Single Photon Imaging Springer Series In Optical Sciences

Optical Imaging Techniques in Cell Biology, Second Edition covers the field of biological microscopy, from the optics of the microscope to the latest advances in imaging below the traditional resolution limit. It includes the techniques—such as labeling by immunofluorescence and fluorescent proteins—which have revolutionized cell biology. Quantitative techniques such as lifetime imaging, ratiometric measurement, and photoconversion are all covered in detail. Expanded with a new chapter and 40 new figures, the second edition has been updated to cover the latest developments in optical imaging techniques. Explanations throughout are accurate, detailed, but as far as possible non-mathematical. This edition includes appendices with useful practical protocols, references, and suggestions for further reading. Color figures are integrated throughout.

Space applications, nuclear physics, military operations, medical imaging, and especially electronics (modern silicon processing) are obvious fields in which radiation damage can have serious consequences, i.e., degradation of MOS devices and circuits. Zeroing in on vital aspects of this broad and complex topic, Radiation Effects in Semiconductors addresses the ever-growing need for a clear understanding of radiation effects on semiconductor devices and circuits to combat potential damage it can cause. Features a chapter authored by renowned radiation authority Lawrence T. Clark on Radiation Hardened by Design SRAM Strategies for TID and SEE Mitigation This book analyzes the radiation problem, focusing on the most important aspects required for comprehending the degrading effects observed in semiconductor devices, circuits, and systems when they are irradiated. It explores how radiation interacts with solid materials, providing a detailed analysis of three ways this occurs: Photoelectric effect, Compton effect, and creation of electron-positron pairs. The author explains that the probability of these three effects occurring depends on the energy of the incident photon and the atomic number of the target. The book also discusses the effects that photons can have on matter—in terms of ionization effects and nuclear displacement Written for post-graduate researchers, semiconductor engineers, and nuclear and space engineers with some electronics background, this carefully constructed reference explains how ionizing radiation is creating damage in semiconducting devices and circuits and systems—and how that damage can be avoided in areas such as military/space missions, nuclear applications, plasma damage, and X-ray-based techniques. It features top-notch international experts in industry and academia who address emerging detector technologies, circuit design techniques, new materials, and innovative system approaches.

Imaging from Cells to Animals In Vivo offers an overview of optical imaging techniques developed over the past two decades to investigate biological processes in live cells and tissues. It comprehensively covers the main imaging approaches used as well as the application of those techniques to biological investigations in preclinical models. Among the areas covered are cell metabolism, receptor-ligand interactions, membrane trafficking, cell signaling, cell migration, cell adhesion, cytoskeleton and other processes using various molecular optical imaging techniques in living organisms, such as mice and zebrafish. Features Brings together biology and advanced optical imaging techniques to provide an overview of progress and modern methods from microscopy to whole body imaging. Fills the need for a comprehensive view of application-driven development and use of new tools to ask new biological questions in the context of a living system. Includes basic chapters on key methods and instrumentation, from fluorescence microscopy and imaging to endoscopy, optical coherence tomography and super-resolution imaging. Discusses approaches at different length scales and biomedical applications to the study of single cell, whole organ, and whole organism behavior. Addresses the impact on discovery, such as cellular function as implicated in human disease and translational medicine, for example in cancer diagnosis. Margarida M. Barroso is a Professor in the Department of Molecular and Cellular Physiology, Albany Medical College (Albany, New York). Xavier Intes is a Professor in the Biomedical Engineering Department and Co-Director of the Center for Modeling, Simulation and Imaging for Medicine (CeMSIM) at Rensselaer Polytechnic Institute (Troy, New York).

In 1984 Desmond O’Connor and David Phillips published their comprehensive book „Time-correlated Single Photon Counting“. At that time time-correlated s- gle photon counting, or TCSPC, was used primarily to record fluorescence decay functions of dye solutions in cuvettes. From the beginning, TCSPC was an am- ingly sensitive and accurate technique with excellent time-resolution. However, acquisition times were relatively slow due to the low repetition rate of the light sources and the limited speed of the electronics of the 70s and early 80s. Moreover, TCSPC was intrinsically one-dimensional, i.e. limited to the recording of the wa- form of a periodic light signal. Even with these limitations, it was a wonderful te- nique. More than 20 years have elapsed, and electronics and laser techniques have made impressive progress. The number of transistors on a single chip has approximately doubled every 18 months, resulting in a more than 1,000-fold increase in compl- ity and speed. The repetition rate and power of pulsed light sources have increased by about the same factor.

Optical Imaging Techniques in Cell Biology, Second Edition

Technology and Applications

Photon-Counting Image Sensors

Pathophysiology and Clinical Applications
Terahertz Spectroscopy and Imaging
Advanced Photon Counting

This open access book provides a comprehensive overview of the application of the newest laser and microscope/ophthalmoscope technology in the field of high resolution imaging in microscopy and ophthalmology. Starting by describing High-Resolution 3D Light Microscopy with STED and RESOLFT, the book goes on to cover retinal and anterior segment imaging and image-guided treatment and also discusses the development of adaptive optics in vision science and ophthalmology. Using an interdisciplinary approach, the reader will learn about the latest developments and most up to date technology in the field and how these translate to a medical setting. High Resolution Imaging in Microscopy and Ophthalmology – New Frontiers in Biomedical Optics has been written by leading experts in the field and offers insights on engineering, biology, and medicine, thus being a valuable addition for scientists, engineers, and clinicians with technical and medical interest who would like to understand the equipment, the applications and the medical/biological background. Lastly, this book is dedicated to the memory of Dr. Gerhard Zinser, co-founder of Heidelberg Engineering GmbH, a scientist, a husband, a brother, a colleague, and a friend.

The acquisition and interpretation of images is a central capability in almost all scientific and technological domains. In particular, the acquisition of electromagnetic radiation, in the form of visible light, UV, infrared, X-ray, etc. is of enormous practical importance. The ultimate sensitivity in electronic imaging is the detection of individual photons. With this book, the first comprehensive review of all aspects of single-photon electronic imaging has been created. Topics include theoretical basics, semiconductor fabrication, single-photon detection principles, imager design and applications of different spectral domains. Today, the solid-state fabrication capabilities for several types of image sensors has advanced to a point, where uncoooled single-photon electronic imaging will soon become a consumer product. This book is giving a specialist ?s view from different domains to the forthcoming “single-photon imaging” revolution. The various aspects of single-photon imaging are treated by internationally renowned, leading scientists and technologists who have all pioneered their respective fields.

This open access book, edited and authored by a team of world-leading researchers, provides a broad overview of advanced photonic methods for nanoscale visualization, as well as describing a range of fascinating in-depth studies. Introductory chapters cover the most relevant physics and basic methods that young researchers need to master in order to work effectively in the field of nanoscale photonic imaging, from physical first principles, to instrumentation, to mathematical foundations of imaging and data analysis. Subsequent chapters demonstrate how these cutting edge methods are applied to a variety of systems, including complex fluids and biomolecular systems, for visualizing their structure and dynamics, in space and on timescales extending over many orders of magnitude down to the femtosecond range. Progress in nanoscale photonic imaging in Göttingen has been the sum total of more than a decade of work by a wide range of scientists and mathematicians across disciplines, working together in a vibrant collaboration of a kind rarely matched. This volume presents the highlights of their research achievements and serves as a record of the unique and remarkable constellation of contributors, as well as looking ahead at the future prospects in this field. It will serve not only as a useful reference for experienced researchers but also as a valuable point of entry for newcomers.

This book is a comprehensive and richly-illustrated guide to cardiac CT, its current state, applications, and future directions. While the first edition of this text focused on what was then a novel instrument looking for application, this edition comes at a time where a wealth of guideline-driven, robust, and beneficial clinical applications have evolved that are enabled by an enormous and ever growing field of technology. Accordingly, the focus of the text has shifted from a technology-centric to a more patient-centric appraisal. While the specifications and capabilities of the CT system itself remain front and center as the basis for diagnostic success, much of the benefit derived from cardiac CT today comes from avant-garde technologies enabling enhanced visualization, quantitative imaging, and functional assessment, along with exciting deep learning, and artificial intelligence applications. Cardiac CT is no longer a mere tool for non-invasive coronary artery stenosis detection in the chest pain diagnostic algorithms; cardiac CT has proven its value for uses as diverse as personalized cardiovascular risk stratification, prediction, and management, diagnosing lesion-specific ischemia, guiding minimally invasive structural heart disease therapy, and planning cardiovascular surgery, among many others. This second edition is an authoritative guide and reference for both novices and experts in the medical imaging sciences who have an interest in cardiac CT.

Practical Nuclear Medicine
Biomedical Image Processing
Nanoscale Photonic Imaging
Emerging New Directions
Nuclear Oncology
Physics and Applications

This volume focuses on Time-Correlated Single Photon Counting (TCSPC), a powerful tool allowing luminescence lifetime measurements to be made with high temporal resolution, even on single molecules. Combining spectrum and lifetime provides a “fingerprint” for identifying such molecules in the presence of a background. Used together with confocal detection, this permits single-molecule spectroscopy and microscopy in addition to ensemble measurements, opening up an enormous range of hot life science applications such as fluorescence lifetime imaging (FLIM) and measurement of Förster Resonant Energy Transfer (FRET for the investigation of protein folding and interaction. Several technology-related chapters present both the basics and current sta of-the-art, in particular of TCSPC electronics, photon detectors and lasers. The remaining chapters cover a broad range of applications and methodologies for experiments and data analysis, including the life sciences, defect centers in diamonds, super- resolution microscopy, and optical tomography. The chapters detailing new options arising from the combination of classic TCSP and fluorescence lifetime with methods based on intensity fluctuation represent a particularly unique highlight.

This book starts at an introductory level and leads reader to the most advanced topics in fluorescence imaging and super-resoluti

techniques that have enabled new developments such as nanobioimaging, multiphoton microscopy, nanometrology and nanosen
The interdisciplinary subject of fluorescence microscopy and imaging requires complete knowledge of imaging optics and molecu
physics. So, this book approaches the subject by introducing optical imaging concepts before going in more depth about advance
imaging systems and their applications. Additionally, molecular orbital theory is the important basis to present molecular physics
and gain a complete understanding of light-matter interaction at the geometrical focus. The two disciplines have some overlap sin
light controls the molecular states of molecules and conversely, molecular states control the emitted light. These two mechanisms
together determine essential imaging factors such as, molecular cross-section, Stoke shift, emission and absorption spectra, qua
yield, signal-to-noise ratio, Forster resonance energy transfer (FRET), fluorescence recovery after photobleaching (FRAP) and
fluorescence lifetime. These factors form the basis of many fluorescence based devices. The book is organized into two parts. Th
part deals with basics of imaging optics and its applications. The advanced part takes care of several imaging techniques and rela
instrumentation that are developed in the last decade pointing towards far-field diffraction unlimited imaging.
In modern medicine, imaging is the most effective tool for diagnostics, treatment planning and therapy. Almost all modalities have
went to directly digital acquisition techniques and processing of this image data have become an important option for health care
future. This book is written by a team of internationally recognized experts from all over the world. It provides a brief but complete
overview on medical image processing and analysis highlighting recent advances that have been made in academics. Color figur
are used extensively to illustrate the methods and help the reader to understand the complex topics.
This textbook, intended for advanced undergraduate and graduate students, is an introduction to the physical and mathematical
principles used in clinical medical imaging. The first two chapters introduce basic concepts and useful terms used in medical
imaging and the tools implemented in image reconstruction, while the following chapters cover an array of topics such as: physics
x-rays and their implementation in planar and computed tomography (CT) imaging;nuclear medicine imaging and the methods of
forming functional planar and single photon emission computed tomography (SPECT) images and Clinical imaging using positron
emitters as radiotracers. The book also discusses the principles of MRI pulse sequencing and signal generation, gradient fields, a
the methodologies implemented for image formation, form flow imaging and magnetic resonance angiography and the basic phys
of acoustic waves, the different acquisition modes used in medical ultrasound, and the methodologies implemented for image
formation and for flow imaging using the Doppler Effect. By the end of the book, readers will know what is expected from a medic
image, will comprehend the issues involved in producing and assessing the quality of a medical image, will be able to conceptual
implement this knowledge in the development of a new imaging modality, and will be able to write basic algorithms for image
reconstruction. Knowledge of calculus, linear algebra, regular and partial differential equations, and a familiarity with the Fourier
transform and it applications is expected, along with fluency with computer programming. The book contains exercises, homewor
problems, and sample exam questions that are exemplary of the main concepts and formulae students would encounter in a clini
setting.
Nonlinear and Two-Photon-Induced Fluorescence
Medical Imaging Systems
Single-Photon Imaging
Applications, Methods, Instrumentation
A Basic Course on Medical Imaging for Engineers
Imaging Cellular and Molecular Biological Functions

This book is an attempt to bridge the gap between the instrumental principles of multi-dimensional time-correlated single photon counting (TCSPC) and typical applications of the technique. Written by an originator of the technique and by sucessful users, it covers the basic principles of the technique, its interaction with optical imaging methods and its application to a wide range of experimental tasks in life sciences and clinical research. The book is recommended for all users of time-resolved detection techniques in biology, bio-chemistry, spectroscopy of live systems, live cell microscopy, clinical imaging, spectroscopy of single molecules, and other applications that require the detection of low-level light signals at single-photon sensitivity and picosecond time resolution.

In 1987 the Electron Microscopy Society of America (EMSA) going to drive important scientific discoveries across wide areas under the leadership of J. P. Revel (Cal Tech) initiated a major of physiology, cellular biology and neurobiology. They had been program to present a discussion of recent advances in light looking for a forum in which they could advance the state of microscopy as part of the annual meeting. The result was three the art of confocal microscopy, alert manufacturers to the lim special LM sessions at the Milwaukee meeting in August 1988: itations of current instruments, and catalyze progress toward The LM Forum, organized by me, and Symposia on Confocal new directions in confocal instrument development. LM, organized by G. Schatten (Madison), and on Integrated These goals were so close to those of the EMSA project that Acoustic/LM/EM organized by C. Rieder (Albany). In addition, the two groups decided to join forces with EMSA to provide there was an optical micro-analysis session emphasizing Raman the organization and the venue for a Confocal Workshop and techniques, organized by the Microbeam Analysis Society, for NSF to provide the financial support for the speakers expenses a total of 40 invited and 30 contributed papers on optical tech and for the publication of extended abstracts.

This book summarizes the latest findings by leading researchers in the field of photon science in Russia and Japan. It discusses recent advances in the field of photon science and chemistry, covering a wide range of topics, including photochemistry and spectroscopy of novel materials, magnetic properties of solids, photobiology and imaging, and spectroscopy of solids and nanostructures. Based on lectures by respected scientists at the forefront of photon and molecular sciences, the book helps keep readers abreast of the current developments in the field.

Fluorescence spectroscopy continues its advance to more sophisticated methods and applications. As one looks over the previous decades, its appears that the first practical instruments for time-resolved

measurements appeared in the 1970's. The instrumentation and analysis methods for time-resolved fluorescence advanced rapidly throughout the 1980's. Since 1990 we have witnessed a rapid migration of the principles of time-resolved fluorescence to cell biology and clinical appli- tions. Most recently, we have seen the introduction of multi-photon excitation, pump-probe and stimulated emission methods for studies of biological mac- molecules and for cellular imaging. These advanced topics are the subject of the present volume. Two-photon excitation was first predicted by Maria Goppert-Mayer in 1931, but was not experimentally observed until 1961. Observation of two-photon excitation required the introduction of lasers which provided adequate photon density for multi-photon absorption. Since the early observations of two-photon excitation in the 1960s, multi-photon spectroscopy has been limited to somewhat exotic applications of chemical physics, where it is used to study the electronic symmetry of small molecules. Placing one's self back in 1980, it would be hard to imagine the use of multi-photon excitation in biophysics or cellular imaging.

From Photon to Pixel

New Frontiers in Biomedical Optics

Laser Spectroscopy and Laser Imaging

Microscopy Techniques

CT of the Heart

Imaging from Cells to Animals In Vivo

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.

This open access book gives a complete and comprehensive introduction to the fields of medical imaging systems, as designed for a broad range of applications. The authors of the book first explain the foundations of system theory and image processing, before highlighting several modalities in a dedicated chapter. The initial focus is on modalities that are closely related to traditional camera systems such as endoscopy and microscopy. This is followed by more complex image formation processes: magnetic resonance imaging, X-ray projection imaging, computed tomography, X-ray phase-contrast imaging, nuclear imaging, ultrasound, and optical coherence tomography.

This monograph demonstrates the latest developments in two-photon fluorescence microscopy and second-harmonic generation (SHG) microscopy, including coverage of high-resolution microscopy methods, such as STED microscopy. A special focus lies on clinical applications of these methods, e.g. in dermatology, ophtalmology, neuro sciences and cell biology.

"a very valuable book for graduate students and researchers in the field of Laser Spectroscopy, which I can fully recommend" —Wolfgang Demtröder, Kaiserslautern University of Technology How would it be possible to provide a coherent picture of this field given all the techniques available today? The authors have taken on this daunting task in this impressive, groundbreaking text. Readers will benefit from the broad overview of basic concepts, focusing on practical scientific and real-life applications of laser spectroscopic analysis and imaging. Chapters follow a consistent structure, beginning with a succinct summary of key principles and concepts, followed by an overview of applications, advantages and pitfalls, and finally a brief discussion of seminal advances and current developments. The examples used in this text span physics and chemistry to environmental science, biology, and medicine. Focuses on practical use in the laboratory and real-world applications Covers the basic concepts, common experimental setups Highlights advantages and caveats of the techniques Concludes each chapter with a snapshot of cutting-edge advances This book is appropriate for anyone in the physical sciences, biology, or medicine looking for an introduction to laser spectroscopic and imaging methodologies. Helmut H. Telle is a full professor at the Instituto Pluridisciplinar, Universidad Complutense de Madrid, Spain. Ángel González Ureña is head of the Department of Molecular Beams and Lasers, Instituto Pluridisciplinar, Universidad Complutense de Madrid, Spain.

Time-correlated single photon counting

Multiphoton Microscopy and Fluorescence Lifetime Imaging

Quantum Photonics: Pioneering Advances and Emerging Applications

Advanced Time-Correlated Single Photon Counting Applications

Fundamentals of Fluorescence Microscopy

Topics in Fluorescence Spectroscopy

This book is a printed edition of the Special Issue "Photon-Counting Image Sensors" that was published in Sensors

This third edition of the Encyclopedia of Spectroscopy and Spectrometry provides authoritative and comprehensive coverage of all aspects of spectroscopy and closely related subjects that use the same fundamental principles, including mass spectrometry, imaging techniques and applications. It includes the history, theoretical background, details of instrumentation and technology, and current applications of the key areas of spectroscopy. The new edition will include over 80 new articles across the field. These will complement those from the previous edition, which have been brought up-to-date to reflect the

latest trends in the field. Coverage in the third edition includes: Atomic spectroscopy Electronic spectroscopy Fundamentals in spectroscopy High-Energy spectroscopy Magnetic resonance Mass spectrometry Spatially-resolved spectroscopic analysis Vibrational, rotational and Raman spectroscopies The new edition is aimed at professional scientists seeking to familiarize themselves with particular topics quickly and easily. This major reference work continues to be clear and accessible and focus on the fundamental principles, techniques and applications of spectroscopy and spectrometry. Incorporates more than 150 color figures, 5,000 references, and 300 articles for a thorough examination of the field Highlights new research and promotes innovation in applied areas ranging from food science and forensics to biomedicine and health Presents a one-stop resource for quick access to answers and an in-depth examination of topics in the spectroscopy and spectrometry arenas

This book illustrates original pathways to manipulate light at the nanoscale by means of surface electromagnetic waves (here, Bloch surface waves, BSWs) on planar dielectric multilayers, also known as one-dimensional photonic crystals. This approach is particularly valuable as it represents an effective alternative to the widely exploited surface plasmon paradigm. After a brief overview on the fundamentals of BSWs, several significant applications of BSW-sustaining structures are described. Particular consideration is given to the propagation, guiding, and diffraction of BSW-coupled radiation. Further, the interaction of organic emitters with BSWs on planar and corrugated multilayers is investigated, including fluorescence beaming in free space. To provide greater insight into sensing applications, an illustrative example of fluorescent microarray-based detection is presented. The book is intended for scientists and researchers working on photon management opportunities in fields such as biosensing, optical circuitry, and lighting.

This book is an essential guide for all practitioners. The emphasis throughout is on the practice of nuclear medicine. Primarily aimed at the radiologist, physician, physicist or technologist starting in nuclear medicine, it will also appeal to more experienced practitioners who are keen to stay up-to-date. The practical approach with tables as "recipes" for acquisition protocols means it is essential for any departmental shelf. 3rd edition expanded - now covering areas of development in nuclear medicine, such as PET and other methods of tumour imaging, data processing. All illustrations are up-to-date to reflect current standards of image quality.

Encyclopedia of Spectroscopy and Spectrometry

Applications in Biology and Medicine

Exploring Life with Light

Optical Imaging and Microscopy

An Introductory Guide

With contributions by numerous experts

Research and development in the terahertz portion of the electromagnetic spectrum has expanded very rapidly during the past fifteen years due to major advances in sources, detectors and instrumentation. Many scientists and engineers are entering the field and this volume offers a comprehensive and integrated treatment of all aspects of terahertz technology. The three authors, who have been active researchers in this region over a number of years, have designed Terahertz Techniques to be both a general introduction to the subject and a definitive reference resource for all those involved in this exciting research area.

This book brings together reviews by internationally renowed 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.

This book offers a comprehensive selection of essays by leading experts, which covers all aspects of modern imaging, from its application and up-scaling to its development. The chapter content ranges from the basics to the most complex overview of method and protocols. There is ample practical and detailed "how-to" content on important, but rarely addressed topics. This first edition features all-colour-plate chapters, licensed software and a unique, continuously updated website forum.

Handbook of Biological Confocal Microscopy

Radiation Effects in Semiconductors

Terahertz Techniques

Techniques and Advanced Systems

From Signals to Image

Photon Counting Detectors for X-ray Imaging

Given the fact of the increasing meaning of individual and functional micro- or nanostructures, it is of high interest to open up two-photon polymerization (TPP) as a structuring technology for production. TPP offers real 3D capability while providing a high precision, so arbitrary geometries with optical, photonic or biological func-tionalities can be realized. Thus, the aim is to use TPP as a mastering technology for metal substrates that serve as tools for injection moulding.

This book provides the reader with a comprehensive understanding of both the basic principles and the clinical applications of nuclear oncology imaging techniques. The authors have assembled a distinguished group of leaders in the field who provide valuable insight on the subject. The book also includes major chapters on the cancer patient and the pathophysiology of abnormal tissue, the evaluation of co-existing disease, and the diagnosis and therapy of specific tumors using functional imaging studies. Each chapter is heavily illustrated to assist the reader in understanding the clinical role of nuclear oncology in cancer disease therapy and management.

This second edition of the fully revised and updated From Photon to Pixel presents essential elements in modern digital photographic devices. Our universal infatuation with photography profoundly affects its usage and development. While some sides of photographic “culture” remain wholly unchanged – art photography, journalistic and advertising photography, scientific photography, etc. – new facets emerge: leisure or travel photography, everyday life photography, anecdotal, observational or unusual photography, and microcosm, or micro-community, photography with its culmination in the narcissistic selfie. These new forms combine an often simplified manner of photographing and modern means of instantaneous, remote and mass communication. This

book does not extend into the sociological study of photography, instead it explains how the digital camera works by examining in detail each of the components that constitutes it to provide the reader with a preliminary guide into the inner workings of this device.
Time-correlated Single Photon Counting has been written in the hope that by relating the authors' experiences with a variety of different single photon counting systems, they may provide a useful service to users and potential users of this formidably sensitive technique. Of all the techniques available to obtain information on the rates of depopulation of excited electronic singlet states of molecular species, monitoring of fluorescence provides, in principle, the simplest and most direct measure of concentration. This volume comprises eight chapters, with the first focusing on the time dependence and applications of fluorescence. Succeeding chapters go on to discuss basic principles of the single photon counting lifetime measurement; light sources; photomultipliers; electronics; data analysis; nanosecond time-resolved emission spectroscopy; time dependence of fluorescence anisotropy. This book will be of interest to practitioners in the field of chemistry.
Photon Management Assisted by Surface Waves on Photonic Crystals
Spectral, Photon Counting Computed Tomography
Mathematics and Physics of Emerging Biomedical Imaging
An Introduction
Fundamentals of CMOS Single-Photon Avalanche Diodes
Millimeter-Precision Laser Rangefinder Using a Low-Cost Photon Counter

This book provides a review of image analysis techniques as they are applied in the field of diagnostic and therapeutic nuclear medicine. Driven in part by the remarkable sophistication of nuclear medicine instrumentation and - crease in computing power and its ready and inexpensive availability, this is a relatively new yet rapidly expanding field. Likewise, although the use of nuclear imaging for diagnosis and therapy has origins dating back almost to the pioneering work of Dr G. de Hevesy, quantitative imaging has only recently emerged as a promising approach for diagnosis and therapy of many diseases. An effort has, therefore, been made to place the reviews provided in this book in a broader context. The effort to do this is reflected by the inclusion of introductory chapters that address basic principles of nuclear medicine instrumentation and dual-modality imaging, followed by overview of issues that are closely related to quantitative nuclear imaging and its potential role in diagnostic and therapeutic applications. A brief overview of each chapter is provided below. Chapter 1 presents a general overview of nuclear medicine imaging physics and instrumentation including planar scintigraphy, single-photon emission computed tomography (SPECT) and positron emission tomography (PET). Nowadays, patients ' diagnosis and therapy is rarely done without the use of imaging technology. As such, imaging considerations are incorporated in almost every chapter of the book. The development of dual-modality - aging systems is an emerging research field, which is addressed in chapter 2.
This text on contemporary optical systems is intended for optical researchers and engineers, graduate students and optical microscopists in the biological and biomedical sciences. In three sections, the book discusses high-aperture optical systems, nonlinear optical techniques, and various techniques that are finding new applications. The new second edition has been thoroughly revised and expanded to account for new advances in fluorescence imaging and diffractive optical lenses.
This book first provides readers with an introduction to the underlying physics and state-of-the-art application of photon counting detectors for X-ray imaging. The authors explain that a photon-counting imaging detector can realize quantitative analysis because the detector can derive X-ray attenuation information based on the analysis of intensity changes of individual X-ray. To realize this analysis, it is important to consider the physics of an object and detector material. In this book, the authors introduce a novel analytical procedure to create quantitative X-ray images for medical diagnosis.
This cross-disciplinary book documents the key research challenges in the mathematical sciences and physics that could enable the economical development of novel biomedical imaging devices. It is hoped that the infusion of new insights from mathematical scientists and physicists will accelerate progress in imaging. Incorporating input from dozens of biomedical researchers who described what they perceived as key open problems of imaging that are amenable to attack by mathematical scientists and physicists, this book introduces the frontiers of biomedical imaging, especially the imaging of dynamic physiological functions, to the educated nonspecialist. Ten imaging modalities are covered, from the well-established (e.g., CAT scanning, MRI) to the more speculative (e.g., electrical and magnetic source imaging). For each modality, mathematics and physics research challenges are identified and a short list of suggested reading offered. Two additional chapters offer visions of the next generation of surgical and interventional techniques and of image processing. A final chapter provides an overview of mathematical issues that cut across the various modalities.
Quantitative Analysis in Nuclear Medicine Imaging
Progress in Photon Science
Two-Photon Polymerization on Metal Surfaces for Structuring Moulding Tools
Advanced Time-Correlated Single Photon Counting Techniques
The Digital Camera Handbook
Multiphoton Microscopy in the Biomedical Sciences

Spectral, Photon Counting Computed Tomography is a comprehensive cover of the latest developments in the most prevalent imaging modality (x-ray computed tomography (CT)) in its latest incarnation: Spectral, Dual-Energy, and Photon Counting CT. Disadvantages of the conventional single-energy technique used by CT technology are that different materials cannot be distinguished and that the noise is larger. To address these problems, a novel spectral CT concept has been proposed. Spectral Dual-Energy CT (DE-CT) acquires two sets of spectral data, and Spectral Photon Counting CT (PC-CT) detects energy of x-ray photons to reveal additional material information of objects by using novel energy-sensitive, photon-counting detectors. The K-edge imaging may be a gateway for functional or molecular CT. The book covers detectors and electronics, image reconstruction methods, image quality assessments, a simulation tool, nanoparticle contrast agents, and clinical applications for spectral CT.
High Resolution Imaging in Microscopy and Ophthalmology