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Optical Properties of Semiconductor Nanocrystals - S. V. Gaponenko 1998-10-28

Examines the optical properties of low-dimensional semiconductor structures, a hot research area - for graduate students and researchers.

Perspectives in Optoelectronics -

Introduction to Modern Digital Holography - Ting-Chung Poon 2014-01-23

Building up from the basic principles of optics, this straightforward introduction to digital holography, aimed at graduate students, engineers and researchers, describes modern techniques and applications, plus all the necessary underlying theory. Supporting Matlab code is available for download online, and homework problems are accompanied by an instructor solution manual.

Mathematical Methods for Optical Physics and Engineering - Gregory J. Gbur 2011-01-06

The first textbook on mathematical methods focusing on techniques for optical science and engineering, this text is ideal for upper division undergraduate and graduate students in optical physics. Containing detailed sections on the basic theory, the textbook places strong emphasis on connecting the abstract mathematical concepts to the optical systems to which they are applied. It covers many topics which usually only appear in more specialized books, such as Zernike polynomials, wavelet and fractional Fourier transforms, vector spherical harmonics, the z-transform, and the angular spectrum representation. Most chapters end by showing how the techniques covered can be used to solve an optical problem. Essay problems based on research publications and numerous exercises help to further strengthen the connection between the theory and its applications.

Supercontinuum Generation in Optical Fibers - J. M. Dudley 2010-04-01

The optical fiber based supercontinuum source has recently become a significant scientific and commercial success, with applications ranging from frequency comb production to advanced medical imaging. This one-of-a-kind book explains the theory of fiber supercontinuum broadening, describes the diverse operational regimes and indicates principal areas of applications, making it a very important guide for researchers and graduate students. With contributions from major figures and groups who have pioneered research in this field, the book describes the historical development of the subject, provides a background to the associated nonlinear optical processes, treats the generation mechanisms from continuous wave to femtosecond pulse pump regimes and highlights the diverse applications. A full discussion of numerical methods and comprehensive computer code are also provided, enabling readers to confidently predict and model supercontinuum generation characteristics under realistic conditions.

Handbook of Silicon Photonics - Laurent Vivien 2016-04-19

The development of integrated silicon photonic circuits has recently been driven by the Internet and the push for high bandwidth as well as the need to reduce power dissipation induced by high data-rate signal transmission. To reach these goals, efficient passive and active silicon photonic devices, including waveguide, modulators, photodetectors,

Fundamentals of Laser Optoelectronics (Second Edition) - See Leang Chin, Huailiang Xu and Shuai Yuan

Classical Optics and its Applications - Masud Mansuripur 2009-02-26

Covering a broad range of fundamental topics in classical optics and electro-magnetism, this book is ideal for graduate-level courses in optics, providing supplementary reading materials for teachers and students alike. Industrial scientists and engineers developing modern optical systems will also find it an invaluable resource. Now in color, this second edition contains 13 new chapters, covering optical pulse compression, the Hanbury Brown-Twiss experiment, the Sagnac effect, Doppler shift and stellar aberration, and optics of semiconductor diode lasers. The first half of the book deals primarily with the basic concepts of optics, while the second half describes how these concepts can be used in a variety of technological applications. Each chapter is concerned with a single topic, developing an understanding through the use of diagrams, examples, numerical simulations, and logical arguments. The mathematical content is kept to a minimum to provide the reader with insightful discussions of optical phenomena.

Laser and Photonic Systems - Shimon Y. Nof 2014-05-12

New, significant scientific discoveries in laser and photonic technologies, systems perspectives, and integrated design approaches can improve even further the impact in critical areas of challenge. Yet this knowledge is dispersed across several disciplines and research arenas. *Laser and Photonic Systems: Design and Integration* brings together a multidisciplinary group of experts to increase understanding of the ways in which systems perspectives may influence laser and photonic innovations and application integration. By bringing together chapters from leading scientists and technologists, industrial and systems engineers, and managers, the book stimulates new thinking that would bring a systems, network, and system-of-systems perspective to bear on laser and photonic systems applications. The chapters challenge you to explore opportunities for revolutionary and broader advancements. The authors emphasize the identification of emerging research and application frontiers where there are promising contributions to lasers, optics, and photonics applications in fields such as manufacturing, healthcare, security, and communications. The book contains insights from leading researchers, inventors, implementers, and innovators. It explains a variety of techniques, models, and technologies proven to work with laser and photonic systems, their development, design, and integration. Such systems are of growing interest to many organizations, given their promise and potential solutions of grand societal challenges. Lastly, the book helps you leverage the knowledge into exciting new frontiers of successful solutions.

Introducing Photonics - Brian Culshaw 2020-07-30

A concise, accessible guide explaining the essential ideas underlying photonics and how they relate to photonic devices and systems.

Materials for Optoelectronic Devices, OEICs and Photonics - H. Schlötterer 1991-10-08

The aim of the contributions in this volume is to give a current overview on the basic properties and applications of semiconductor and nonlinear optical materials for optoelectronics and integrated optics. They provide a cross-linkage between different materials (III-V, II-VI, Si-Ge, glasses, etc.), various sample dimensions (from bulk crystals to quantum dots), and a range of techniques for growth (LPE to MOMBE) and for processing (from surface passivation to ion beams). Major growth techniques and materials are discussed, including the sophisticated technologies required to exploit the exciting properties of low

dimensional semiconductors. These proceedings will prove an invaluable guide to the current state of optoelectronic and nonlinear optical materials development, as well as indicating trends and also future markets for optoelectronic devices.

The Angular Momentum of Light - David L. Andrews 2013

The first comprehensive and authoritative coverage of the angular momentum of light, illustrating both its theoretical and applied aspects.

The Elements of Nonlinear Optics - Paul N. Butcher 1990

This book is a self-contained account of the most important principles of nonlinear optics. Assuming a familiarity with basic mathematics, the fundamentals of nonlinear optics are developed from the basic concepts, introducing and explaining the essential quantum mechanical apparatus as it arises. Later chapters deal with the materials used and the constructions that are necessary to induce the effects.

A Practical Guide to Experimental Geometrical Optics - Yuriy A. Garbovskiy 2017-12-28

A concise, yet deep introduction to geometrical optics, developing the practical skills and research techniques routinely used in modern laboratories. Suitable for both students and self-learners, this accessible text teaches readers how to build their own optical laboratory, and design and perform optical experiments.

2D Materials for Photonic and Optoelectronic Applications - Qiaoliang Bao 2019-10-19

2D Materials for Photonic and Optoelectronic Applications introduces readers to two-dimensional materials and their properties (optical, electronic, spin and plasmonic), various methods of synthesis, and possible applications, with a strong focus on novel findings and technological challenges. The two-dimensional materials reviewed include hexagonal boron nitride, silicene, germanene, topological insulators, transition metal dichalcogenides, black phosphorous and other novel materials. This book will be ideal for students and researchers in materials science, photonics, electronics, nanotechnology and condensed matter physics and chemistry, providing background for both junior investigators and timely reviews for seasoned researchers. Provides an in-depth look at boron nitride, silicene, germanene, topological insulators, transition metal dichalcogenides, and more Reviews key applications for photonics and optoelectronics, including photodetectors, optical signal processing, light-emitting diodes and photovoltaics Addresses key technological challenges for the realization of optoelectronic applications and comments on future solutions

Microwave Photonics - Stavros Iezekiel 2009-03-23

Microwave photonics is an important interdisciplinary field that, amongst a host of other benefits, enables engineers to implement new functions in microwave systems. With contributions from leading experts, *Microwave Photonics: Devices and Applications* explores this rapidly developing discipline. It bridges a gap between microwave and photonic engineering, providing an accessible interpretation of the current available research material and a detailed introduction to various aspects of the area. Opening with an overview to the subject, this book covers direct modulation, photonic oscillators for THz signal generation, and terahertz sources. It takes a unique application- focused approach and describes: analogue fibre-optic links; fibre radio technology; microwave photonic signal processing; measurement of microwave photonic components, and; biomedical applications. This text is ideal for practising microwave and fibre optics communication engineers wishing to improve their knowledge, and for researchers and graduate students wanting an overview of the subject.

Photonics and Lasers - Richard S. Quimby 2006-04-14

An introduction to photonics and lasers that does not rely on complex mathematics This book evolved from a series of courses developed by the author and taught in the areas of lasers and photonics. This thoroughly classroom-tested work fills a unique need for students, instructors, and industry professionals in search of an introductory-level book that covers a wide range of topics in these areas. Comparable books tend to be aimed either too high or too low, or they cover only a portion of the topics that are needed for a comprehensive treatment. *Photonics and Lasers* is divided into four parts: * Propagation of Light * Generation and Detection of Light * Laser Light * Light-Based Communication The author has ensured that complex mathematics does not become an obstacle to understanding key physical concepts. Physical arguments and explanations are clearly set forth while, at the same time, sufficient mathematical detail is provided for a quantitative understanding. As an additional aid to readers who are learning to think

symbolically, some equations are expressed in words as well as symbols. Problem sets are provided throughout the book for readers to test their knowledge and grasp of key concepts. A solutions manual is also available for instructors. Finally, the detailed bibliography leads readers to in-depth explorations of particular topics. The book's topics, lasers and photonics, are often treated separately in other texts; however, the author skillfully demonstrates their natural synergy. Because of the combined coverage, this text can be used for a two-semester course or a one-semester course emphasizing either lasers or photonics. This is a perfect introductory textbook for both undergraduate and graduate students, additionally serving as a practical reference for engineers in telecommunications, optics, and laser electronics.

Mid-infrared Optoelectronics - Eric Tournié 2019-10-19

Mid-infrared Optoelectronics: Materials, Devices, and Applications addresses the new materials, devices and applications that have emerged over the last decade, along with exciting areas of research. Sections cover fundamentals, light sources, photodetectors, new approaches, and the application of mid-IR devices, with sections discussing LEDs, laser diodes, and quantum cascade lasers, mid-infrared optoelectronics, emerging research areas, dilute bismide and nitride alloys, Group-IV materials, gallium nitride heterostructures, and new nonlinear materials. Finally, the most relevant applications of mid-infrared devices are reviewed in industry, gas sensing, spectroscopy, and imaging. This book presents a key reference for materials scientists, engineers and professionals working in R&D in the area of semiconductors and optoelectronics. Provides a comprehensive overview of mid-infrared photodetectors and light sources and the latest materials and devices Reviews emerging areas of research in the field of mid-infrared optoelectronics, including new materials, such as wide bandgap materials, chalcogenides and new approaches, like heterogeneous integration Includes information on the most relevant applications in industry, like gas sensing, spectroscopy and imaging

Metal Oxides for Optoelectronics and Optics-Based Medical Applications - Suresh Sagadevan 2022-07-15

Metal Oxides for Optoelectronics and Optics-based Medical Applications reviews recent advances in metal oxides and their mechanisms for optoelectronic, photoluminescent and medical applications. In addition, the book examines the integration of key chemistry concepts with nanoelectronics that can improve performance in a diverse range of applications. Sections place a strong emphasis on synthesis processes that can improve the metal oxides' physical properties and the reflected surface chemical changes that can impact their performance in various devices like light-emitting diodes, luminescence materials, solar cells, etc. Finally, the book discusses the challenges associated with the handling and maintenance of metal oxides crystalline properties. This book will be suitable for academics and those working in R&D in industry looking to learn more about cheaper and more effective methods to produce metal oxides for use in the fields of electronics, photonics, biophotonics and engineering. Reviews the latest advances in the utilization of metal oxide materials in photonics, optoelectronics and optics-based medical applications Considers the most relevant synthesis strategies for the development of high-performing metal oxide-based devices Addresses a wide range of metal oxides including photonic crystals, fibers, metastructures, glasses, and more

A Practical Guide to Laboratory Optics - Andri M. Gretarsson 2021-06-03

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

Basics of Interferometry - P. Hariharan 2012-12-02

This book is for those who have some knowledge of optics, but little or no previous experience in interferometry. Accordingly, the carefully designed presentation helps readers easily find and assimilate the interferometric techniques they need for precision measurements. Mathematics is held to a minimum, and the topics covered are also summarized in capsule overviews at the beginning and end of each chapter. Each chapter also contains a set of worked problems that give a feel for numbers. The first five chapters present a clear tutorial review of fundamentals. Chapters six and seven discuss the types of lasers and photodetectors used in interferometry. The next eight chapters describe key applications of interferometry: measurements of length, optical testing, studies of refractive index fields, interference microscopy, holographic and speckle interferometry, interferometric sensors, interference spectroscopy, and Fourier-transform spectroscopy. The final chapter offers suggestions on choosing and setting up an interferometer.

Optical Sources, Detectors, and Systems - Robert H. Kingston 1995-07-06

Optical Sources, Detectors, and Systems presents a unified approach, from the applied engineering point of view, to radiometry, optical devices, sources, and receivers. One of the most important and unique features of the book is that it combines modern optics, electric circuits, and system analysis into a unified, comprehensive treatment. The text provides physical concepts together with numerous data for sources and systems and offers basic analytical tools for a host of practical applications. Convenient reference sources, such as a glossary with explanatory text for specialized optical terminology, are included. Also, there are many illustrative examples and problems with solutions. The book covers many important, diverse areas such as medical thermography, fiber optical communications, and CCD cameras. It also explains topics such as D^* , NEP, f number, RA product, BER, shot noise, and more. This volume can be considered an essential reference for research and practical scientists working with optical and infrared systems, as well as a text for graduate-level courses on optoelectronics, optical sources and systems, and optical detection. A problem solution manual for instructors who wish to adopt this text is available. Provides a unified treatment of optical sources, detectors, and applications Explains D^* , NEP, f number, RA product, BER, shot noise, and more Contains numerous illustrative examples and exercises with solutions

Extensively illustrated with more than 90 drawings and graphs

Principles of Photonics - Jia-Ming Liu 2016-08-19

With this self-contained and comprehensive text, students will gain a detailed understanding of the fundamental concepts and major principles of photonics. Assuming only a basic background in optics, readers are guided through key topics such as the nature of optical fields, the properties of optical materials, and the principles of major photonic functions regarding the generation, propagation, coupling, interference, amplification, modulation, and detection of optical waves or signals. Numerous examples and problems are provided throughout to enhance understanding, and a solutions manual containing detailed solutions and explanations is available online for instructors. This is the ideal resource for electrical engineering and physics undergraduates taking introductory, single-semester or single-quarter courses in photonics, providing them with the knowledge and skills needed to progress to more advanced courses on photonic devices, systems and applications.

Organic Optoelectronics and Photonics - 2004

Polarization Holography - L. Nikolova 2009-05-14

Reference for researchers reviewing the developments in this field over the last 15 years.

Computational Photonics - Marek S. Wartak 2013-01-10

A comprehensive manual on the efficient modeling and analysis of photonic devices through building numerical codes, this book provides graduate students and researchers with the theoretical background and MATLAB programs necessary for them to start their own numerical experiments. Beginning by summarizing topics in optics and electromagnetism, the book discusses optical planar waveguides, linear optical fiber, the propagation of linear pulses, laser diodes, optical amplifiers, optical receivers, finite-difference time-domain method, beam propagation method and some wavelength division devices, solitons, solar cells and metamaterials. Assuming only a basic knowledge of physics and numerical methods, the book is ideal for engineers, physicists and practising scientists. It concentrates on the operating principles of optical devices, as well as the models and numerical methods used to describe them.

Introduction to Aberrations in Optical Imaging Systems - José Sasián 2013

An accessible, well presented introduction to the theory of optical aberrations, covering key topics that are often missing from comparable books.

Nanoscale Photonics and Optoelectronics - Zhiming M Wang 2010-11-16

The intersection of nanostructured materials with photonics and electronics shows great potential for clinical diagnostics, sensors, ultrafast telecommunication devices, and a new generation of compact and fast computers. Nanophotonics draws upon cross-disciplinary expertise from physics, materials science, chemistry, electrical engineering, biology, and medicine to create novel technologies to meet a variety of challenges. This is the first book to focus on novel materials and techniques relevant to the burgeoning area of nanoscale photonics and optoelectronics, including novel-hybrid materials with multifunctional

capabilities and recent advancements in the understanding of optical interactions in nanoscale materials and quantum-confined objects. Leading experts provide a fundamental understanding of photonics and the related science and technology of plasmonics, polaritons, quantum dots for nanophotonics, nanoscale field emitters, near-field optics, nanophotonic architecture, and nanobiophotonic materials.

Photonic Devices and Systems - Hunsperger 2017-10-19

This work describes all the major devices used in photonic systems. It provides a thorough overview of the field of photonics, detailing practical examples of photonic technology in a wide range of applications. Photonic systems and devices are discussed with a mathematical rigor that is precise enough for design purposes yet highly readable.

Sensors And Microsystems, Proceedings Of The 4th Italian Conference - Bremner J Mike 2000-01-22

The Mathematical Analysis of Electrical and Optical Wave-motion on the Basis of Maxwell's Equations - Harry Bateman 1915

Fundamentals of Photonics - Bahaa E. A. Saleh 1991-08-29

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.

Photonic Crystal Metasurface Optoelectronics - 2019-07-10

Photonic Crystal Metasurface Optoelectronics, Volume 101, covers an emerging area of nanophotonics that represents a new range of optoelectronic devices based on free-space coupled photonic crystal structures and dielectric metasurfaces. Sections in this new release include Free-space coupled nanophotonic platforms, Fano resonances in nanophotonics, Fano resonances in photonic crystal slabs, Transition from photonic crystals to dielectric metamaterials, Photonic crystals for absorption control and energy applications, Photonic crystal membrane reflector VCSELs, Fano resonance filters and modulators, and Fano resonance photonic crystal sensors. Presents the latest in an emerging area of research with great potentials for research and commercialization Includes sections written by world leading researchers in the field

Optoelectronics and Photonics - Safa O. Kasap 2013

For one-semester, undergraduate-level courses in Optoelectronics and Photonics, in the departments of electrical engineering, engineering physics, and materials science and engineering. This text takes a fresh look at the enormous developments in electro-optic devices and associated materials.

Introduction to Optical Engineering - Francis T. S. Yu 1997-05-13

Optical devices are employed in an ever-increasing range of applications, from simple lenses to complex

fibre-optic communication networks. This book provides a detailed introduction to modern optical engineering, covering the fundamental concepts as well as practical techniques and applications. Basic optical principles are presented, particularly reflection, refraction, aberrations, diffraction and interference. Building on this foundation, a wide variety of optical devices and processes are then discussed, including simple optical instruments, photodetectors, spatial light modulators, holography and lasers. Two chapters are devoted to linear system transforms and signal processing, and the book concludes with a chapter on fibre optics. The book contains many worked examples and over 250 problems (solutions manual for instructors available from the publishers). It will be invaluable to electrical engineering and physics undergraduates taking courses in optical engineering, photonics, and electro-optics.

Handbook of Optoelectronics - John P. Dakin 2017-10-05

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

or broad-based introduction to the field, the Handbook offers everything you need to get started. John P. Dakin, PhD, is professor (emeritus) at the Optoelectronics Research Centre, University of Southampton, UK. Robert G. W. Brown, PhD, is chief executive officer of the American Institute of Physics and an adjunct full professor in the Beckman Laser Institute and Medical Clinic at the University of California, Irvine. *Environmental Sensing and Applications* - Society of Photo-optical Instrumentation Engineers 1999

Diode Lasers and Photonic Integrated Circuits - Larry A. Coldren 2012-03-02

Diode Lasers and Photonic Integrated Circuits, Second Edition provides a comprehensive treatment of optical communication technology, its principles and theory, treating students as well as experienced engineers to an in-depth exploration of this field. Diode lasers are still of significant importance in the areas of optical communication, storage, and sensing. Using the the same well received theoretical foundations of the first edition, the Second Edition now introduces timely updates in the technology and in focus of the book. After 15 years of development in the field, this book will offer brand new and updated material on GaN-based and quantum-dot lasers, photonic IC technology, detectors, modulators and SOAs, DVDs and storage, eye diagrams and BER concepts, and DFB lasers. Appendices will also be expanded to include quantum-dot issues and more on the relation between spontaneous emission and gain.

Optical Electronics - Ajoy Kumar Ghatak 1989-07-20

Intended for senior undergraduate students, a comprehensive account of optical electronics includes the basic principles concerning electromagnetic waves, laser theory, optical wave guides, fiber and integrated optics.

Introductory Quantum Optics - Christopher Gerry 2005

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