

Wenshan Cai
Vladimir Shalaev

Optical Metamaterials

Fundamentals and Applications

 Springer

Optical Metamaterials Fundamentals And Applications

**Arash Ahmadvand, Burak
Gerislioglu, Zeinab Ramezani**



Optical Metamaterials Fundamentals And Applications:

Optical Metamaterials Wenshan Cai,Vladimir Shalaev,2009-12-01 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 **Optical**

Metamaterials Wenshan Cai,Vladimir Shalaev,2009-11-23 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 Non-magnetic Optical

Metamaterials Leonid Alekseyev,2011 **Tunable and Reconfigurable Optical Metamaterials** Yuancheng Fan,Qian

Zhao,Fuli Zhang,Nianhai Shen,2021-10-13 Nanoscopy and Nanospectroscopy Sandip Dhara,Deep Jariwala,Soumen

Das,2023-03-31 This book builds a narrative on the near field optical and spectroscopic studies with an emphasis on plasmonic and photonic assisted nano optics as a tool for superlensing Deliberations on near field studies using confined light in various applications are included along with their commercial implications Single molecule detection utilizing efficient surface enhanced Raman scattering phenomenon in the far field and plasmonic tip enhanced Raman scattering studies in the near field measurements for fast analysis up to trace level is discussed Features Covers the broad area of nano optical spectroscopy from the perspective of putting the concepts and innovations in the field to use Discusses entire spectra of near field optics and spectroscopy using light Explores gas chemical sensing using surface plasmon resonance SPR in the Kretschmann configuration Includes dielectric nano photonics and optical confinement Studies phonon behaviour using confined light for the analysis of chemical biological and other materials This book is aimed at graduate students and researchers in material science analytical chemistry nanotechnology and electrical engineering Mechanics of

Metamaterials with Negative Parameters Teik-Cheng Lim,2020-07-23 This book discusses bulk solids that derive their mechanical properties not from those of their base materials but from their designed microstructures Focusing on the negative mechanical properties it addresses topics that reveal the counter intuitive nature of solids specifically the negativity of properties that are commonly positive such as negative bulk modulus negative compressibility negative hygroexpansion negative thermal expansion negative stiffness phase and negative Poisson s ratio These topics are significant not only due to

the curiosity they have sparked but also because of the possibility of designing materials and structures that can behave in ways that are not normally expected in conventional solids and as such of materials that can outperform solids and structures made from conventional materials The book includes illustrations to facilitate learning and where appropriate reference tables The presentation is didactic starting with simple cases followed by increasingly complex ones It provides a solid foundation for graduate students and a valuable resource for practicing materials engineers seeking to develop novel materials through the judicious design of microstructures and their corresponding mechanisms

Fundamentals of Photonics Bahaa E. A. Saleh, Malvin Carl Teich, 2020-03-04 *Fundamentals of Photonics* A complete thoroughly updated full color third edition *Fundamentals of Photonics* Third Edition is a self contained and up to date introductory level textbook that thoroughly surveys this rapidly expanding area of engineering and applied physics Featuring a 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 and matter Presented at increasing levels of complexity preliminary sections build toward more advanced topics such as Fourier optics and holography photonic crystal optics guided wave and fiber optics LEDs and lasers acousto optic and electro optic devices nonlinear optical devices ultrafast optics optical interconnects and switches and optical fiber communications The third edition features an entirely new chapter on the optics of metals and plasmonic devices Each chapter contains highlighted equations exercises problems summaries and selected reading lists Examples of real systems are included to emphasize the concepts governing applications of current interest Each of the twenty four chapters of the second edition has been thoroughly updated

Science John Michels (Journalist), 2011

Dielectric Metamaterials Igal Brener, Sheng Liu, Isabelle Staude, Jason Valentine, Christopher L. Holloway, 2019-11-12 *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

Toroidal Metamaterials Arash Ahmadi, Burak Gerislioglu, Zeinab Ramezani, 2020-09-25 This book provides an overview of the use of toroidal moments This includes methods of excitation numerical analysis and experimental measurements of associating structures

Special emphasis is placed on understanding the fundamental physics characteristics and real world applications of toroidal multipoles This book also covers a variety of both planar and 3D meta atom and metamolecule schemes capable to sustain toroidal moments across a wide range of spectrum It discusses the implementation of innovative approaches for exploring the spectral features and excitation methodologies predicting the properties of the correlating metasystems in their excited states An applicable text for undergraduate graduate and postgraduate students this book is also of interest to researchers theorizers and experimentalists working in optical physics photonics and nanotechnology **Metamaterials** ,2008

Optical Metamaterials: Qualitative Models Arkadi Chipouline,Franko Küppers,2018-12-28 This textbook bridges the gap between university courses on electrodynamics and the knowledge needed to successfully address the problem of electrodynamics of metamaterials It appeals to both experimentalists and theoreticians who are interested in the physical basics of metamaterials and plasmonics Focusing on qualitative fundamental treatment as opposed to quantitative numerical treatment it covers the phenomena of artificial magnetization at high frequencies and discusses homogenization procedures and the basics of quantum dynamics in detail By considering different phenomena it creates a self consistent qualitative picture to explain most observable phenomena This allows readers to develop a better understanding of the concepts and helps to create a conceptual approach which is especially important in educational contexts This clearly written book includes problems and solutions for each chapter which can be used for seminars and homework as well as qualitative models that are helpful to students *Negative-Refractive Metamaterials* G. V. Eleftheriades,K. G. Balmain,2005-07-07 Learn about the revolutionary new technology of negative refraction metamaterials Negative Refraction Metamaterials Fundamental Principles and Applications introduces artificial materials that support the unusual electromagnetic property of negative refraction Readers will discover several classes of negative refraction materials along with their exciting groundbreaking applications such as lenses and antennas imaging with super resolution microwave devices dispersion compensating interconnects radar and defense The book begins with a chapter describing the fundamentals of isotropic metamaterials in which a negative index of refraction is defined In the following chapters the text builds on the fundamentals by describing a range of useful microwave devices and antennas Next a broad spectrum of exciting new research and emerging applications is examined including Theory and experiments behind a super resolving negative refractive index transmission line lens 3 D transmission line metamaterials with a negative refractive index Numerical simulation studies of negative refraction of Gaussian beams and associated focusing phenomena Unique advantages and theory of shaped lenses made of negative refractive index metamaterials A new type of transmission line metamaterial that is anisotropic and supports the formation of sharp steerable beams resonance cones Implementations of negative refraction metamaterials at optical frequencies Unusual propagation phenomena in metallic waveguides partially filled with negative refractive index metamaterials Metamaterials in which the refractive index and the underlying group velocity are both negative This work

brings together the best minds in this cutting edge field It is fascinating reading for scientists engineers and graduate level students in physics chemistry materials science photonics and electrical engineering Metamaterials Nader Engheta, Richard W. Ziolkowski, 2006-07-11 Modern metamaterials is relatively new less than two years old and evolving rapidly It has captured the interest of researchers because theoretically predicted exciting fundamental electromagnetic phenomena can now be realized experimentally and novel devices are feasible This is the critical resource sought by readers who need fundamental knowledge and applications provided by pre eminent experts in this field *Materials for Nanophotonics - Plasmonics, Metamaterials and Light Localization: Volume 1182* Luca Dal Negro, 2009-11-19 The MRS Symposium Proceeding series is an internationally recognised reference suitable for researchers and practitioners

Tutorials in Metamaterials Mikhail A. Noginov, Viktor A. Podolskiy, 2016-04-19 From science fiction to science laboratories Discover the State of the Art in Photonic Metamaterials Metamaterials composite media with unusual optical properties have revolutionized the landscape of optical science and engineering over the past decades Metamaterials have transformed science fiction like concepts of superresolution imaging and optic Metamaterials, 2012 **Member Guide** Optical Society of America, 2007 **Metamaterials** Allan Boardman, Nader Engheta, Mikhail Noginov, Nikolay Zheludev, 2010 Includes Proceedings Vol 7821 **Plasmonic Metamaterials** Yongmin Liu, 2009

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