Introduction To Surface Plasmon Theory Institut Fresnel

Surface plasmon resonance (SPR) plays a dominant role in real-time interaction sensing of biomolecular binding events. This book focuses on a total system description including optics, fluidics and sensor surfaces. It covers all commercial SPR systems in the market. It is the first of its kind and fills a gap in the technical literature as no other handbook on SPR is currently available. The final chapter discussed new trends and a vision is given for future developments and needs of the SPR market. This excellent handbook provides comprehensive information with easy to use, stand-alone chapters and will be of great use to anyone one working with or affiliated to the technology.

"In 1952 Pines and Bohm discussed a quantized bulk plasma oscillation of electronsin a metallic solid to explain the energy losses of fast electrons passing throughmetal foils [1]. They called this excitation a "plasmon"--Provided by publisher.

This invaluable book contains pedagogical articles on the dominant nonstochastic methods of microscopic many-body theories — the methods of density functional theory, coupled cluster theory, and correlated basis functions — in their widest sense. Other articles introduce students to applications of these methods in front-line research, such as Bose-Einstein condensates, the nuclear many-body problem, and the dynamics of quantum liquids. These keynote articles are supplemented by experimental reviews on intimately connected topics that are of current relevance. The book addresses the striking lack of pedagogical reference literature in the field that allows researchers to acquire the requisite physical insight and technical skills. It should, therefore, provide useful reference material for a broad range of theoretical physicists in condensed-matter and nuclear theory.

Nanoplasmonics is a young topic of research, which is part of nanophotonics and nano-optics. Nanoplasmonics concerns to the investigation of electron oscillations in metallic nanostructures and nanoparticles. Surface plasmons have optical properties, which are very interesting. For instance, surface plasmons have the unique capacity to confine light at the nanoscale. Moreover, surface plasmons are very sensitive to the surrounding medium and the properties of the materials on which they propagate. In addition to the above, the surface plasmon resonances can be controlled by adjusting the size, shape, periodicity, and materials' nature. All these optical properties can enable a great number of applications, such as biosensors, optical modulators, photodetectors, and photovoltaic devices. This book is intended for a broad audience and provides an overview of some of the fundamental knowledges and applications of nanoplasmonics.

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.

The first book-length treatment of an exciting new technology, this volume explains the principles behind induced plasmonic current. With contributions by the world's leading scientists in this area, it details how this important discovery might be used to better understand solar energy conversion; to detect and quantify DNA more quickly and accurately; to enhance the use of fluorescence microscopy; and to enhance the timeliness and accuracy of digital immunoassays. It is a key work for researchers and students in the field of plasmonics and fluorescence.

This book deals with all aspects of plasmonics, basics, applications and advanced developments. Plasmonics is an emerging field of research dedicated to the resonant interaction of light with metals. The light/matter interaction is strongly enhanced at a nanometer scale which sparks a keen interest of a wide scientific community and offers promising applications in pharmacology, solar energy, nanocircuitry or also light sources. The major breakthroughs of this field of research originate from the recent advances in nanotechnology, imaging and numerical modelling. The book is divided into three main parts: extended surface plasmons polaritons propagating on metallic surfaces, surface plasmons localized on metallic particles, imaging and nanofabrication techniques. The reader will find in the book: Principles and recent advances of plasmonics, a complete description of the physics of surface plasmons, a historical survey with emphasize on the emblematic topic of Wood's anomaly, an overview of modern applications of molecular plasmonics and an extensive description of imaging and fabrications techniques.

Given such problems as rejection, the interface between an implant and its human host is a critical area in biomaterials. Surfaces and Interfaces for Biomaterials summarizes the wealth of research on understanding the surface properties of biomaterials and the way they interact with human tissue. The first part of the book reviews the way biomaterial surfaces form. Part Two then discusses ways of monitoring and characterizing surface structure and behavior. The final two parts of the book look at a range of in vitro and in vivo studies of the complex interactions between biomaterials and the body. Chapters cover such topics as bone and tissue regeneration, the role of interface interactions in biodegradable biomaterials, microbial biofilm formation, vascular tissue engineering and ways of modifying biomaterial surfaces to improve biocompatibility. Surfaces and Interfaces for Biomaterials will be a standard work on how to understand and control surface processes in ensuring biomaterials are used successfully in medicine.

This book covers both experimental and theoretical aspects of nanoscale light scattering and surface roughness. Topics include: spherical particles located on a substrate; surface and buried interface roughness; surface roughness of polymer thin films; magnetic and thermal fluctuations at planar surfaces; speckle patterns; scattering of electromagnetic waves from a metal; multiple wavelength light scattering; nanoroughness standards.

Labs on Chip: Principles, Design and Technology provides a complete reference for the complex field of labs on chip in biotechnology. Merging three main areas— fluid dynamics, monolithic micro- and nanotechnology, and out-of-equilibrium biochemistry—this text integrates coverage of technology issues with strong theoretical explanations of design techniques. Analyzing each subject from basic principles to relevant applications, this book: Describes the biochemical elements required to work on labs on chip Discusses fabrication, microfluidic, and

electronic and optical detection techniques Addresses planar technologies, polymer microfabrication, and process scalability to huge volumes Presents a global view of current lab-on-chip research and development Devotes an entire chapter to labs on chip for genetics Summarizing in one source the different technical competencies required, Labs on Chip: Principles, Design and Technology offers valuable guidance for the lab-on-chip design decision-making process, while exploring essential elements of labs on chip useful both to the professional who wants to approach a new field and to the specialist who wants to gain a broader perspective.

Surface plasmon resonance (SPR) plays a dominant role in real-time interaction sensing of biomolecular binding events, this book provides a total system description including optics, fluidics and sensor surfaces for a wide researcher audience.

The book provides an introduction of surface plasmons and presents its applications in the sensing of various chemical and biological analyses using optical fiber technology. The field is developed by introducing the surface plasmons for semi-infinite metal–dielectric interface with discussion of their propagation length and penetration depth. Practical issues with the excitation of surface plasmons in different configurations and in various geometries including various means of their excitation have also been included. The book discusses the essential components of fiber optic sensors, their functions and the performance parameters along with the theoretical description of fiber optic Surface Plasmon Resonance (SPR) sensors with respect to various light launching conditions. The fabrication methods and protocols used for the fabrication of the fiber optic SPR chemical and biosensors have been described. Some fiber optic sensing applications based on SPR phenomena and various issues, such as sensitivity enhancement, influence of external stimuli etc, have been an important part of the book. The book will help beginners as well as established researchers in understanding the fundamentals and advancements of optical fiber plasmonic sensor technology. The book contains both the rigorous theory and the experimental techniques of SPR and related variety of sensors. Contents:IntroductionPhysics of PlasmonsCharacteristics and Components of Fiber Optic SensorTheory of SPR-based Optical Fiber SensorFabrication and Functionalization MethodsSPR based Sensing ApplicationsSPR based Fiber Optic Sensors: Factors Affecting PerformanceFuture Scope of ResearchAppendices:Dispersion Relations of Dielectric Materials and MetalsList of Constants Readership: Beginners as well as established researchers who are interested in the fundamentals and advancements of optical fiber plasmonic sensor technology. Key Features:All the contents in this book are totally different from the topics covered in other books on fiber optic sensors as we focus on chemical and biochemical sensing applications of fiber topic plasmonic sensorsThe book discusses the fiber optic chemical and biosensors based on plasmonics which is one of the hottest topics of research these days. Further, the book includes sensor fabrication methods apart from just adding sensors based on surface interactionsThe book includes not only the basics of surface plasmons but also the chemical and bio-chemical sensing applications using optical fiber technologyThe book covers the state of art work on fiber optic sensors utilizing surface plasmon resonance techniqueThe authors have carried out tremendous amount of research on this area during the last 10 years and their work has extensively been cited in the literatureKeywords:Optical Fiber;Sensor;Surface Plasmon;Plasmonics

Surface Analytical Techniques for Probing Biomaterial Processes describes four surface analytical techniques for probing dynamic, in situ processes at the biomaterial interface. The book presents the theoretical basis and biomaterial applications of: Total Internal Reflection Fluorescence Spectroscopy (TIRFS) Surface Plasmon Resonance (SPR) Ellipsometry Dynamic Contact Angle (DCA) analysis This book is not a review, but a practical description of the techniques to enable the biomaterialist to assess and intelligently use any one of the methods described. It deliberately avoids addressing expensive or non-dynamic tests, and concentrates instead on the growing field of biomaterials. Theory is presented in a simple and readable manner, experimental procedures are described, and the type of information obtained is discussed. It is written not just for the avid or interested reader but also, and perhaps more important, for the end user.

This revised and updated edition of the well-received book by C. Klingshirn provides an introduction to and an overview of all aspects of semiconductor optics, from IR to visible and UV. It has been split into two volumes and rearranged to offer a clearer structure of the course content. Inserts on important experimental techniques as well as sections on topical research have been added to support research-oriented teaching and learning. Volume 1 provides an introduction to the linear optical properties of semiconductors. The mathematical treatment has been kept as elementary as possible to allow an intuitive approach to the understanding of results of semiconductor spectroscopy. Building on the phenomenological model of the Lorentz oscillator, the book describes the interaction of light with fundamental optical excitations in semiconductors (phonons, free carriers, excitons). It also offers a broad review of seminal research results augmented by concise descriptions of the relevant experimental techniques, e.g., Fourier transform IR spectroscopy, ellipsometry, modulation spectroscopy and spatially resolved methods, to name a few. Further, it picks up on hot topics in current research, like quantum structures, mono-layer semiconductors or Perovskites. The experimental aspects of semiconductor optics are complemented by an in-depth discussion of group theory in solid-state optics. Covering subjects ranging from physics to materials science and optoelectronics, this book provides a lively and comprehensive introduction to semiconductor optics. With over 120 problems, more than 480 figures, abstracts to each chapter, as well as boxed inserts and a detailed index, it is intended for use in graduate courses in physics and neighboring sciences like material science and electrical engineering. It is also a valuable reference resource for doctoral and advanced researchers.

This book discusses a new class of photonic devices, known as surface plasmon nanophotonic structures. The book highlights several exciting new discoveries, while providing a clear discussion of the underlying physics, the nanofabrication issues, and the materials considerations involved in designing plasmonic devices with new functionality. Chapters written by the leaders in the field of plasmonics provide a solid background to each topic.

Cottam and Tilley provide an introduction to the properties of wave-like excitations associated with surfaces and interfaces. The emphasis is on acoustic, optic and magnetic excitations, and, apart from one section on liquid surfaces, the text concentrates on solids. The important topic of superlattices is also discussed, in which the different kinds of excitation are considered from a unified point of view. Throughout the book the authors are careful to relate theory and experiment and all of the most important experimental techniques are described. The theoretical treatment assumes only a knowledge of undergraduate physics, except for Green function methods that are used in a few sections; these methods are developed in an appendix. The book also contains extensive references to enable the reader to consult the research and review literature, and problems are provided in each of the main chapters to allow the reader to develop topics presented in the text.

This book is the first of 2 special volumes dedicated to the memory of Gérard Maugin. Including 40 papers that reflect his vast field of scientific activity, the contributions discuss non-standard methods (generalized model) to demonstrate the wide range of subjects that were covered by this exceptional scientific leader. The topics range from micromechanical basics to engineering applications, focusing on new models and applications of well-known models to new problems. They include micro–macro aspects, computational endeavors, options for identifying constitutive equations, and old problems with incorrect or non-satisfying solutions based on the classical continua assumptions.

This work pursues a novel route to functionalizing large surfaces with hybrid nanoparticles. It also casts new light on the combined use of surface plasmon resonance and X-rays. SPR spectroscopy is employed to study Au-based plasmonic nanostructures fabricated by novel methods, and a new experimental device is developed combining SPR with X-ray absorption spectroscopy at a synchrotron beamline. Using the new SPR-XAS setup developed in this work, the author has studied in-situ and real-time effects of X-ray irradiation in materials such as glasses and Co-phthalocyanines.

This Brief focuses on the synthesis, functionalization techniques, optical properties and biomedical application of gold nanostars (GNS). Various facilities of gold nanostars synthesis as well as functionalization of GNS with PEG, organic dyes, bioactive compounds are

discussed. The authors discuss physical origin of the Localized Surface Plasmon Resonances and the way the nano-environment affects them. The implication of the LSPR of gold nanostars surface enhanced Raman scattering is also discussed. The emphasis has been done on the application of GNS for current and emerge needs of medicine, biology and pharmacy. Moreover, properties of gold nanostars as contrast agents for in vivo imaging and interaction of GNS with cells are also discussed in this Brief.

This book is expected to present state-of-the-art understanding of a selection of excitonic and photonic processes in useful materials from semiconductors to insulators to metal/insulator nanocomposites, both inorganic and organic. Among the featured applications are components of solar cells, detectors, light-emitting devices, scintillators and materials with novel optical properties. Excitonic properties are particularly important in organic photovoltaics and light emitting devices, as also in questions of the ultimate resolution and efficiency of new-generation scintillators for medical diagnostics, border security and nuclear non proliferation. Novel photonic and optoelectronic applications benefit from new material combinations and structures to be discussed.

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.

This is a comprehensive treatment of the field of SPR sensors, in three parts. Part I introduces principles of surface plasmon resonance bio-sensors, electromagnetic theory of surface plasmons, theory of SPR sensors and molecular interactions at sensor surfaces. Part II examines the development of SPR sensor instrumentation and functionalization methods. Part III reviews applications of SPR biosensors in the study of molecules, and in environmental monitoring, food safety and medical diagnostics.

Modern Introduction to Surface PlasmonsTheory, Mathematica Modeling, and ApplicationsCambridge University Press

Biosensors are becoming increasingly important bioanalytical tools in the pharmaceutical, biotechnology, food, and other consumer oriented industries. The technology, though well developed in Europe, is slowly developing and has begun to generate interest in the United States only over the past couple of years. Research is now being directed toward the development of biosensors that are versatile, economical, and simple to use. Engineering Biosensors is a comprehensive introduction to biosensors that includes numerous illustrations to further explain the main concepts and practical examples from existing literature. It describes what biosensors are, where they are used, and how their performance is affected by existing surface characteristics. A better understanding of biosensors, as provided by this book, will greatly assist in the design of new as well as the improvement of existing biosensors. Readers are also provided with invaluable and hard-to-find data on the economics of the biosensor market to assist them in better understanding the market and where it is heading.

This book provides a systemic and self-contained guide to the theoretical description of the fundamental properties of plasmonic waves. The field of plasmonics is built on the interaction of electromagnetic radiation and conduction electrons at metallic interfaces or in metallic nanostructures, and so to describe basic plasmonic behavior, boundary-value problems may be formulated and solved using electromagnetic wave theory based on Maxwell’s equations and the electrostatic approximation. In preparation, the book begins with the basics of electromagnetic and electrostatic theories, along with a review of the local and spatial nonlocal plasma model of an electron gas. This is followed by clear and detailed boundary value analysis of both classical three-dimensional and novel two-dimensional plasmonic systems in a range of different geometries. With only general electromagnetic theory as a prerequisite, this resulting volume will be a useful entry point to plasmonic theory for students, as well as a convenient reference work for researchers who want to see how the underlying models can be analysed rigorously.

An up-to-date status report presenting the current state-of-the-art in nano-optics, this volume also deals with near-field optical microscopy. Each chapter is written by a leading scientist in the field. It will be useful to all researchers working at the forefront of near-field optics and nanoelectro-optics.

This book introduces graduate students in physics, optics, materials science and electrical engineering to surface plasmons, and applications of surface plasmon physics.

Surface physics and chemistry have in recent years become one of the most active fields in solid state research. A number of techniques have been developed, and both the experimental aspect and the correlated theory are evolving at an extremely fast rate. Electron and ion spectroscopy are of major importance in this development. In this volume, which contains edited and extended versions of eight sets of lectures given at the NATO Advanced Study Institute held at Ghent, Belgium, from August 29 to September 9, 1977, a re view of the state of the art in these fields is given from both an experimental and a theoretical point of view. Electron emission techniques such as UPS (ultraviolet photoemission spectroscopy), XPS (x-ray photoemission spectroscopy), and AES (Auger electron spectroscopy) constitute the major part of this volume, reflecting the fact that they continue to be the most widely applied surface techniques. Recent developments in the application of synchrotron radiation to angle-resolved photoelectron spectroscopy are extensively covered, from an experimental point of view by Prof. W. E. Spicer (Stanford University, U.S.A.) and from a theoretical point of view by Dr. A. Liebsch (Kernforschungsanlage Julich, Germany). Emphasis is put on the study of energy bands in layered structures, and on chemisorption on well-defined surfaces. Chemisorption and catalysis on metals is treated in detail by Prof. G. Ertl (Universitat Munchen, Germany). This chapter contains a review of the application of the different surface techniques to specific surface systems.

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.

Quantum Optics and Nanophotonics consists of the lecture notes of the Les Houches Summer School 101 held in August 2013. Some of the most eminent experts in this flourishing area of research have contributed chapters lying at the intersection of basic quantum science and advanced nanotechnology. The book is part of the renowned series of tutorial books that contain the lecture notes of all the Les Houches Summer Schools since the 1950's and cover the latest developments in physics and related fields.

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.
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.
"From the beginning of this century, there has been a dramatic increase in interest in the study of surface plasmon polaritons-based metallic subwavelength structures and learning. This is a refreshing concise book on issues and considerations in designing"
In this book "surface science" is understood in a broad sense, taken to include two-dimensional structures such as thin films and superlattices. Thecontributions reflect current research activities in surface and thin-film science in Latin-America, presenting a clear picture of the research centers, equipment and expertise available in the region in this rapidly developing field of physics. The topics treated cover the whole spectrum of the subject, with the latest theoretical results beingreported alongside details of industrial applications such as materials characterization and photovoltaic cells. Surface scientists, engineers and research admistrators will find this volume of interest.
Metamaterials represent a new emerging innovative field of research which has shown rapid acceleration over the last couple of years. In this handbook, we present the richness of the field of metamaterials in its widest sense, describing artificial media with sub-wavelength structure for control over wave propagation in four volumes. Volume 1 focuses on the fundamentals of electromagnetic metamaterials in all their richness, including metasurfaces and hyperbolic metamaterials. Volume 2 widens the picture to include elastic, acoustic, and seismic systems, whereas Volume 3 presents nonlinear and active photonic metamaterials. Finally, Volume 4 includes recent progress in the field of nanoplasmonics, used extensively for the tailoring of the unit cell response of photonic metamaterials. In its totality, we hope that this handbook will be useful for a wide spectrum of readers, from students to active researchers in industry, as well as teachers of advanced courses on wave propagation. Contents: Volume 1: Electromagnetic Metamaterials (Ekaterina Shamonina): PrefaceElectromagnetic Metamaterials: Homogenization and Effective Properties of Mixtures (Ari Sihvola)Effective Medium Theory of Electromagnetic and Quantum Metamaterials (Mário G Silveirinha)Hyperbolic Metamaterials (Igor I Smolyaninov)Circuit and Analytical Modelling of Extraordinary Transmission Metamaterials (Francisco Medina, Francisco Mesa, Raul Rodríguez-Berral and Carlos Molero)Electromagnetic Metasurfaces: Synthesis, Realizations and Discussions (Karim Achouri and Christophe Caloz)Metasurfaces for General Control of Reflection and Transmission (Sergei Tretyakov, Viktar Asadchy and Ana Díaz-Rubio)Scattering at the Extreme with Metamaterials and Plasmonics (Francesco Monticone and Andrea Alù)All-Dielectric Nanophotonics: Fundamentals, Fabrication, and Applications (Alexander Krasnok, Roman Savelev, Denis Baranov and Pavel Belov)Tunable Metamaterials (Ilya V Shadrivov and Dragomir N Neshev)Spatial Solitonic and Nonlinear Plasmonic Aspects of Metamaterials (Allan D Boardman, Alesandro Alberucci, Gaetano Assanto, Yu G Rapoport, Vladimir V Grimalsky, Vasyl M Ivchenko and Eugen N Tkachenko)Metamaterial Catheter Receivers for Internal Magnetic Resonance Imaging (Richard R A Syms, Ian R Young and Laszlo Solymar)Microwave Sensors Based on Symmetry Properties and Metamaterial Concepts (Jordi Naqui, Ali K Horestani, Christophe Fumeaux and Ferran Martín)Volume 2: Elastic, Acoustic, and Seismic Metamaterials (Richard Craster and Sébastien Guenneau): PrefaceDynamic Homogenization of Acoustic and Elastic Metamaterials and Phononic Crystals (Richard Craster, Tryfon Antonakakis and Sébastien Guenneau)Acoustic Metamaterial (Nicholas Fang, Jun Xu, Navid Nemati, Nicolas Viard and Denis Lafarge)Flat Lens Focusing of Flexural Waves in Thin Plates (Patrick Sebbah and Marc Dubois)Space–Time Cloaking (Martin W McCall and Paul Kinsler)Soda Cans Metamaterial: Homogenization and Beyond (Fabrice Lemoult, Geoffroy Lerosey, Nadège Kaïna and Mathias Fink)New Trends Toward Locally-Resonant Metamaterials at the Mesoscopic Scale (Philippe Roux, Matthieu Rupin, Fabrice Lemoult, Geoffroy Lerosey, Andrea Colombi, Richard Craster, Sébastien Guenneau, William A Kuperman and Earl G Williams)Seismic Metamaterials: Controlling Surface Rayleigh Waves Using Analogies with Electromagnetic Metamaterials (Stéphane Brûlé, Stefan Enoch, Sébastien Guenneau and
This is the third volume in the Reviews in Fluorescence series. To date, two volumes have been both published and well received by the scientific community. Several book reviews have also favorably described the series as an "excellent compilation of material which is well balanced from authors in both the US and Europe". Of particular mention we note the recent book review in JACS by Gary Baker, Los Alamos. In this 3rd volume we continue the tradition of publishing leading edge and timely articles from authors around the world. We hope you find this volume as useful as past volumes, which promises to be just as diverse with regard to content. Finally, in closing, we would like to thank Dr Kadir Asian for the typesetting of the entire volume and our counterparts at Springer, New York, for its timely publication. Professor Chris D. Geddes Professor Joseph R. Lakowicz August 20*^ 2005.
Plasmonics gives researchers in universities and industries and designers an overview of phenomena enabled by artificially designed metamaterials and their application for plasmonic devices. The purpose of this book is to provide a detailed introduction to the basic modeling approaches and an overview of enabled innovative phenomena. The main research agenda of this book is aimed at the study of modeling techniques and novel functionalities such as plasmonic enhancement of solar cell efficiency, plasmonics in sensing, etc. The topics addressed in this book cover the major strands: theory, modeling and design, applications in practical devices, fabrication, characterization, and measurement. It

is worthwhile mentioning that the strategic objectives of developing new artificial functional materials require close cooperation of the research in each subarea.