possible applications This book is the result of more than ten years of research and teaching in the field of quantum electronics. The purpose of the book is to introduce the principles of lasers, starting from elementary notions of quantum mechanics and electromagnetism. Because it is an introductory book, an effort has been made to make it self contained to minimize the need for reference to other works. For the same reason; the references have been limited (whenever possible) either to review papers or to papers of seminal importance. The organization of the book is based on the fact that a laser can be thought of as consisting of three elements: (i) an active material, (ii) a pumping system, and (iii) a suitable resonator. Ac cordingly, after an introductory chapter, the next three chapters deal, respectively, with the interaction of radiation with matter, pumping processes, and the theory of passive optical resonators. This smooth introduction for advanced undergraduates starts with the fundamentals of lasers and pulsed optics. Thus prepared, the student is introduced to short and ultrashort laser pulses, and learns how to generate, manipulate, and measure them. Spectroscopic implications are also discussed. The second edition has been completely revised and includes two new chapters on some of the most promising and fast-developing applications in ultrafast phenomena: coherent control and attosecond pulses. This book provides the information necessary for the reader to achieve a thorough understanding of all aspects of QW lasers - from the basic mechanism of optical gain, through the current technolgoical state of the art, to the future technologies of quantum wires and quantum dots. In view of the growing importance of QW lasers, this book should be read by all those with an active interest in laser science and technology, from the advanced student to the experienced laser scientist. * The first comprehensive book-length treatment of quantum well lasers * Provides a detailed treatment of quantum well laser basics * Covers strained quantum well lasers * Explores the different state-of-the-art quantum well laser types * Provides key information on future laser technologies The complete guide to understanding and using lasers in material processing! Lasers are now an integral part of modern society, providing extraordinary opportunities for innovation in an ever-widening range of material processing and manufacturing applications. The study of laser material processing is a core element of many materials and manufacturing courses at undergraduate and postgraduate level. As a consequence, there is now a vast amount of research on the theory and application of lasers to be absorbed by students, industrial researchers, practising engineers and production managers. Written by an acknowledged expert in the field with over twenty years' experience in laser processing, John Ion distils cutting-edge information and research into a single key text. Essential for anyone studying or working with lasers, Laser Processing of Engineering Materials provides a clear explanation of the underlying principles, including physics, chemistry and materials science, along with a framework of available laser processes and their distinguishing features and variables. This book delivers the knowledge needed to understand and apply lasers to the processing of engineering materials, and is highly recommended as a valuable guide to this revolutionary manufacturing technology. The first single volume text that treats this core engineering subject in a systematic manner Covers the

principles, practice and application of lasers in all contemporary industrial processes; packed with examples, materials data and analysis, and modelling techniques This Book On Lasers Is The Culmination Of Several Years Of Relentless Personal Research, Exhaustive Literature Survey, Critical Analysis Of All The Facets Of The Subject And Interactions With The Subject Experts And Students In India And Abroad, By The Author.This Book Has Been Very Systematically Structured And Organised. The Subject Has Been Divided Into Three Parts. Part A Deals With All The Established Principles And Theories Of Laser Science Prefixed With A Journey Through The Relevant Areas Of Optics And Modern Physics. Part B Presents A Galaxy Of All The Available Laser Schemes Of The Day, With A Peep Into The Future. Part C Deals With The Myriads Of Applications Of This 'Wonder Beam' In Every Walk Of Life.While Giving An Exhaustive Account About Lasers, The Book Also Covers All The, Relevant Aspects Of Related Subjects Such As Fibre Optics, Holography, Laser Safety Etc. Apart From The Excellent Presentation Of The Topics, As They Unfold, This Book Contains A Rich Fund Of Worked Out Examples And Student Exercises, With Answers.The Language Is Simple And Reader-Friendly, The Treatise Logical, And Even The Intricate Mathematical Derivations And Clear And Lucid. This Book Is Meant To Be A Very Valuable Guide To Students At Graduate And Postgraduate Levels And To Those Working Or Intending To Work In The Field Of Lasers, To Add To What They Already Know. This Is Perhaps The Only Book, At Present, On Lasers By An Indian Author With Such A Vast Coverage Of The Subject Itself And The Associated Disciplines. Expand your skills in the rapidly growing field of laser dentistry! Principles and Practice of Laser Dentistry uses a concise, evidence-based approach in describing protocols and procedures. Dr. Robert A. Convissar, a renowned lecturer on this subject, has assembled a diverse panel of international contributors; he’s also one of the first general dentists to use lasers in his practice. The book covers the history of lasers in dentistry and laser research, plus the use of lasers in periodontics, periodontal surgery, oral pathology, implantology, fixed and removable prosthetics, cosmetic procedures, endodontics, operative dentistry, pediatrics, orthodontics, and oral and maxillofacial surgery. Full-color images show the latest laser technology, surgical techniques, and key steps in patient treatment. Full-color photos and illustrations demonstrate surgical techniques and key teaching points. A Laser Fundamentals chapter describes the physics of lasers and the wavelengths that can produce better outcomes. Introducing Lasers into the Dental Practice chapter provides guidelines on investing in laser technology and in marketing this new procedure. Clinical Tip and Caution boxes include advice and alerts that can only be offered by a seasoned practitioner of 27 years. At the time that we decided to begin work on this book, several other volumes on the free-electron laser had either been published or were in press. The earliest work of which we were aware was published in 1985 by Dr T. C. Marshall of Columbia University [1]. This book dealt with the full range of research on free-electron lasers, including an overview of the extant experiments. However, the field has matured a great deal since that time and, in our judgement, the time was ripe for a more extensive work which includes the most recent advances in the field. The fundamental work in this field has largely been approached from two distinct and, unfortunately, separate viewpoints. On the one hand, free-electron lasers at sub-millimetre and longer wavelengths driven by low-energy and high-current electron beams have been pursued by the plasma physics and microwave tube communities. This work has confined itself largely to the high-gain regimes in which collective effects may play an important role. On the other hand, short-wavelength free-electron lasers in the infrared and optical regimes have been pursued by the accelerator and laser physics community. Due to the high-energy and low-current electron beams appropriate to this spectral range, these experiments have operated largely in the low-gain single-particle regimes. The most recent books published on the free-electron laser by Dr C. A. A tutorial introduction to the field of dye lasers, Dye Laser Principles also serves as an up-to-date overview for those using dye lasers as research and industrial tools. A number of the issues discussed in this book are pertinent not only to dye lasers but also to lasers in general. Most of the chapters in the book contain problem sets that expand on the material covered in the chapter. Dye lasers are among the most versatile and successful laser sources currently available in use Offering both pulsed and continuous-wave operation and tunable from the near ultraviolet to the near infrared, these lasers are used in such diverse areas as: industrial applications, medical applications, military applications, large-scale laser isotope separation, fundamental physics, spectroscopic techniques, laser radar This book is motivated by the very favorable reception given to the previous editions as well as by the considerable range of new developments in the laser field since the publication of the third edition in 1989. These new developments include, among others, quantum-well and muitiple-quantum-welliasers, diode-pumped solid-state lasers, new concepts for both stable and unstable resonators, femtosecond lasers, ultra-high-brightness lasers, etc. This edition thus represents a radically revised version of the preceding edition, amounting essentially to a new book in its own right. However, the basic aim has remained the same, namely to provide a broad and unified description of laser behavior at the simplest level which is compatible with a correct physical understanding. The book is therefore intended as a textbook for a senior-level or first-year graduate course and/or as a reference book. The most relevant additions or changes to this edition can be summarized as follows: 1. A much-more detailed description of Amplified Spontaneous Emission has been given (Chapter 2) and a novel simplified treatment of this phenomenon, both for homogeneous and inhomogeneous lines, has been introduced (Appendix C). 2. A major fraction of a new chapter (Chapter 3) is dedicated to the interaction of radiation with semiconductor media, either in a bulk form or in a quantum-confined structure (quantum-well, quantum-wire and quantum dot). 3. 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 and engineers who work with lasers. The Handbook provides, a comprehensive guide to the current status of lasers and laser systems; it is accessible to science or engineering graduates needing no more than standard undergraduate knowledge of optics. Whilst being a self-contained reference work, the Handbook provides extensive references to contemporary work, and is a basis for studying the professional journal literature on the subject. It covers applications through detailed case studies, and is therefore well suited to readers who wish to use it to solve specific problems of their own. The first of the three volumes comprises an introduction to the basic scientific principles of lasers, laser beams and non-linear optics. The second volume describes the mechanisms and operating characteristics of specific types of laser including crystalline solid - state lasers, semiconductor diode lasers, fibre lasers, gas lasers, chemical lasers, dye lasers and many others as well as detailing the optical and electronic components which tailor the laser's performance and beam delivery systems. The third volume is devoted to case studies of applications in a wide range of subjects including materials processing, optical measurement techniques, medicine, telecommunications, data storage, spectroscopy, earth sciences and astronomy, and plasma fusion research. This vast compendium of knowledge on laser science and technology is the work of over 130 international experts, many of whom are recognised as the world leaders in their respective fields. Whether the reader is engaged in the science, technology, industrial or medical applications of lasers or is researching the subject as a manager or investor in technical enterprises they cannot fail to be informed and enlightened by the wide range of information the Handbook supplies. Principles of Lasers and Optics, first published in 2005, describes both the fundamental principles of the laser and the propagation and application of laser radiation in bulk and guided-wave components. All solid state, gas and semiconductor lasers are analysed uniformly as macroscopic devices with susceptibility originated from quantum mechanical interactions to develop an overall understanding of the coherent nature of laser radiation. Analyses of the unique properties of coherent laser light in bulk and guided-wave components are presented together and derived from fundamental principles, to allow students to appreciate the differences and similarities. Topics covered include discussions on how laser radiation should be analysed, the macroscopic differences and similarities of various analyses, special techniques, types of lasers and setting up laser analyses. This text will be useful for first-year graduates in electrical engineering and physics and also as a reference book on analytical techniques. Introduction to Laser Spectroscopy is a well-written, easy-to-read guide to understanding the fundamentals of lasers, experimental methods of modern laser spectroscopy and applications. It provides a solid grounding in the fundamentals of many aspects of laser physics, nonlinear optics, and molecular spectroscopy. In addition, by comprehensively combining theory and experimental techniques it explicates a variety of issues that are essential to understanding broad areas of physical, chemical and biological science. Topics include key laser types - gas, solid state, and semiconductor - as well as the rapidly evolving field of ultrashort laser phenomena for femtochemistry applications. The examples used are well researched and clearly presented. Introduction to Laser Spectroscopy is strongly recommended to newcomers as well as researchers in physics, engineering, chemistry and biology. * A comprehensive course that combines theory and practice * Includes a systematic and comprehensive description for key laser types * Written for students and professionals looking to gain a thorough

understanding of modern laser spectroscopy Will full-color photographs throughout, this reference demonstrates and assesses various technologies and methods to effectively perform laser treatments for a variety of cutaneous disorders-emphasizing the selection of the appropriate laser for each clinical situation, practical treatment guidelines, and the avoidance of complications in the practice of laser surgery. This book is especially written for physicians and dentists who are new to the exciting field of lasers. It will give you a good reference for the physical and biophysical part of laser medicine and dentistry. It may also serve you well as a reference and study material in a fellowship or master's program. There are many books about lasers and laser physics, but these are written by physicists for physicists - and they generally do not address the specific knowledge a doctor needs to be aware of when it comes to laser-tissue-interaction. In this book, I want to cut to the chase. I will give you the background information you need when new to the field of laser medicine or laser dentistry: Your laser: what is that thing you just bought or are considering to use? How does absorption, scattering and transmission in biological tissues take place? On what parameters do the clinical effects depend? How can a laser be used as a minimally invasive tool in modern medicine? Laser Therapy in Veterinary Medicine: Photobiomodulation is a complete guide to using therapeutic lasers to treat veterinary patients, focusing on practical information. Offers a comprehensive resource for incorporating therapeutic lasers in veterinary practice Focuses on practical information tailored for the veterinary clinic Written by 37 leading experts in veterinary laser therapy Provides a thorough foundation on this standard-of-care modality Emphasizes clinical applications with a real-world approach This textbook originates from a lecture course in laser physics at the Karlsruhe School of Optics and Photonics at the Karlsruhe Institute of Technology (KIT). A main goal in the conception of this textbook was to describe the fundamentals of lasers in a uniform and especially lab-oriented notation and formulation as well as many currently well-known laser types, becoming more and more important in the future. It closes a gap between the measureable spectroscopic quantities and the whole theoretical description and modeling. This textbook contains not only the fundamentals and the context of laser physics in a mathematical and methodical approach important for university-level studies. It allows simultaneously, owing to its conception and its modern notation, to directly implement and use the learned matter in the practical lab work. It is presented in a format suitable for everybody who wants not only to understand the fundamentals of lasers but also use modern lasers or even develop and make laser setups. This book tries to limit prerequisite knowledge and fundamental understanding to a minimum and is intended for students in physics, chemistry and mathematics after a bachelor degree, with the intention to create as much joy and interest as seen among the participants of the corresponding lectures. This university textbook describes in its first three chapters the fundamentals of lasers: light-matter interaction, the amplifying laser medium and the laser resonator. In the fourth chapter, pulse generation and related techniques are presented. The fifth chapter gives a closing overview on different laser types gaining importance currently and in the future. It also contains a set of examples on which the theory learned in the first four chapters is applied and extended. This Guide provides an overview on the essential types of lasers and their key properties as well as an introduction into the most important physical and technological aspects of lasers. Apart from describing the basic principles (such as stimulated emission and the properties of optical resonators), this Guide discusses the numerous important properties of laser crystals, the impact of thermal effects on laser performance, methods of wavelength tuning and pulse generation, and laser noise. Practitioners will also gain valuable insight from remarks on laser safety and obtain new ideas about how to make the laser development process more efficient. Advanced Laser Surgery in Dentistry delivers a state-of-the-art reference for laser technology in the context of a dental practice. The book encompasses oral surgery, periodontology, and implant dentistry, covering the latest research, knowledge, and clinical practices. The author demonstrates the clinical relevance by including many real-world clinical cases that illustrate the application of the discussed techniques. The book includes high-quality, color photographs throughout to support the text and add visual information to the covered topics, which include wound healing, oral surgery, periodontology, implant dentistry, and laser fundamentals and safety considerations. Advanced Laser Surgery in Dentistry provides readers with a step-by-step guide for using lasers in dental practice and discusses likely new directions and possible future treatments in the rapidly advancing field of laser dentistry. Readers will also benefit from a wide variety of subjects, including: A thorough introduction to the fundamentals of lasers, including the beam, the laser cavity, active mediums, lenses, resonators, and delivery systems An exploration of lasers and wound healing, including soft tissue and bone healing, as well as laser-assisted excisions and osteotomies An analysis of lasers in periodontology, including laser-assisted bacteria reduction in the periodontal tissues and the removal of subgingival dental calculus A discussion of lasers in implant dentistry and treatment for peri-implantitis Perfect for oral and maxillofacial surgeons, periodontists, and implant dentists, as well as general dentists, Advanced Laser Surgery in Dentistry will also earn a place in the libraries of dental students and residents seeking to improve their understanding of laser-based oral and dental procedures with a carefully organized reference guide. This monograph summarizes major achievements in laser dynamics over the past three decades. The book begins with two introductory Chapters. Chapter 1 offers general considerations on quantum oscillators, formulates the requirements for the laser key elements and shows how these requirements are met in different laser systems. The second Chapter proposes the mathematical models used in semiclassical laser theory, discusses the approximations and simplifications in particular cases, and specifies the range of applicability of these models. In Chapters 3-5 attention is given primarily to the steady states and their stability, the laser behavior in the instability domain, the characteristics of regular and chaotic pulsations and the nature of their mechanisms. Chapter 6 deals with the processes in a laser, accompanying the time variance of laser parameters. Considerable attention is given to a laser response to weak, low-frequency modulation of the parameters. The problems addressed therein are resonant modulation enhancement, transition to the nonlinear regime, chaotic response to periodic impact, spike-like generation due to variation of the cavity geometry and a laser rod temperature drift. Laser behavior is subject to qualitative changes if its optical elements exhibit nonlinear properties. The action of a saturable absorber, which leads to a loss of laser stability and provides passive Q-modulation, is investigated. To a much lesser degree the researchers' attention has been attracted by other nonlinear effects such as self-focusing, e.g., which may have a strong influence on laser dynamics. All of these issues are covered in Chapter 7. The book is intended for researchers, engineers, graduate and post-graduate students majoring in quantum electronics. This monograph summarizes major achievements in laser dynamics over the past three decades. The book begins with two introductory Chapters. 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Its mission remains to provide a broad, unified description of laser behavior, physics, technology, and applications. This book describes the principles of laser treatment in dermatology and, taking into account these principles, provides clinicans with clear, up-to-date guidance on choice of the appropriate laser and parameters for different skin conditions. The aim is to provide a gold standard laser reference book that will meet the needs of those who are already performing laser surgery as well as novices to the field. Readers will find readily understandable coverage of both basic and advanced laser theory. Based on this theory, the authors proceed to explain all the considerations that need to be taken into account when choosing laser systems and parameters for a variety of indications, including all relevant vascular and pigmented lesions and the removal of hair, scars, and tattoos. Close attention is paid to the skin characteristics of Asians and the impacts of these characteristics on parameter selection. In addition, a separate chapter is devoted to the efficacy and safety of laser treatment of

melasma, a common disease in Asians. Laser-Beam Interactions with Materials treats, from a physicist's point of view, the wide variety of processes that lasers can induce in materials. Physical phenomena ranging from optics to shock waves are discussed, as are applications in such diverse fields as semiconductor annealing, hole drilling and fusion plasma production. The approach taken emphasizes the fundamental ideas and their interrelations. The newcomer is given the necessary important background material, while the active research worker finds a critical and comprehensive review of the field. Geared toward upper-level undergraduate and graduate students, this text introduces the interdisciplinary area of laser light scattering. It focuses chiefly on quasielastic laser scattering, discussing theoretical concepts at a realistic level. Some background in the physical sciences is assumed, but the opening chapters offer a brief review of classical electricity and magnetism as well as the general scattering theory. Topics include basic theoretical concepts related to light mixing spectroscopy, characteristics of the Fabry-Perot interferometer, and photon-counting fluctuations. The author, a distinguished professor in the Department of Chemistry at Stony Brook University, discusses experimental methods, including setting up a light scattering spectrometer using digital photon-counting and correlation techniques. Subsequent chapters explore applications to macromolecular systems, anemometry and its utility in reaction kinetics, and critical opalescence. References appear throughout the text. Laser Fundamentals provides a clear and comprehensive introduction to the physical and engineering principles of laser operation and design. Simple explanations, based throughout on key underlying concepts, lead the reader logically from the basics of laser action to advanced topics in laser physics and engineering. Much new material has been added to this second edition, especially in the areas of solid-state lasers, semiconductor lasers, and laser cavities. This 2004 edition contains a new chapter on laser operation above threshold, including extensive discussion of laser amplifiers. The clear explanations, worked examples, and many homework problems will make this book invaluable to undergraduate and first-year graduate students in science and engineering taking courses on lasers. The summaries of key types of lasers, the use of many unique theoretical descriptions, and the extensive bibliography will also make this a valuable reference work for researchers. This second edition, appearing about twenty years after the discovery of the laser is a substantially revised version of the first edition. It is, like the first, aimed at both classroom teaching and self-study by technical personnel interested in learning the principles of laser operation. In preparing the second edition the hope has been that both these aims will be better served as a result of the various improvements made. The main changes have been made with the following aims in mind: (i) To update the book. Thus new topics have been added (in particular on various new types of lasers, e. g. , rare-gas-halide excimer lasers, color-center lasers, and free-electron lasers), while on the other hand some topics have been given less emphasis (again this applies particularly to some types of lasers, e. g. , the ruby laser). Updating is especially important in the area of laser applications, and the chapter on this topic has therefore been com pletely rewritten. (ii) To make some improvements to the logical consis tency of the book by rearranging material and adding new material. Thus a few topics have been moved from one section to another and a new chapter entitled Laser Beam Transformation has been added. (iii) To further reduce the mathematical content, placing greater emphasis on physical descrip tions of phenomena. Although the basic principles of lasers have remained unchanged in the past 20 years, there has been a shift in the kinds of lasers generating interest. Providing a comprehensive introduction to the operating principles and applications of lasers, this second edition of the classic book on the subject reveals the latest developments and applications of lasers. Placing more emphasis on applications of lasers and on optical physics, the book's self-contained discussions will appeal to physicists, chemists, optical scientists, engineers, and advanced undergraduate students. With the maturation of laser technology in diagnostic and conservation applications, conservation scientists, archeologists, art historians, researchers, and advanced science-oriented students now have the tools necessary for preserving the future of our past-our cultural heritage. Presenting recent developments in the field, Lasers in the Preservation of Cultural Heritage: Principles and Applications addresses the basic concepts of laser applications and supplies case studies of analytical, structural diagnostic, and laser cleaning applications. The book provides a comprehensive presentation of the fundamental principles and applications of modern laser technology in the analysis of composition, diagnostics of structural integrity, and conservation of artworks and antiquities. Beginning with an introduction to the basic techniques used in art conservation and archeology, the book describes the fundamental aspects of laser-matter interactions, emphasizing laser diagnostics and laser processing applications. The next few chapters focus on laser-based spectroscopic techniques for the analysis of the composition of materials in art and archaeology, including laser-induced breakdown, Raman, and laser-induced fluorescence spectroscopic techniques. The book proceeds to highlight nondestructive diagnostic techniques, laser processing applications, laser applications for the cleaning of paintings and stone, and methods for the removal of encrustations. It concludes with case studies for the conservation of materials like parchment, paper, metal, ivory, and wood, and includes conservation approaches for modern paintings. Bridging science with art, Lasers in the Preservation of Cultural Heritage presents a systematic overview of the fundamentals and applications of laser techniques in artwork conservation and archeological science. A comprehensive introduction to the burgeoning field ofphotonics The field of photonics is finding increasing applications across abroad range of industries. While many other books provide anoverview of the subject, Fundamentals of Light Sources and Laserscloses a clear gap in the current literature by concentrating onthe principles of laser operation as well as providing coverage ofimportant concepts necessary to fully understand the principlesinvolved. The scope of the book includes everything a professionalneeds to get up to speed in the field, as well as all the materialnecessary to serve as an excellent introductory laser course forstudents. Ideal for self-study as well as structured coursework, the bookoffers thorough coverage of: * The nature of light and atomic emission * Basic quantum mechanics and laser processes * Cavity optics, fast-pulse production, and nonlinear opticalphenomena * Laser technology, including visible gas lasers, UV gas lasers,infrared gas lasers, solid-state lasers, semiconductor lasers andtunable dye lasers Extensive real-world case studies are included to help readersappreciate the practical applications of the material covered. *An Instructor's Manual presenting detailed solutions to all theproblems in the book is available from the Wiley editorialdepartment. Lasers is both a textbook and a general reference book with an emphasis on basic laser principles and theory. This textbook provides an introductory presentation of all types of lasers. It contains a general description of the laser, a theoretical treatment and a characterization of its operation as it deals with gas, solid state, free-electron and semiconductor lasers. This expanded and updated second edition of the book presents a description of the dynamics of free-electron laser oscillation using a model introduced in the first edition that allows a reader to understand basic properties of a free-electron laser and makes the difference to “conventional” lasers. The discussions and the treatment of equations are presented in a way that a reader can immediately follow. The book addresses graduate and undergraduate students in science and engineering, featuring problems with solutions and over 400 illustrations. Heterostructure Lasers, Part B: Materials and Operating Characteristics focuses on the operating characteristics of heterostructure lasers and the semiconductor materials used to fabricate them. Each major topic is introduced along with the basic laws that govern the observed phenomena. The expressions relevant to heterostructure lasers are derived from the basic laws, and realistic numerical examples based on the GaAs-AlxGa1-xAs heterostructure are given. This book is comprised of four chapters and begins with a discussion on semiconductor materials that have been used most extensively to fabricate heterostructure injection lasers, particularly combinations of III-V compounds. IV-VI binary compounds and their solutions are described, along with compositional grading for heterostructure lasers. The next chapter presents the phase equilibria, impurity incorporation, and the epitaxial growth techniques for heterostructure lasers, namely, liquid-phase epitaxy, molecular-beam epitaxy, and chemical vapor deposition. The fabrication and operating characteristics of both broad-area and stripe-geometry heterostructure lasers are then examined. The final chapter is devoted to the degradation of heterostructure lasers, with emphasis on catastrophic mirror damage at high power densities, ""dark-line defect"" formation, and gradual degradation. This monograph will be of interest to physicists.


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- Lasers
- Principles Of Free Electron Lasers
- Principles Of Laser Spectroscopy And Quantum Optics
- Principles Of Laser Materials Processing
- Principles Of Lasers
- Laser Physics
- Handbook Of Laser Technology And Applications
- Principles And Practice Of Laser Dentistry E Book
- Laser Fundamentals
- Basics Of Laser Physics
- Dye Laser Principles
- Lasers Principles And Applications
- Laser Light Scattering
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