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KEY=NEGATIVE - SWEENEY GIDEON

Tunable and Reconfigurable Optical Metamaterials

Frontiers Media SA

Metamaterials

Devices and Applications

BoD - Books on Demand Metamaterials have become one of the most important emerging technologies in the scientific community due to its unusual electromagnetic properties. Consequently, during the last years, a huge deal of efforts has been concentrated in order to design functional components and devices based on metamaterials for many potential applications. The main objective of this book is to present in-depth analysis of the theory, properties, and realizations of novel devices that could be integrated within modern and future communication systems. The book contains 11 chapters written by acknowledged experts, researchers, academics, and microwave engineers, providing comprehensive information and covering a wide range of topics on several aspects of microwaves and optics, including polarization conversion, asymmetric transmission, transmission lines, filters, plasmonic lenses, tunable

metamaterials, light manipulation, absorbers, and antennas, among others. This book is suitable for scholars from large scientific domain and therefore given to engineers, scientists, graduates, and other interested professionals as a reference on these artificial materials of tomorrow.

Liquid Crystals

John Wiley & Sons The latest edition of the leading resource on the properties and applications of liquid crystals In the newly revised Third Edition of *Liquid Crystals*, Professor **Iam Choon Khoo** delivers a comprehensive treatment of the fundamentals and applied aspects of optical physics, light scattering, electro-optics, and non-linear optics of liquid crystals. The book's opening chapters include coverage of the foundational physics and optical properties of liquid crystals and lead to more advanced content on the display, photonics and nonlinear optics applications of liquid crystals. New topics, including photonic crystals, metamaterials, ultrafast nonlinear optics, and fabrication methods for massive cholesteric and blue phase liquid crystals are discussed at length. Analytical methods and experimental observations of nonlinear light propagation through liquid crystalline and anisotropic materials and devices are also discussed. *Liquid Crystals* offers an insightful and unique treatment of the nonlinear optics of liquid crystals. New and expanded sections round out this new edition and add to the most up-to-date resource on this topic available today. The book also includes: A thorough introduction to liquid crystals, including their molecular structures, chemical compositions, order parameter, phase transition, and free energies Practical discussions of nematic, cholesteric, smectic, and ferroelectric liquid crystals, and explorations of linear and nonlinear light scattering in these phases. A detailed quantum mechanical treatment of the linear and nonlinear electronic optical response of liquid crystal molecules to optical fields. A self-contained discussion of the fundamentals of nonlinear optics/photonics and comprehensive review of all liquid crystalline materials-based nonlinear optical processes and applications. The latest edition of *Liquid Crystals* is an indispensable resource for graduate students, professors, research scientists and engineers in industrial or government laboratories. It's also an ideal reference for anyone seeking a one-stop textbook with complete coverage of the optical, electro-optical, and non-linear optical properties and processes of liquid crystals.

Reconfigurable Circuits and

Technologies for Smart Millimeter-Wave Systems

Cambridge University Press Describes the theory, modeling, and design of tunable mm-wave circuits and systems using CMOS, RF MEMS, and microwave liquid crystals.

Terahertz Spectroscopy and Imaging

Springer This book presents the state-of-the-art of Terahertz spectroscopy. It is a modern source for a beginners and researcher interested in THz spectroscopy. The basics and physical background of THz spectroscopy and technology are explained, and important applications are described. The book presents the highlights of scientific research in the field of THz science and provides an excellent overview of the field and future directions of research. Over the last decade the field of terahertz spectroscopy has developed into one of the most rapidly growing fields of spectroscopy with large impact across a wide range of scientific disciplines. Due to substantial advances in femtosecond laser technology, terahertz time-domain spectroscopy (THz-TDS) has established itself as the dominant spectroscopic technique for experimental scientists interested in measurements in this frequency range. In solids and liquids terahertz radiation is at resonance with both phonon modes and hydrogen bonding modes which makes it an ideal tool to study the interaction between molecules in a unique way, thus opening a wealth of opportunities for research in physics, chemistry, biology, materials science and pharmaceuticals. This book provides an easy access to scientists, engineers and students alike who want to understand the theory and applications of modern terahertz spectroscopy.

Comprehensive Nanoscience and Technology

Academic Press From the Introduction: Nanotechnology and its underpinning sciences are progressing with unprecedented rapidity. With technical advances in a variety of nanoscale fabrication and manipulation technologies, the whole topical area is maturing into a vibrant field that is generating new scientific research and a burgeoning range of commercial applications, with an annual market already at the trillion dollar threshold. The means of fabricating and controlling matter on the nanoscale afford

striking and unprecedented opportunities to exploit a variety of exotic phenomena such as quantum, nanophotonic and nanoelectromechanical effects. Moreover, researchers are elucidating new perspectives on the electronic and optical properties of matter because of the way that nanoscale materials bridge the disparate theories describing molecules and bulk matter. Surface phenomena also gain a greatly increased significance; even the well-known link between chemical reactivity and surface-to-volume ratio becomes a major determinant of physical properties, when it operates over nanoscale dimensions. Against this background, this comprehensive work is designed to address the need for a dynamic, authoritative and readily accessible source of information, capturing the full breadth of the subject. Its six volumes, covering a broad spectrum of disciplines including material sciences, chemistry, physics and life sciences, have been written and edited by an outstanding team of international experts. Addressing an extensive, cross-disciplinary audience, each chapter aims to cover key developments in a scholarly, readable and critical style, providing an indispensable first point of entry to the literature for scientists and technologists from interdisciplinary fields. The work focuses on the major classes of nanomaterials in terms of their synthesis, structure and applications, reviewing nanomaterials and their respective technologies in well-structured and comprehensive articles with extensive cross-references. It has been a constant surprise and delight to have found, amongst the rapidly escalating number who work in nanoscience and technology, so many highly esteemed authors willing to contribute. Sharing our anticipation of a major addition to the literature, they have also captured the excitement of the field itself in each carefully crafted chapter. Along with our painstaking and meticulous volume editors, full credit for the success of this enterprise must go to these individuals, together with our thanks for (largely) adhering to the given deadlines. Lastly, we record our sincere thanks and appreciation for the skills and professionalism of the numerous Elsevier staff who have been involved in this project, notably Fiona Geraghty, Megan Palmer and Greg Harris, and especially Donna De Weerd-Wilson who has steered it through from its inception. We have greatly enjoyed working with them all, as we have with each other.

Optoelectronic Nanodevices

MDPI During the last decade, novel graphene related materials (GRMs), perovskites, as well as metal oxides and other metal nanostructures have received the interest of the scientific community. Due to their extraordinary physical, optical, thermal, and electrical properties, which are correlated with their 2D ultrathin atomic layer structure, large interlayer distance, ease of functionalization, and bandgap tunability, these nanomaterials have been applied in the development or the improvement of innovative optoelectronic applications, as well as the

expansion of theoretical studies and simulations in the fast-growing fields of energy (photovoltaics, energy storage, fuel cells, hydrogen storage, catalysis, etc.), electronics, photonics, spintronics, and sensing devices. The continuous nanostructure-based applications development has provided the ability to significantly improve existing products and to explore the design of materials and devices with novel functionalities. This book demonstrates some of the most recent trends and advances in the interdisciplinary field of optoelectronics. Most articles focus on light emitting diodes (LEDs) and solar cells (SCs), including organic, inorganic, and hybrid configurations, whereas the rest address photodetectors, transistors, and other well-known dynamic optoelectronic devices. In this context, this exceptional collection of articles is directed at a broad scientific audience of chemists, materials scientists, physicists, and engineers, with the goals of highlighting the potential of innovative optoelectronic applications incorporating nanostructures and inspiring their realization.

Metamaterials II

16-18 April, 2007, Prague, Czech Republic

Society of Photo Optical Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.

Nonlinear Optics and Applications II

16-18 April 2007, Prague, Czech Republic

Society of Photo Optical Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.

Photon Counting Applications, Quantum Optics, and Quantum Cryptography

18-19 April 2007, Prague, Czech
Republic

Society of Photo Optical Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.

Adaptive Optics for Laser Systems and Other Applications

18-19 April 2007, Prague, Czech
Republic

Society of Photo Optical Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.

Damage to VUV, EUV, and X-ray Optics

18-19 April 2007, Prague, Czech

Republic

Society of Photo Optical Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of SPIE are among the most cited references in patent literature.

Computational Nanotechnology Modeling and Applications with MATLAB®

CRC Press Applications of nanotechnology continue to fuel significant innovations in areas ranging from electronics, microcomputing, and biotechnology to medicine, consumer supplies, aerospace, and energy production. As progress in nanoscale science and engineering leads to the continued development of advanced materials and new devices, improved methods of modeling and simulation are required to achieve a more robust quantitative understanding of matter at the nanoscale. **Computational Nanotechnology: Modeling and Applications with MATLAB®** provides expert insights into current and emerging methods, opportunities, and challenges associated with the computational techniques involved in nanoscale research. Written by, and for, those working in the interdisciplinary fields that comprise nanotechnology—including engineering, physics, chemistry, biology, and medicine—this book covers a broad spectrum of technical information, research ideas, and practical knowledge. It presents an introduction to computational methods in nanotechnology, including a closer look at the theory and modeling of two important nanoscale systems: molecular magnets and semiconductor quantum dots. Topics covered include: Modeling of nanoparticles and complex nano and MEMS systems Theory associated with micromagnetics Surface modeling of thin films Computational techniques used to validate hypotheses that may not be accessible through traditional experimentation Simulation methods for various nanotubes and modeling of carbon nanotube and silicon nanowire transistors In regard to applications of computational nanotechnology in biology, contributors describe tracking of nanoscale structures in cells, effects of various forces on cellular behavior, and use of protein-coated gold nanoparticles to better understand protein-associated nanomaterials. Emphasizing the importance of MATLAB for biological simulations in nanomedicine, this wide-ranging survey of computational nanotechnology concludes by discussing future directions in the field, highlighting the

importance of the algorithms, modeling software, and computational tools in the development of efficient nanoscale systems.

Handbook of Liquid Crystals, 8 Volume Set

John Wiley & Sons This front line reference work defines the science behind the key technology of the 21st century. The reader gets an in-depth and comprehensive overview of everything there is to know about nanotechnology and nanoscience by using a cross-disciplinary approach. Not only fundamentals but also applications of nanotechnology are presented in close to 100 contributions by leading professionals in this field. With topics ranging from engineering to electronics, life and medical sciences, chemistry, materials science and analytics, the following key areas are covered: Principles and Fundamentals of Nanotechnology, Philosophical and Ethical Aspects, Types of Nanosystems, Generation of Nanostructures, Environmental Nanotechnology, Nanoparticles in the Environment, Semiconductor Technology, High-Density Memories, Nanofabrication, Nanomedicine, Nanobiotechnology, Nanoprobes, Light and Energy, Nanostructured Surfaces.

Hyperbolic Metamaterials

Morgan & Claypool Publishers Hyperbolic metamaterials were originally introduced to overcome the diffraction limit of optical imaging. Soon thereafter it was realized that hyperbolic metamaterials demonstrate a number of novel phenomena resulting from the broadband singular behavior of their density of photonic states. These novel phenomena and applications include super resolution imaging, new stealth technologies, enhanced quantum-electrodynamic effects, thermal hyperconductivity, superconductivity, and interesting gravitation theory analogs. Here I review typical material systems, which exhibit hyperbolic behavior and outline important new applications of hyperbolic metamaterials, such as imaging experiments with plasmonic hyperbolic metamaterials and novel VCSEL geometries, in which the Bragg mirrors may be engineered in such a way that they exhibit hyperbolic properties in the long wavelength infrared range, so that they may be used to efficiently remove excess heat from the laser cavity. I will also discuss potential applications of self-assembled photonic hypercrystals. This system bypasses 3D nanofabrication issues, which typically limit hyperbolic metamaterial applications. Photonic hypercrystals combine the most interesting features of hyperbolic metamaterials and photonic crystals.

Photonic Crystals

Molding the Flow of Light - Second Edition

Princeton University Press Since it was first published in 1995, Photonic Crystals has remained the definitive text for both undergraduates and researchers on photonic band-gap materials and their use in controlling the propagation of light. This newly expanded and revised edition covers the latest developments in the field, providing the most up-to-date, concise, and comprehensive book available on these novel materials and their applications. Starting from Maxwell's equations and Fourier analysis, the authors develop the theoretical tools of photonics using principles of linear algebra and symmetry, emphasizing analogies with traditional solid-state physics and quantum theory. They then investigate the unique phenomena that take place within photonic crystals at defect sites and surfaces, from one to three dimensions. This new edition includes entirely new chapters describing important hybrid structures that use band gaps or periodicity only in some directions: periodic waveguides, photonic-crystal slabs, and photonic-crystal fibers. The authors demonstrate how the capabilities of photonic crystals to localize light can be put to work in devices such as filters and splitters. A new appendix provides an overview of computational methods for electromagnetism. Existing chapters have been considerably updated and expanded to include many new three-dimensional photonic crystals, an extensive tutorial on device design using temporal coupled-mode theory, discussions of diffraction and refraction at crystal interfaces, and more. Richly illustrated and accessibly written, Photonic Crystals is an indispensable resource for students and researchers. Extensively revised and expanded Features improved graphics throughout Includes new chapters on photonic-crystal fibers and combined index-and band-gap-guiding Provides an introduction to coupled-mode theory as a powerful tool for device design Covers many new topics, including omnidirectional reflection, anomalous refraction and diffraction, computational photonics, and much more.

Optics Letters

Optics, Light and Lasers

The Practical Approach to Modern Aspects of Photonics and Laser Physics

John Wiley & Sons This new, updated and enlarged edition of the successful and exceptionally well-structured textbook features new chapters on such hot topics as optical angular momentum, microscopy beyond the resolution limit, metamaterials, femtocombs, and quantum cascade lasers. It provides comprehensive and coherent coverage of fundamental optics, laser physics, and important modern applications, while equally including some traditional aspects for the first time, such as the Collins integral or solid immersion lenses. Written for newcomers to the topic who will benefit from the author's ability to explain difficult theories and effects in a straightforward and readily comprehensible way.

Plasmonics and Plasmonic Metamaterials Analysis and Applications

World Scientific This book is a collection of the works of leading experts worldwide in the rapidly developing fields of plasmonics and metamaterials. These developments are promising to revolutionize ways of generating, controlling and processing light in the nanoscale. The technological applications range from nano-lasers to optical nano-waveguides to artificial media with unusual and exotic optical properties unattainable in natural materials. The volume cuts across all relevant disciplines and covers experiments, measurements, fabrication, physical and mathematical analysis, as well as computer simulation.

Microwave Ferrites and Ferrimagnetics Ferroelectrics

Applications

BoD - Books on Demand Ferroelectric materials have been and still are widely used in many applications, that have moved from sonar towards breakthrough technologies such as memories or optical devices. This book is a part of a four volume collection (covering material aspects, physical effects, characterization and modeling, and applications) and focuses on the application of ferroelectric devices to innovative systems. In particular, the use of these materials as varying capacitors, gyroscope, acoustics sensors and actuators, microgenerators and memory devices will be exposed, providing an up-to-date review of recent scientific findings and recent advances in the field of ferroelectric devices.

Frontiers in Optics and Photonics

Walter de Gruyter GmbH & Co KG This book provides a cutting-edge research overview on the latest developments in the field of Optics and Photonics. All chapters are authored by the pioneers in their field and will cover the developments in Quantum Photonics, Optical properties of 2D Materials, Optical Sensors, Organic Opto-electronics, Nanophotonics, Metamaterials, Plasmonics, Quantum Cascade lasers, LEDs, Biophotonics and biomedical photonics and spectroscopy.

Phononic Crystals

Artificial Crystals for Sonic, Acoustic, and Elastic Waves

Walter de Gruyter GmbH & Co KG Phononic crystals are artificial periodic structures that can alter efficiently the flow of sound, acoustic waves, or elastic waves. They were introduced about twenty years ago and have gained increasing interest since then, both because of their amazing physical properties and because of their potential applications. The topic of phononic crystals stands as the cross-road of physics (condensed matter physics, wave propagation in inhomogeneous and periodic media) and engineering (acoustics, ultrasonics, mechanical engineering, electrical engineering). Phononic crystals cover a wide range of scales, from meter-size periodic structures for sound in air to nanometer-size structures for information processing or thermal phonon control in integrated circuits. Phononic crystals have a definite relation with the topic of photonic crystals in optics. The marriage of phononic and photonic crystals also provides a promising structural basis for enhanced sound and light interaction. As the topic is getting popular, it is nowadays presented and

discussed at various international conferences. After the first ten years during which the topic has remained mainly theoretical with a few proof-of-concept demonstrations in the literature, the evolution has been towards applications, instrumentation, and novel designs. The physical explanations for various effects are now well understood and efficient numerical methods and analysis tools have been developed. The book contains a comprehensive set of finite element model (FEM) scripts for solving basic phononic crystal problems. The scripts are short, easy to read, and efficient, allowing the reader to generate for him(her)self band structures for 2D and 3D phononic crystals, to compute Bloch waves, waveguide and cavity modes, and more.

An Introduction to Metamaterials and Nanophotonics

Cambridge University Press This book offers a unified presentation of metamaterials building from fundamental nanophotonic principles.

Metamaterials

Physics and Engineering Explorations

John Wiley & Sons Leading experts explore the exotic properties and exciting applications of electromagnetic metamaterials. **Metamaterials: Physics and Engineering Explorations** gives readers a clearly written, richly illustrated introduction to the most recent research developments in the area of electromagnetic metamaterials. It explores the fundamental physics, the designs, and the engineering aspects, and points to a myriad of exciting potential applications. The editors, acknowledged leaders in the field of metamaterials, have invited a group of leading researchers to present both their own findings and the full array of state-of-the-art applications for antennas, waveguides, devices, and components. Following a brief overview of the history of artificial materials, the publication divides its coverage into two major classes of metamaterials. The first half of the publication examines effective media with single (SNG) and double negative (DNG) properties; the second half examines electromagnetic band gap (EBG) structures. The book further divides each of these classes into their three-dimensional (3D volumetric) and two-dimensional (2D planar or surface) realizations. Examples of each type of metamaterial are presented, and their known and anticipated properties are reviewed. Collectively, **Metamaterials: Physics and Engineering Explorations** presents a review of recent research advances associated with a highly diverse set of

electromagnetic metamaterials. Its multifaceted approach offers readers a combination of theoretical, numerical, and experimental perspectives for a better understanding of their behaviors and their potential applications in components, devices, and systems. Extensive reference lists provide opportunities to explore individual topics and classes of metamaterials in greater depth. With full-color illustrations throughout to clarify concepts and help visualize actual results, this book provides a dynamic, user-friendly resource for students, engineers, physicists, and other researchers in the areas of electromagnetic materials, microwaves, millimeter waves, and optics. It equips newcomers with a basic understanding of metamaterials and their potential applications. Advanced researchers will benefit from thought-provoking perspectives that will deepen their knowledge and lead them to new areas of investigation.

Nanophotonic Materials

Photonic Crystals, Plasmonics, and Metamaterials

John Wiley & Sons' *Nanophotonic Materials - Photonic Crystals, Plasmonics, and Metamaterials* summarizes the work and results of a consortium consisting of more than 20 German research groups concentrated on photonic crystals research over the last seven years. Illustrated throughout in full color, the book provides an overview of these novel materials, spanning the entire range from fundamentals to applications.

Nonlinear, Tunable and Active Metamaterials

Springer *Metamaterials*, artificial electromagnetic media achieved by structuring on the subwave-length-scale were initially suggested for the negative index and superlensing. They became a paradigm for engineering electromagnetic space and controlling propagation of waves. The research agenda is now shifting on achieving tuneable, switchable, nonlinear and sensing functionalities. The time has come to talk about the emerging research field of metadevices employing active and tunable metamaterials with unique functionalities achieved by structuring of functional matter on the subwave-length scale. This book presents the first systematic and comprehensive summary of the reviews written by the pioneers and top-class experts in the field of metamaterials. It addresses many grand challenges of the cutting edge research for creating smaller and more efficient photonic structures and devices.

Lab-on-Fiber Technology

Springer This book focuses on a research field that is rapidly emerging as one of the most promising ones for the global optics and photonics community: the “lab-on-fiber” technology. Inspired by the well-established “lab on-a-chip” concept, this new technology essentially envisages novel and highly functionalized devices completely integrated into a single optical fiber for both communication and sensing applications. Based on the R&D experience of some of the world's leading authorities in the fields of optics, photonics, nanotechnology, and material science, this book provides a broad and accurate description of the main developments and achievements in the lab-on-fiber technology roadmap, also highlighting the new perspectives and challenges to be faced. This book is essential for scientists interested in the cutting-edge fiber optic technology, but also for graduate students.

Metamaterials with Negative Parameters

Theory, Design, and Microwave Applications

John Wiley & Sons The first general textbook to offer a complete overview of metamaterial theory and its microwave applications **Metamaterials with Negative Parameters** represents the only unified treatment of metamaterials available in one convenient book. Devoted mainly to metamaterials that can be characterized by a negative effective permittivity and/or permeability, the book includes a wide overview of the most important topics, scientific fundamentals, and technical applications of metamaterials. Chapter coverage includes: the electrodynamics of left-handed media, synthesis of bulk metamaterials, synthesis of metamaterials in planar technology, microwave applications of metamaterial concepts, and advanced and related topics, including SRR- and CSRR-based admittance surfaces, magneto- and electro-inductive waves, and sub-diffraction imaging devices. A list of problems and references is included at the end of each chapter, and a bibliography offers a complete, up-to-date representation of the current state of the art in metamaterials. Geared toward students and professionals alike, **Metamaterials with Negative Parameters** is an ideal textbook for postgraduate courses and also serves as a valuable introductory reference for scientists and RF/microwave engineers.

Dielectric Metamaterials Fundamentals, Designs and Applications

Woodhead Publishing Dielectric Metamaterials: Fundamentals, Designs and Applications links fundamental Mie scattering theory with the latest dielectric metamaterial research, providing a valuable reference for new and experienced researchers in the field. The book begins with a historical, evolving overview of Mie scattering theory. Next, the authors describe how to apply Mie theory to analytically solve the scattering of electromagnetic waves by subwavelength particles. Later chapters focus on Mie resonator-based metamaterials, starting with microwaves where particles are much smaller than the free space wavelengths. In addition, several chapters focus on wave-front engineering using dielectric metasurfaces and the nonlinear optical effects, spontaneous emission manipulation, active devices, and 3D effective media using dielectric metamaterials. Highlights a crucial link in fundamental Mie scattering theory with the latest dielectric metamaterial research spanning materials, design and applications Includes coverage of wave-front engineering and 3D metamaterials Provides computational codes for calculating and simulating Mie resonances

Index to Theses with Abstracts
Accepted for Higher Degrees by the
Universities of Great Britain and
Ireland and the Council for National
Academic Awards



Nonlinearities in Periodic Structures

and Metamaterials

Springer Optical information processing of the future is associated with a new generation of compact nanoscale optical devices operating entirely with light. Moreover, adaptive features such as self-guiding, reconfiguration and switching become more and more important. Nonlinear devices offer an enormous potential for these applications. Consequently, innovative concepts for all-optical communication and information technologies based on nonlinear effects in photonic-crystal physics and nanoscale devices as metamaterials are of high interest. This book focuses on nonlinear optical phenomena in periodic media, such as photonic crystals, optically-induced, adaptive lattices, atomic lattices or metamaterials. The main purpose is to describe and overview new physical phenomena that result from the interplay between nonlinearities and structural periodicities and is a guide to actual and future developments for the expert reader in optical information processing, as well as in the physics of cold atoms in optical lattices.

Advances in Photonic Crystals and Devices

CRC Press In recent decades, there has been a phenomenal growth in the field of photonic crystal research and has emerged as an interdisciplinary area. Photonic crystals are usually nanostructured electromagnetic media consisting of periodic variation of dielectric constant, which prohibit certain electromagnetic wave frequency ranges called photonic bandgaps to propagate through them. Photonic crystals elicited numerous interesting features by unprecedented control of light and their exploitation is a promising tool in nanophotonics and designing optical components. The book 'Advances in Photonic Crystals and Devices' is designed with 15 chapters with introductory as well as research and application based contents. It covers the following highlighted features: Basics of photonic crystals and photonic crystal fibers Different theoretical as well as experimental approaches Current research advances from around the globe Nonlinear optics and super-continuum generation in photonic crystal fibers Magnetized cold plasma photonic crystals Liquid crystal defect embedded with graphene layers Biophysics and biomedical applications as optical sensors Two-dimensional photonic crystal demultiplexer Optical logic gates using photonic crystals A large number of references The goal of this book is to draw the background in understanding, fabrication and characterization of photonic crystals using a variety of materials and their applications in design of several optical devices. Though the book is useful as a reference for the researchers working in the area of photonics, optical computing and fabrication of

nanophotonic devices, it is intended for the beginners like students pursuing their masters' degree in photonics.

Liquid Crystal Colloids

Springer This book brings together the many concepts and discoveries in liquid crystal colloids contributed over the last twenty years and scattered across numerous articles and book chapters. It provides both a historical overview of the development of the field and a clear perspective on the future applications in photonics. The book covers all phenomena observed in liquid crystal colloids with an emphasis on experimental tools and applications of topology in condensed matter, as well as practical micro-photonics applications. It includes a number of spectacular manifestations of new topological phenomena not found or difficult to observe in other systems. Starting from the early works on nematic colloids, it explains the basics of topological defects in ordered media, charge and winding, and the elastic forces between colloidal particles in nematics. Following a detailed description of experimental methods, such as optical tweezing and particle tracking, the book eases the reader into the theoretical part, which deals with elastic deformation of nematic liquid crystals due to inclusions and surface alignment. This is discussed in the context of basic mean field Landau-de Gennes Q-tensor theory, with a brief explanation of the free-energy minimization numerical methods. There then follows an excursion into the topology of complex nematic colloidal structures, colloidal entanglement, knotting and linking. Nematic droplets, shells, handlebodies and chiral topological structures are addressed in separate chapters. The book concludes with an extensive chapter on the photonic properties of nematic dispersions, presenting the concept of integrated soft matter photonics and discussing the concepts of nematic and chiral nematic microlasers, surface-sensitive photonic devices and smectic microfibers. The text is complemented by a large bibliography, explanatory sketches and beautiful micrographs.

Photonic Crystals

Towards Nanoscale Photonic Devices

Springer Science & Business Media This book provides the theoretical background required for modelling photonic crystals and their optical properties, while presenting the large variety of devices where photonic crystals have found application. As such, it aims at building bridges between optics, electromagnetism and solid state physics. This second edition includes the most recent developments of two-dimensional

photonic crystal devices, as well as some of the last results reported on metamaterials.

Plasmonics

Principles and Applications

BoD - Books on Demand The title of this book, **Plasmonics: Principles and Applications**, encompasses theory, technical issues, and practical applications which are of interest for diverse classes of the plasmonics. The book is a collection of the contemporary researches and developments in the area of plasmonics technology. It consists of 21 chapters that focus on interesting topics of modeling and computational methods, plasmonic structures for light transmission, focusing, and guiding, emerging concepts, and applications.

Theory and Phenomena of Metamaterials

CRC Press **Theory and Phenomena of Metamaterials** offers an in-depth look at the theoretical background and basic properties of electromagnetic artificial materials, often called metamaterials. A volume in the **Metamaterials Handbook**, this book provides a comprehensive guide to working with metamaterials using topics presented in a concise review format along with numerous references. With contributions from leading researchers, this text covers all areas where artificial materials have been developed. Each chapter in the text features a concluding summary as well as various cross references to address a wide range of disciplines in a single volume.

Electromagnetic Surface Waves

A Modern Perspective

Newnes For decades, the surface-plasmon-polariton wave guided by the interface of simple isotropic materials dominated the scene. However, in recent times research on electromagnetic surface waves guided by planar interfaces has expanded into new and exciting areas. In the 1990's research focused on advancing knowledge of the newly discovered Dyakonov wave. More recently, much of the surface wave research is motivated by the proliferation of nanotechnology and the growing number of materials available with novel properties. This book leads the reader from the relatively simple surface-plasmon-polariton wave with isotropic

materials to the latest research on various types of electromagnetic surface waves guided by the interfaces of complex materials enabled by recent developments in nanotechnology. This includes: Dyakonov waves guided by interfaces formed with columnar thin films, Dyakonov-Tamm waves guided by interfaces formed with sculptured thin films, and multiple modes of surface-plasmon-polariton waves guided by the interface of a metal and a periodically varying dielectric material. Gathers research from the past 5 years in a single comprehensive view of electromagnetic surface waves. Written by the foremost experts and researchers in the field. Layered presentation explains topics with an introductory overview level up to a highly technical level.

Plasmonics: Fundamentals and Applications

Springer Science & Business Media Considered a major field of photonics, plasmonics offers the potential to confine and guide light below the diffraction limit and promises a new generation of highly miniaturized photonic devices. This book combines a comprehensive introduction with an extensive overview of the current state of the art. Coverage includes plasmon waveguides, cavities for field-enhancement, nonlinear processes and the emerging field of active plasmonics studying interactions of surface plasmons with active media.