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The Casimir Effect and Its Applications

Oxford University Press The Casimir effect arises from the zero-point energy of a quantized field and can exert a measurable force on a conducting plate. It is important in some modern developments in cosmology and elementary particle physics.

Singular and Chiral Nanoplasmonics

CRC Press Plasmonics has already revolutionized molecular imaging, cancer research, optical communications, sensing, spectroscopy, and metamaterials development. This book is a collective effort by several research groups to push the frontiers of plasmonics research into the emerging area of harnessing and generation of photon angular momentum on micro- and nanoscales. It offers a glimpse into the ongoing research efforts to develop new types of plasmonic vortex-pinning platforms and chiral nanostructures for light harvesting, bio(chemical) sensing, drug discovery, and nanoscale energy transfer.

Structured Surfaces as Optical Metamaterials

Cambridge University Press Optical metamaterials are an exciting new field in optical science. A rapidly developing class of these metamaterials are those that allow the manipulation of volume and surface electromagnetic waves in desirable ways by suitably structuring the surfaces they interact with. They have applications in a variety of fields, such as materials science, photovoltaic technology, imaging and lensing, beam shaping and lasing. Describing techniques and applications, this book is ideal for researchers and professionals working in metamaterials and plasmonics, as well as those just entering this exciting new field. It surveys different types of structured surfaces, their design and fabrication, their unusual optical properties, recent experimental observations and their applications. Each chapter is written by an expert in that area, giving the reader an up-to-date overview of the subject. Both the experimental and theoretical aspects of each topic are presented.

Optical Metamaterials

Fundamentals and Applications

Springer Science & Business Media Metamaterials—artificially structured materials with engineered electromagnetic properties—have enabled unprecedented flexibility in manipulating electromagnetic waves and producing new functionalities. This book details recent advances in the study of optical metamaterials, ranging from fundamental aspects to up-to-date implementations, in one unified treatment. Important recent developments and applications such as superlens and cloaking devices are also treated in detail and made understandable. The planned monograph can serve as a very timely book for both newcomers and advanced researchers in this extremely rapid evolving field.

Elastic Waves in Solids I

Free and Guided Propagation

Springer Science & Business Media Elastic waves possess some remarkable properties and have become ever more important to applications in fields such as telecommunications (signal processing), medicine (echography), and metallurgy (non-destructive testing). These volumes serve as a bridge between basic books on wave phenomena and more technically oriented books on specific applications of wave phenomena. The first volume studies the different mechanisms of propagation in isotropic and anisotropic media. The second volume describes the generation and applications of free and guided waves.

Quantum Photonics: Pioneering Advances and Emerging Applications

Springer This book brings together reviews by internationally renowned experts on quantum optics and photonics. It describes novel experiments at the limit of single photons, and presents advances in this emerging research area. It also includes reprints and historical descriptions of some of the first pioneering experiments at a single-photon level and nonlinear optics, performed before the inception of lasers and modern light detectors, often with the human eye serving as a single-photon detector. The book comprises 19 chapters, 10 of which describe modern quantum photonics results, including single-photon sources, direct measurement of the photon's spatial wave function, nonlinear interactions and non-classical light, nanophotonics for room-temperature single-photon sources, time-multiplexed methods for optical quantum information processing, the role of photon statistics in visual perception, light-by-light coherent control using metamaterials, nonlinear nanoplasmonics, nonlinear polarization optics, and ultrafast nonlinear optics in the mid-infrared.

Metasurfaces: Physics and Applications

MDPI This book is a printed edition of the Special Issue "Metasurfaces: Physics and Applications" that was published in Applied Sciences

Fundamentals of Nanomechanical Resonators

Springer This authoritative book introduces and summarizes the latest models and skills required to design and fabricate nanomechanical resonators with a focus on nanomechanical sensing. It also establishes the theoretical foundation for courses on micro and nanomechanics. This book takes an applied approach to nanomechanics, providing a complete set of mechanical models, including strings and membrane resonators. Also discussed are quality factors, noise issues, transduction techniques, nanomechanical sensing, fabrication techniques, and applications for all common nanomechanical resonator types. It is an ideal book for students and researchers working with micro and nanomechanical resonators.

Organic Light-Emitting Transistors

Towards the Next Generation Display Technology

John Wiley & Sons This book puts Organic Light Emitting Transistors (OLETs) in the context of organic electronics and photonics, exploring devices' physics principles, the properties of currently available materials, processing and fabrication techniques, and the different approaches adopted to structure the active channel and to control organic and hybrid interfaces. Major applications in different fields as well as the industry's roadmap for future implementation are also reviewed in detail.

Springer Handbook of Surface Science

Springer Nature This handbook delivers an up-to-date, comprehensive and authoritative coverage of the broad field of surface science, encompassing a range of important materials such metals, semiconductors, insulators, ultrathin films and supported nanoobjects. Over 100 experts from all branches of experiment and theory review in 39 chapters all major aspects of solid-state surfaces, from basic principles to applications, including the latest, ground-breaking research results. Beginning with the fundamental background of kinetics and thermodynamics at surfaces, the handbook leads the reader through the basics of crystallographic structures and electronic properties, to the advanced topics at the forefront of current research. These include but are not limited to novel applications in nanoelectronics, nanomechanical devices, plasmonics, carbon films, catalysis, astrochemistry and biology. The handbook is an ideal reference guide and instructional aid for a wide range of physicists, chemists, materials scientists and engineers

active throughout academic and industrial research.

Dynamics of optically levitated nanoparticles in high vacuum

GRIN Verlag Doctoral Thesis / Dissertation from the year 2014 in the subject Physics - Optics, grade: Excellent Cum Laude with Honors, language: English, abstract: The present thesis investigates the dynamics of optically levitated particles in high vacuum. A levitated nanoparticle in high vacuum constitutes a nanomechanical resonator featuring a small mass and a ultra-high quality factor - significantly higher than that of fabricated nanomechanical resonators, which are approaching fundamental limits of dissipation. The combination of small mass and high quality factor allows for sensing of feeble exotic forces, including gravitational forces, and quantum state preparation. Investigating the quantum behavior of a nanomechanical system and testing the predictions of quantum theory on meso- to macroscopic scales, addresses one of the outstanding challenges of modern physics and will provide answers to fundamental questions on our understanding of the world. The scope of the thesis ranges from a detailed description of the experimental apparatus and proof-of-principle experiments (parametric feedback cooling) to the first observation of phenomena owing to the unique parameters of this novel optomechanical system (thermal nonlinearities). Aside from optomechanics and optical trapping, the topics covered include the dynamics of complex (nonlinear) systems and the experimental and theoretical study of fluctuation theorems, the latter playing a pivotal role in statistical physics. Optically trapped nanoparticles are just beginning to emerge as a new class of optomechanical systems. Owing to their unique mechanical properties, there is clearly a vast and untapped potential for further research. Primary examples of how levitated particles in high vacuum can impact other fields and inspire new research avenues have been the first observation of thermal nonlinearities in a mechanical oscillator and the study of fluctuation relations with a high-Q nanomechanical resonator. Based on recent progress in the field, a plethora of fundamental research opportunities and novel applications are expected to emerge as this still young field matures.

Tuneable Film Bulk Acoustic Wave Resonators

Springer Science & Business Media To handle many standards and ever increasing bandwidth requirements, large number of filters and switches are used in transceivers of modern wireless communications systems. It makes the cost, performance, form factor, and power consumption of these systems, including cellular phones, critical issues. At present, the fixed frequency filter banks based on

Film Bulk Acoustic Resonators (FBAR) are regarded as one of the most promising technologies to address performance -form factor-cost issues. Even though the FBARs improve the overall performances the complexity of these systems remains high. Attempts are being made to exclude some of the filters by bringing the digital signal processing (including channel selection) as close to the antennas as possible. However handling the increased interference levels is unrealistic for low-cost battery operated radios. Replacing fixed frequency filter banks by one tuneable filter is the most desired and widely considered scenario. As an example, development of the software based cognitive radios is largely hindered by the lack of adequate agile components, first of all tuneable filters. In this sense the electrically switchable and tuneable FBARs are the most promising components to address the complex cost-performance issues in agile microwave transceivers, smart wireless sensor networks etc. Tuneable Film Bulk Acoustic Wave Resonators discusses FBAR need, physics, designs, modelling, fabrication and applications. Tuning of the resonant frequency of the FBARs is considered. Switchable and tuneable FBARs based on electric field induced piezoelectric effect in paraelectric phase ferroelectrics are covered. The resonance of these resonators may be electrically switched on and off and tuned without hysteresis. The book is aimed at microwave and sensor specialists in the industry and graduate students. Readers will learn about principles of operation and possibilities of the switchable and tuneable FBARs, and will be given general guidelines for designing, fabrication and applications of these 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.

Advances in Nanophotonics

Walter de Gruyter GmbH & Co KG Presents recent developments in theoretical and experimental research of nanophotonics Discusses properties and features of nanophotonic devices, e.g. scanning near-field optical microscopy, nanofiber/nanowire based photonic devices Illustrates the most promising nanophotonic devices and instruments and their application Suits well for researchers and graduates in nanophotonics field Contents Scanning near-field optical microscopy Nanofibers/nanowires and their applications in photonic components and devices Micro/nano-optoelectronic devices based on photonic crystal

Optomagnonic Structures: Novel Architectures For Simultaneous Control Of Light And Spin Waves

World Scientific Understanding, controlling and, more importantly, enhancing the interaction between light (photons) and spin waves (magnons) can be, among others, a step towards the realization of magnon-mediated microwave-to-optical transducers for quantum computing applications or hybrid solid-state spintronic-photonic interconnections. In this respect, the development of novel composite multifunctional micro/nanostructures — so-called optomagnonic — which simultaneously control optical and spin waves and enhance their interaction, is particularly attractive. This book constitutes a collective work, comprising seven chapters from leading researchers in the field of optomagnonics and related areas. Apart from exciting recent developments, it provides the necessary fundamental knowledge in an explanatory manner and, therefore, it is accessible to non-experts. It is suitable for PhD students, post-docs, and researchers who are willing to get engaged in optomagnonics, while selected parts could also serve as lecture material for advanced courses. With increasing demand for miniaturized optomagnonic devices, this book will be an important resource to researchers working on optomagnonics, magneto-optics, spintronics, as well as on hybrid micro/nano devices for information processing.

4D Electron Microscopy

Imaging in Space and Time

World Scientific Structural phase transitions, mechanical deformations, and the embryonic stages of melting and crystallization are examples of phenomena that can now be imaged in unprecedented structural detail with high spatial resolution, and ten orders of magnitude as fast as hitherto. No monograph in existence attempts to cover the revolutionary dimensions that EM in its various modes of operation nowadays makes possible. The authors of this book chart these developments, and also compare the merits of coherent electron waves with those of synchrotron radiation. They judge it prudent to recall some important basic procedural and theoretical aspects of imaging and diffraction so that the reader may better comprehend the significance of the new vistas and applications now afoot. This book is not a vade mecum - numerous other texts are available for the practitioner for that purpose.

2D Materials

Cambridge University Press Learn about the most recent advances in 2D materials with this comprehensive and accessible text. Providing all the necessary materials science and physics background, leading experts discuss the fundamental properties of a wide range of 2D materials, and their potential applications in electronic, optoelectronic and photonic devices. Several important classes of materials are covered, from more established ones such as graphene, hexagonal boron nitride, and transition metal dichalcogenides, to new and emerging materials such as black phosphorus, silicene, and germanene. Readers will gain an in-depth understanding of the electronic structure and optical, thermal, mechanical, vibrational, spin and plasmonic properties of each material, as well as the different techniques that can be used for their synthesis. Presenting a unified perspective on 2D materials, this is an excellent resource for graduate students, researchers and practitioners working in nanotechnology, nanoelectronics, nanophotonics, condensed matter physics, and chemistry.

Springer Handbook of Electronic and Photonic Materials

Springer The second, updated edition of this essential reference book provides a wealth of detail on a wide range of electronic and photonic materials, starting from fundamentals and building up to advanced topics and applications. Its extensive coverage, with clear illustrations and applications, carefully selected chapter sequencing and logical flow, makes it very different from other electronic materials handbooks. It has been written by professionals in the field and instructors who teach the subject at a university or in corporate laboratories. The Springer Handbook of Electronic and Photonic Materials, second edition, includes practical applications used as examples, details of experimental techniques, useful tables that summarize equations, and, most importantly, properties of various materials, as well as an extensive glossary. Along with significant updates to the content and the references, the second edition includes a number of new chapters such as those covering novel materials and selected applications. This handbook is a valuable resource for graduate students, researchers and practicing professionals working in the area of electronic, optoelectronic and photonic materials.

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

Cavity Optomechanics

Nano- and Micromechanical Resonators Interacting with Light

Springer During the last few years cavity-optomechanics has emerged as a new field of research. This highly interdisciplinary field studies the interaction between micro and nano mechanical systems and light. Possible applications range from novel high-bandwidth mechanical sensing devices through the generation of squeezed optical or mechanical states to even tests of quantum theory itself. This is one of the first books in this relatively young field. It is aimed at scientists, engineers and students who want to obtain a concise introduction to the state of the art in the field of cavity optomechanics. It is valuable to researchers in nano science, quantum optics, quantum information, gravitational wave detection and other cutting edge fields. Possible applications include biological

sensing, frequency comb applications, silicon photonics etc. The technical content will be accessible to those who have familiarity with basic undergraduate physics.

Narrow Plasmon Resonances in Hybrid Systems

Springer Advances in understanding the interactions between light and subwavelength materials have enabled the author and his collaborators to tailor unique optical responses at the nanoscale. In particular, metallic nanostructures capable of supporting surface plasmons can be designed to possess spectrally narrow plasmon resonances, which are of particular interest due to their exceptional sensitivity to their local environment. In turn, combining plasmonic nanostructures with other materials in hybrid systems allows this sensitivity to be exploited in a broad range of applications. In this book the author explores two different approaches to attaining narrow plasmon resonances: in gold nanoparticle arrays by utilising diffraction coupling, and in copper thin films covered by a protective graphene layer. The performance of these resonances is then considered in a number of applications. Nanoparticle arrays are used along with an atomic heterostructure as elements in a nanomechanical electro-optical modulator that is capable of strong, broadband modulation. Strong coupling between diffraction-coupled plasmon resonances and a gold nanoparticle array and guided modes in a dielectric slab is used to construct a hybrid waveguide. Lastly, the extreme phase sensitivity of graphene-protected copper is used to detect trace quantities of small toxins in solution far below the detection limit of commercial surface plasmon resonance sensors.

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.

Polarization of Light in Nonlinear Optics

Wiley Polarization of Light in Nonlinear Optics provides a unique and detailed introduction to polarization (vectorial) properties of light in intense light fields. The study and understanding of this subject is becoming increasingly important in laser physics, optoelectronics, spectroscopy and optical telecommunications. This volume gives a systematic introduction into the phenomenological and microscopic formalisms of the polarization phenomena in nonlinear optics. Crucial experiments on transmissive, reflective and pump-probe effects involving changing polarization state of light are also discussed. Polarization of Light in Nonlinear Optics will be extremely useful both as a detailed introduction to the subject for students of optical physics and nonlinear optics, and as a reference source for researchers in the field.

Nanomaterials

A Guide to Fabrication and Applications

CRC Press Nanomaterials are being incorporated into products all around us, having an incredible impact on durability, strength, functionality, and other material properties. There are a vast number of nanomaterials presently available, and new formulations and chemistries are being announced daily. Nanomaterials: A Guide to Fabrication and Applications provides product developers, researchers, and materials scientists with a handy resource for understanding the range of options and materials currently available. Covering a variety of nanomaterials and their applications, this practical reference: Discusses the scale of nanomaterials and nanomachines, focusing on integrated circuits (ICs) and microelectromechanical systems (MEMS) Offers insight into different nanomaterials' interactions with chemical reactions, biological processes, and the environment Examines the mechanical properties of nanomaterials and potential treatments to enhance the nanomaterials' performance Details recent accomplishments in the use of nanomaterials to create new forms of electronic devices Explores the optical properties of certain nanomaterials and the nanomaterials' use in optimizing lasers and optical absorbers Describes an energy storage application as well as how nanomaterials from waste products may be used to improve capacitors Featuring contributions from experts around the globe, Nanomaterials: A Guide to Fabrication and Applications serves as a springboard for the discovery of new applications of nanomaterials.

Casimir Physics

Springer Science & Business Media Casimir effects serve as primary examples of directly observable manifestations of the nontrivial properties of quantum fields, and as such are attracting increasing interest from quantum field theorists, particle physicists, and cosmologists. Furthermore, though very weak except at short distances, Casimir forces are universal in the sense that all material objects are subject to them. They are thus also an increasingly important part of the physics of atom-surface interactions, while in nanotechnology they are being investigated not only as contributors to 'stiction' but also as potential mechanisms for actuating micro-electromechanical devices. While the field of Casimir physics is expanding rapidly, it has reached a level of maturity in some important respects: on the experimental side, where most sources of imprecision in force measurements have been identified as well as on the theoretical side, where, for example, semi-analytical and numerical methods for the computation of Casimir forces between bodies of arbitrary shape have been successfully developed. This book is, then, a timely and comprehensive guide to the essence of Casimir (and Casimir-Polder) physics that will have lasting value, serving the dual purpose of an introduction and reference to the field. While this volume is not intended to be a unified textbook, but rather a collection of largely independent chapters written by prominent experts in the field, the detailed and carefully written articles adopt a style that should appeal to non-specialist researchers in the field as well as to a broader audience of graduate students.

Resistive Switching

From Fundamentals of Nanoionic Redox Processes to Memristive Device Applications

John Wiley & Sons With its comprehensive coverage, this reference introduces readers to the wide topic of resistance switching, providing the knowledge, tools, and methods needed to understand, characterize and apply resistive switching memories. Starting with those materials that display resistive switching behavior, the book explains the basics of resistive switching as well as switching mechanisms and models. An in-depth discussion of memory reliability is followed by chapters on memory cell structures and architectures, while a section on logic gates rounds off the text. An invaluable self-contained book for materials scientists, electrical

engineers and physicists dealing with memory research and development.

Nano-optics and Near-field Optical Microscopy

Artech House This groundbreaking book focuses on near-field microscopy which has opened up optical processes at the nanoscale for direct inspection. Further, it explores the emerging area of nano-optics which promises to make possible optical microscopy with true nanometer resolution. This frontline resource helps you achieve high resolution optical imaging of biological species and functional materials. You also find guidance in the imaging of optical device operation and new nanophotonics functionalities.

Photonic Crystals: Physics and Technology

Springer Science & Business Media The aim of the work is give an overview of the activity in the field of Photonic Crystal developed in the frame of COST P11 action . The main objective of the COST P11 action was to unify and coordinate national efforts aimed at studying linear and nonlinear optical interactions with Photonic Crystals (PCs), without neglecting an important aspect related to the material research as idea and methods of realizations of 3D PC, together with the development and implementation of measurement techniques for the experimental evaluation of their potential applications in different area, as for example telecommunication with novel optical fibers, lasers, nonlinear multi-functionality, display devices, opto-electronics, sensors. The book contains contributions from authors who gave their lecture at the Cost P11 Training School.

Phononic Crystals

Fundamentals and Applications

Springer This book provides an in-depth analysis as well as an overview of phononic crystals. This book discusses numerous techniques for the analysis of phononic crystals and covers, among other material, sonic and ultrasonic structures, hypersonic planar structures and their characterization, and novel applications of phononic crystals. This is an ideal book for those working with micro and nanotechnology, MEMS (microelectromechanical systems), and acoustic devices. This book also: Presents an introduction to the fundamentals and properties of phononic crystals Covers simulation techniques for the analysis of phononic crystals Discusses sonic and ultrasonic, hypersonic and planar, and three-dimensional phononic crystal structures Illustrates how phononic crystal structures

are being deployed in communication systems and sensing systems

Nanophotonics with Surface Plasmons

Elsevier Current developments in optical technologies are being directed toward nanoscale devices with subwavelength dimensions, in which photons are manipulated on the nanoscale. Although light is clearly the fastest means to send information to and from the nanoscale, there is a fundamental incompatibility between light at the microscale and devices and processes at the nanoscale. Nanostructured metals which support surface plasmon modes can concentrate electromagnetic (EM) fields to a small fraction of a wavelength while enhancing local field strengths by several orders of magnitude. For this reason, plasmonic nanostructures can serve as optical couplers across the nano-micro interface: metal-dielectric and metal-semiconductor nanostructures can act as optical nanoantennae and enhance light matter coupling in nanoscale devices. This book describes how one can fully integrate plasmonic nanostructures into dielectric, semiconductor, and molecular photonic devices, for guiding photons across the nano-micro interface and for detecting molecules with unsurpassed sensitivity. ·Nanophotonics and Nanoplasmonics ·Metamaterials and negative-index materials ·Plasmon-enhanced sensing and spectroscopy ·Imaging and sensing on the nanoscale ·Metal Optics

Cosmeceuticals and Active Cosmetics

CRC Press Cosmeceuticals and Active Cosmetics discusses the science of nearly two dozen cosmeceuticals used today. This third edition provides ample evidence on specific cosmeceutical substances, their classes of use, skin conditions for which they are used, and points of interest arising from other considerations, such as toxicology and manufacturing. The book discusses both cosmetic and therapeutic uses of cosmeceuticals for various conditions including rosacea, dry skin, alopecia, eczema, seborrheic dermatitis, purpura, and vitiligo. Active ingredients in the following products are discussed: caffeine, curcumin, green tea, Rhodiola rosea, milk thistle, and more. Also covered are topical peptides and proteins, amino acids and derivatives, antioxidants, vitamins E and C, niacinamide, botanical extracts, and biomarine actives. Providing ample scientific references, this book is an excellent guide to understanding the science behind the use of cosmeceuticals to treat a variety of dermatological conditions.

Carbon Nanotubes

Elsevier Carbon nanotubes have been studied extensively in relation to fullerenes, and together with fullerenes have opened a new science and technology field on nano scale materials. A whole range of issues from the preparation, structure, properties and observation of quantum effects in carbon nanotubes in comparison with 0-D fullerenes are discussed. In addition, complementary reviews on carbon nanoparticles such as carbon nano-capsules, onion-like graphite particles and metal-coated fullerenes are covered. This book aims to cover recent research and development in this area, and so provide a convenient reference tool for all researchers in this field. It is also hoped that this book can serve to stimulate future work on carbon nanotubes.

Nanomaterials Chemistry

Recent Developments and New Directions

John Wiley & Sons With this handbook, the distinguished team of editors has combined the expertise of leading nanomaterials scientists to provide the latest overview of this field. They cover the whole spectrum of nanomaterials, ranging from theory, synthesis, properties, characterization to application, including such new developments as quantum dots, nanoparticles, nanoporous materials, nanowires, nanotubes, and nanostructured polymers. The result is recommended reading for everybody working in nanoscience: Newcomers to the field can acquaint themselves with this exciting subject, while specialists will find answers to all their questions as well as helpful suggestions for further research.

Nonlinear Dynamics of Nanosystems

John Wiley & Sons A discussion of the fundamental changes that occur when dynamical systems from the fields of nonlinear optics, solids, hydrodynamics and biophysics are scaled down to nanosize. The authors are leading scientists in the field and each of their contributions provides a broader introduction to the specific area of research. In so doing, they include both the experimental and theoretical point of view, focusing especially on the effects on the nonlinear dynamical behavior of scaling, stochasticity and quantum mechanics. For everybody working on the synthesis and integration of nanoscopic devices who sooner or later will have to learn how to deal with nonlinear effects.

Nanoscience

The Science of the Small in Physics, Engineering, Chemistry, Biology and Medicine

Springer Science & Business Media Nanoscience stands out for its interdisciplinarity. Barriers between disciplines disappear and the fields tend to converge at the very smallest scale, where basic principles and tools are universal. Novel properties are inherent to nanosized systems due to quantum effects and a reduction in dimensionality: nanoscience is likely to continue to revolutionize many areas of human activity, such as materials science, nanoelectronics, information processing, biotechnology and medicine. This textbook spans all fields of nanoscience, covering its basics and broad applications. After an introduction to the physical and chemical principles of nanoscience, coverage moves on to the adjacent fields of microscopy, nanoanalysis, synthesis, nanocrystals, nanowires, nanolayers, carbon nanostructures, bulk nanomaterials, nanomechanics, nanophotonics, nanofluidics, nanomagnetism, nanotechnology for computers, nanochemistry, nanobiology, and nanomedicine. Consequently, this broad yet unified coverage addresses research in academia and industry across the natural scientists. Didactically structured and replete with hundreds of illustrations, the textbook is aimed primarily at graduate and advanced-undergraduate students of natural sciences and medicine, and their lecturers.

Proceedings of 5th Electronics Packaging Technology Conference (EPTC 2003)

10-12 December, 2003, Pan Pacific Hotel, Singapore

Handbook of Nonlinear Optics

CRC Press Examining classic theories, experimental methods, and practical formulas for exploration of the core topics in nonlinear optics, the second edition of this acclaimed text was extensively revised to reflect recent advances in the analysis and modification of material properties for application in frequency conversion, optical switching and limiting.

Susceptibility Tensors for Nonlinear Optics

Routledge Susceptibility Tensors for Nonlinear Optics is a unique and invaluable reference book with accompanying software. Starting from basic principles, the book presents a detailed introduction to the concept of optical susceptibilities of crystalline media. Substantial appendices include useful tables of third-, fourth-, and fifth-rank susceptibility tensors for major nonlinear optical effects. Integral to the book is an entirely original TURBO RANK software package (compatible with PCs running MS-DOS and Windows) that allows the calculation of the symmetry of material tensors up to seventh rank, effectively superseding conventional reference tables of high rank tensors. This package is also useful for scientists working in solid state physics, crystallography, acoustics, and materials engineering.

Thermoplasmonics

Cambridge University Press An overview of thermoplasmonics including the underlying theory in nanophotonics and applications in nanoengineering and nanomedicine.

Time-Dependent Density-Functional Theory

Concepts and Applications

Oxford University Press Time-dependent density-functional theory (TDDFT) is a quantum mechanical approach for the dynamical properties of electrons in matter. It's widely used in (bio)chemistry and physics to calculate molecular excitation energies and optical properties of materials. This is the first graduate-level text on the formal framework and applications of TDDFT.