

High Performance Silicon Imaging Fundamentals And Applications Of Cmos And Ccd Sensors Woodhead Publishing Series In Electronic And Optical Materials

As recognized, adventure as with ease as experience about lesson, amusement, as well as contract can be gotten by just checking out a book **High Performance Silicon Imaging Fundamentals And Applications Of Cmos And Ccd Sensors Woodhead Publishing Series In Electronic And Optical Materials** plus it is not directly done, you could give a positive response even more all but this life, roughly speaking the world.

We have the funds for you this proper as without difficulty as simple pretension to acquire those all. We come up with the money for High Performance Silicon Imaging Fundamentals And Applications Of Cmos And Ccd Sensors Woodhead Publishing Series In Electronic And Optical Materials and numerous book collections from fictions to scientific research in any way. among them is this High Performance Silicon Imaging Fundamentals And Applications Of Cmos And Ccd Sensors Woodhead Publishing Series In Electronic And Optical Materials that can be your partner.

Optical Payloads for Space Missions - Shen-En Qian 2015-11-19

Optical Payloads for Space Missions is a comprehensive collection of optical spacecraft payloads with contributions by leading international rocket-scientists and instrument builders. Covers various applications, including earth observation, communications, navigation, weather, and science satellites and deep space exploration Each chapter covers one or more specific optical payload Contains a review chapter which provides readers with an overview on the background, current status, trends, and future prospects of the optical payloads Provides information on the principles of the optical spacecraft payloads, missions' background, motivation and challenges, as well as the scientific returns, benefits and applications

Indoor Infrared Optical Wireless Communications - Ke Wang 2019-12-23

This book aims to give an overview of recent developments in indoor near-infrared optical wireless communication technologies and systems, including basic theories, operating fundamentals, system architectures, modelling, experimental demonstrations, advanced techniques, and most recently, the research efforts towards integrations. Both line-of-sight and diffusive-signals-based options will be reviewed, to provide readers a complete picture about this rapidly developing area, which targets the provision of high-speed wireless connectivity to end- users in indoor environments, such as offices, homes and shopping centres, to satisfy the growing high-speed communication requirement. Provides a systematic approach for the fundamentals of indoor optical wireless communications. Provides an overview of recent developments in indoor infrared optical wireless communications, including theoretical fundamentals. Examines system architectures, modelling, experimental demonstrations, and the research efforts towards integrations. Dr. Ke Wang is an Australian Research Council (ARC) DECRA Fellow and a senior lecturer in the School of Engineering, Royal Melbourne Institute of Technology (RMIT University), VIC, Australia. He worked with the University of Melbourne, Australia, and Stanford University, California, before joining RMIT University. He has published over 110 peer-reviewed papers in top journals and leading international conferences, including over 20 invited papers. He has been awarded several prestigious national and international awards as recognition of research contributions, such as the Victoria Fellowship, the AIPS Young Tall Poppy Science Award, and the Marconi Society Paul Baran Young Scholar Award. His major areas of interest include: silicon photonics integration, opto-electronics integrated devices and circuits, nanophotonics, optical wireless technology for short-range applications, quasi-passive reconfigurable devices and applications and optical interconnects in data - centres and high-performance computing.

Emission Tomography - Miles N. Wernick 2004-12-07

PET and SPECT are two of today's most important medical-imaging methods, providing images that reveal subtle information about physiological processes in humans and animals. Emission Tomography: The Fundamentals of PET and SPECT explains the physics and engineering principles of these important functional-imaging methods. The technology of emission tomography is covered in detail, including historical origins,

scientific and mathematical foundations, imaging systems and their components, image reconstruction and analysis, simulation techniques, and clinical and laboratory applications. The book describes the state of the art of emission tomography, including all facets of conventional SPECT and PET, as well as contemporary topics such as iterative image reconstruction, small-animal imaging, and PET/CT systems. This book is intended as a textbook and reference resource for graduate students, researchers, medical physicists, biomedical engineers, and professional engineers and physicists in the medical-imaging industry. Thorough tutorials of fundamental and advanced topics are presented by dozens of the leading researchers in PET and SPECT. SPECT has long been a mainstay of clinical imaging, and PET is now one of the world's fastest growing medical imaging techniques, owing to its dramatic contributions to cancer imaging and other applications. Emission Tomography: The Fundamentals of PET and SPECT is an essential resource for understanding the technology of SPECT and PET, the most widely used forms of molecular imaging. *Contains thorough tutorial treatments, coupled with coverage of advanced topics *Three of the four holders of the prestigious Institute of Electrical and Electronics Engineers Medical Imaging Scientist Award are chapter contributors *Include color artwork

Biological Identification - R. Paul Schaudies 2014-05-08

Biological Identification provides a detailed review of, and potential future developments in, the technologies available to counter the threats to life and health posed by natural pathogens, toxins, and bioterrorism agents. Biological identification systems must be fast, accurate, reliable, and easy to use. It is also important to employ the most suitable technology in dealing with any particular threat. This book covers the fundamentals of these vital systems and lays out possible advances in the technology. Part one covers the essentials of DNA and RNA sequencing for the identification of pathogens, including next generation sequencing (NGS), polymerase chain reaction (PCR) methods, isothermal amplification, and bead array technologies. Part two addresses a variety of approaches to making identification systems portable, tackling the special requirements of smaller, mobile systems in fluid movement, power usage, and sample preparation. Part three focuses on a range of optical methods and their advantages. Finally, part four describes a unique approach to sample preparation and a promising approach to identification using mass spectroscopy. Biological Identification is a useful resource for academics and engineers involved in the microelectronics and sensors industry, and for companies, medical organizations and military bodies looking for biodetection solutions. Covers DNA sequencing of pathogens, lab-on-chip, and portable systems for biodetection and analysis Provides an in-depth description of optical systems and explores sample preparation and mass spectrometry-based biological analysis

Subsea Optics and Imaging - John Watson 2013-10-31

The use of optical methodology, instrumentation and photonics devices for imaging, vision and optical sensing is of increasing importance in understanding our marine environment. Subsea optics can make an important contribution to the protection and sustainable management of ocean resources and contribute to

monitoring the response of marine systems to climate change. This important book provides an authoritative review of key principles, technologies and their applications. The book is divided into three parts. The first part provides a general introduction to the key concepts in subsea optics and imaging, imaging technologies and the development of ocean optics and colour analysis. Part two reviews the use of subsea optics in environmental analysis. An introduction to the concepts of underwater light fields is followed by an overview of coloured dissolved organic matter (CDOM) and an assessment of nutrients in the water column. This section concludes with discussions of the properties of subsea bioluminescence, harmful algal blooms and their impact and finally an outline of optical techniques for studying suspended sediments, turbulence and mixing in the marine environment. Part three reviews subsea optical systems technologies. A general overview of imaging and visualisation using conventional photography and video leads onto advanced techniques like digital holography, laser line-scanning and range-gated imaging as well as their use in controlled observation platforms or global observation networks. This section also outlines techniques like Raman spectroscopy, hyperspectral sensing and imaging, laser Doppler anemometry (LDA) and particle image velocimetry (PIV), optical fibre sensing and LIDAR systems. Finally, a chapter on fluorescence methodologies brings the volume to a close. With its distinguished editor and international team of contributors, Subsea optics and imaging is a standard reference for those researching, developing and using subsea optical technologies as well as environmental scientists and agencies concerned with monitoring the marine environment. Provides an authoritative review of key principles, technologies and their applications. Outlines the key concepts in subsea optics and imaging, imaging technologies and the development of ocean optics and colour analysis. Reviews the properties of subsea bioluminescence, harmful algal blooms and their impact.

MEMS Sensors and Resonators - Frederic Nabki 2020-05-27
Microelectromechanical systems (MEMS) have had a profound impact on a wide range of applications. The degree of miniaturization made possible by MEMS technology has significantly improved the functionalities of many systems, and the performance of MEMS has steadily improved as its uses augment. Notably, MEMS sensors have been prevalent in motion sensing applications for decades, and the sensing mechanisms leveraged by MEMS have been continuously extended to applications spanning the detection of gases, magnetic fields, electromagnetic radiation, and more. In parallel, MEMS resonators have become an emerging field of MEMS and affected subfields such as electronic timing and filtering, and energy harvesting. They have, in addition, enabled a wide range of resonant sensors. For many years now, MEMS have been the basis of various industrial successes, often building on novel academic research. Accordingly, this Special Issue explores many research innovations in MEMS sensors and resonators, from biomedical applications to energy harvesting, gas sensing, resonant sensing, and timing.

Fundamentals and Sensing Applications of 2D Materials - Chandra Sekhar Rout 2019-06-15
Fundamentals and Sensing Applications of 2D Materials provides a comprehensive understanding of a wide range of 2D materials. Examples of fundamental topics include: defect and vacancy engineering, doping and advantages of 2D materials for sensing, 2D materials and composites for sensing, and 2D materials in biosystems. A wide range of applications are addressed, such as gas sensors based on 2D materials, electrochemical glucose sensors, biosensors (enzymatic and non-enzymatic), and printed, stretchable, wearable and flexible biosensors. Due to their sub-nanometer thickness, 2D materials have a high packing density, thus making them suitable for the fabrication of thin film based sensor devices. Benefiting from their unique physical and chemical properties (e.g. strong mechanical strength, high surface area, unparalleled thermal conductivity, remarkable biocompatibility and ease of functionalization), 2D layered nanomaterials have shown great potential in designing high performance sensor devices. Provides a comprehensive overview of 2D materials systems that are relevant to sensing, including transition metal dichalcogenides, metal oxides, graphene and other 2D materials system. Includes

information on potential applications, such as flexible sensors, biosensors, optical sensors, electrochemical sensors, and more. Discusses graphene in terms of the lessons learned from this material for sensing applications and how these lessons can be applied to other 2D materials.

Hyperspectral Satellites and System Design - Shen-En Qian 2020-04-22

Hyperspectral Satellites and System Design is the first book on this subject. It provides a systematic analysis and detailed design of the entire development process of hyperspectral satellites. Derived from the author's 25-year firsthand experience as a technical lead of space missions at the Canadian Space Agency, the book offers engineers, scientists, and decision-makers detailed knowledge and guidelines on hyperspectral satellite system design, trade-offs, performance modeling and simulation, optimization from component to system level, subsystem design, and implementation strategies. This information will help reduce the risk, shorten the development period, and lower the cost of hyperspectral satellite missions. This book is a must-have reference for professionals in developing hyperspectral satellites and data applications. It is also an excellent introductory book for early practitioners and students who want to learn more about hyperspectral satellites and their applications.

Robust Design of Microelectronics Assemblies Against Mechanical Shock, Temperature and Moisture - E-H Wong 2015-05-23

Robust Design of Microelectronics Assemblies Against Mechanical Shock, Temperature and Moisture discusses how the reliability of packaging components is a prime concern to electronics manufacturers. The text presents a thorough review of this important field of research, providing users with a practical guide that discusses theoretical aspects, experimental results, and modeling techniques. The authors use their extensive experience to produce detailed chapters covering temperature, moisture, and mechanical shock induced failure, adhesive interconnects, and viscoelasticity. Useful program files and macros are also included. Discusses how the reliability of packaging components is a prime concern to electronics manufacturers. Presents a thorough review of this important field of research, providing users with a practical guide that discusses theoretical aspects, experimental results, and modeling techniques. Includes program files and macros for additional study.

Infrared Thermal Imaging - Michael Vollmer 2018-02-20
This new up-to-date edition of the successful handbook and ready reference retains the proven concept of the first, covering basic and advanced methods and applications in infrared imaging from two leading expert authors in the field. All chapters have been completely revised and expanded and a new chapter has been added to reflect recent developments in the field and report on the progress made within the last decade. In addition there is now an even stronger focus on real-life examples, with 20% more case studies taken from science and industry. For ease of comprehension the text is backed by more than 590 images which include graphic visualizations and more than 300 infrared thermography figures. The latter include many new ones depicting, for example, spectacular views of phenomena in nature, sports, and daily life.

'Advances in Optics: Reviews', Vol. 4 - Sergey Yurish 2019-07-18

The fourth volume of this popular Book Series is devoted to optics, lasers and optical sensors, and written by 29 authors from academia and industry from 10 countries: Brazil, China, France, Germany, Greece, Israel, Russia, Serbia, USA and Vietnam. This book ensures that the readers will stay at the cutting edge of the field and get the right and effective start point and road map for the further researches and developments. By this way, they will be able to save more time for productive research activity and eliminate routine work.

Microelectronics, Communication Systems, Machine Learning and Internet of Things - Vijay Nath 2022-07-11
This volume presents peer-reviewed papers of the First International Conference on Microelectronics, Communication Systems, Machine Learning, and the Internet of Things (MCMI-2020). This book discusses recent trends in technology and advancement in microelectronics, nano-electronics, VLSI design, IC technologies, wireless communications, optical communications, SoC, advanced instrumentations, signal

processing, internet of things, machine learning, image processing, green energy, hybrid vehicles, weather forecasting, cloud computing, renewable energy, CMOS sensors, actuators, RFID, transducers, real-time embedded system, sensor network and applications, EDA design tools and techniques, fuzzy logic & artificial intelligence, high-performance computer architecture, AI-based robotics & applications, brain-computer interface, deep learning, advanced operating systems, supply chain development & monitoring, physical systems design, ICT applications, e-farming, information security, etc. It includes original papers based on theoretical, practical, experimental, simulations, development, application, measurement, and testing. The applications and solutions discussed in the book will serve as good reference material for young scholars, researchers, and academics.

Reliability Characterisation of Electrical and Electronic Systems - Jonathan Swingler 2014-12-24

This book takes a holistic approach to reliability engineering for electrical and electronic systems by looking at the failure mechanisms, testing methods, failure analysis, characterisation techniques and prediction models that can be used to increase reliability for a range of devices. The text describes the reliability behavior of electrical and electronic systems. It takes an empirical scientific approach to reliability engineering to facilitate a greater understanding of operating conditions, failure mechanisms and the need for testing for a more realistic characterisation. After introducing the fundamentals and background to reliability theory, the text moves on to describe the methods of reliability analysis and characterisation across a wide range of applications. Takes a holistic approach to reliability engineering Looks at the failure mechanisms, testing methods, failure analysis, characterisation techniques and prediction models that can be used to increase reliability Facilitates a greater understanding of operating conditions, failure mechanisms and the need for testing for a more realistic characterisation

Silicon-Based Hybrid Nanoparticles - Sabu Thomas 2021-09-24

Silicon-Based Hybrid Nanoparticles: Fundamentals, Properties, and Applications focuses on the fundamental principles and promising applications of silicon-based hybrid nanoparticles in nanoelectronics, energy storage/conversion, catalysis, sensors, biomedicine, environment and imaging. This book is an important reference source for materials scientists and engineers who are seeking to understand more about the major properties and applications of silicon-based hybrid nanoparticles. As the hybridization of silicon nanoparticles with other semiconductors or metal oxides nanoparticles may exhibit superior features, when compared to lone, individual nanoparticles, this book provides the latest insights. In addition, the silicon/iron oxide hybrid nanoparticles also possess excellent fluorescence, super-paramagnetism, and biocompatibility that can be effectively used for the diagnostic imaging system in vivo. Similarly, gold-silicon nanohybrids could be used as highly efficient near-infrared hyperthermia agents for cancer cell destruction. Outlines the major thermal, electrical, optical, magnetic and toxic properties of silicon-based hybrid nanoparticles Describes major applications in energy, environmental science and catalysis Assesses the major challenges to manufacturing silicon-based nanostructured materials on an industrial scale

High Performance Silicon Imaging - Daniel Durini 2019-10-19

High Performance Silicon Imaging: Fundamentals and Applications of CMOS and CCD Sensors, Second Edition, covers the fundamentals of silicon image sensors, addressing existing performance issues and current and emerging solutions. Silicon imaging is a fast growing area of the semiconductor industry. Its use in cell phone cameras is already well established, with emerging applications including web, security, automotive and digital cinema cameras. The book has been revised to reflect the latest state-of-the art developments in the field, including 3D imaging, advances in achieving lower signal noise, and new applications for consumer markets. The fundamentals section has also been expanded to include a chapter on the characterization and testing of CMOS and CCD sensors that is crucial to the success of new applications. This book is an excellent resource for

both academics and engineers working in the optics, photonics, semiconductor and electronics industries. Covers the fundamentals of silicon-based image sensors and technical advances, focusing on performance issues Looks at image sensors in applications, such as mobile phones, scientific imaging, and TV broadcasting, and in automotive, consumer and biomedical applications Addresses the theory behind 3D imaging and 3D sensor development, including challenges and opportunities *Machine Vision and Navigation* - Oleg Sergiyenko 2019-09-30

This book presents a variety of perspectives on vision-based applications. These contributions are focused on optoelectronic sensors, 3D & 2D machine vision technologies, robot navigation, control schemes, motion controllers, intelligent algorithms and vision systems. The authors focus on applications of unmanned aerial vehicles, autonomous and mobile robots, industrial inspection applications and structural health monitoring. Recent advanced research in measurement and others areas where 3D & 2D machine vision and machine control play an important role, as well as surveys and reviews about vision-based applications. These topics are of interest to readers from diverse areas, including electrical, electronics and computer engineering, technologists, students and non-specialist readers. • Presents current research in image and signal sensors, methods, and 3D & 2D technologies in vision-based theories and applications; • Discusses applications such as daily use devices including robotics, detection, tracking and stereoscopic vision systems, pose estimation, avoidance of objects, control and data exchange for navigation, and aerial imagery processing; • Includes research contributions in scientific, industrial, and civil applications.

Photodetectors - Bahram Nabet 2015-10-24

Photodetectors: Materials, Devices and Applications discusses the devices that convert light to electrical signals, key components in communication, computation, and imaging systems. In recent years, there has been significant improvement in photodetector performance, and this important book reviews some of the key advances in the field. Part one covers materials, detector types, and devices, and includes discussion of silicon photonics, detectors based on reduced dimensional charge systems, carbon nanotubes, graphene, nanowires, low-temperature grown gallium arsenide, plasmonic, Si photomultiplier tubes, and organic photodetectors, while part two focuses on important applications of photodetectors, including microwave photonics, communications, high-speed single photon detection, THz detection, resonant cavity enhanced photodetection, photo-capacitors and imaging. Reviews materials, detector types and devices Addresses fabrication techniques, and the advantages and limitations and different types of photodetector Considers a range of application for this important technology Includes discussions of silicon photonics, detectors based on reduced dimensional charge systems, carbon nanotubes, graphene, nanowires, and more

Ecological Design of Smart Home Networks - N. Saito 2015-03-31

This book provides an authoritative guide for postgraduate students and academic researchers in electronics, computer and network engineering, telecommunications, energy technology and home automation, as well as R&D managers in industrial sectors such as wireless technology, consumer electronics, telecommunications and networking, information technology, energy technology and home automation. Part One outlines the key principles and technologies needed for ecological smart home networks. Beginning with a thorough overview of the concept behind ecological smart home network design, the book reviews such important areas as power line communications, hybrid systems and middleware platforms. Part Two then goes on to discuss some important applications of this technology, with wireless smart sensor networks for home and telecare, and smart home networking for content and energy management (including the intelligent Zero Emission Urban System), all explored in detail. More systematic and comprehensive coverage: the book covers ecological design and technology requirements, performance and applications for smart home networks Better focus on industry needs: the book covers current and emerging smart home networking technologies. It explains how the technologies work, how they have

developed, their capabilities and the markets that they target Better coverage of the best international research: the book is multi-contributor and brings together the leading researchers from around the world **Handbook of Optics: Fundamentals, techniques, and design** - Optical Society of America 1995

Annotation -- A new volume in the field's bestselling optics reference -- an entirely new opus focusing on x-ray, nonlinear, and vision optics -- Provides the same mix of tutorial writing with in-depth reference material that distinguished Volumes I & II.

Advances in Semiconductor Technologies - An Chen 2022-09-27

Advances in Semiconductor Technologies Discover the broad sweep of semiconductor technologies in this uniquely curated resource Semiconductor technologies and innovations have been the backbone of numerous different fields: electronics, online commerce, the information and communication industry, and the defense industry. For over fifty years, silicon technology and CMOS scaling have been the central focus and primary driver of innovation in the semiconductor industry. Traditional CMOS scaling has approached some fundamental limits, and as a result, the pace of scientific research and discovery for novel semiconductor technologies is increasing with a focus on novel materials, devices, designs, architectures, and computer paradigms. In particular, new computing paradigms and systems—such as quantum computing, artificial intelligence, and Internet of Things—have the potential to unlock unprecedented power and application space. Advances in Semiconductor Technologies provides a comprehensive overview of selected semiconductor technologies and the most up-to-date research topics, looking in particular at mainstream developments in current industry research and development, from emerging materials and devices, to new computing paradigms and applications. This full-coverage volume gives the reader valuable insights into state-of-the-art advances currently being fabricated, a wide range of novel applications currently under investigation, and a glance into the future with emerging technologies in development. Advances in Semiconductor Technologies readers will also find: A comprehensive approach that ensures a thorough understanding of state-of-the-art technologies currently being fabricated Treatments on all aspects of semiconductor technologies, including materials, devices, manufacturing, modeling, design, architecture, and applications Articles written by an impressive team of international academics and industry insiders that provide unique insights into a wide range of topics Advances in Semiconductor Technologies is a useful, time-saving reference for electrical engineers working in industry and research, who are looking to stay abreast of rapidly advancing developments in semiconductor electronics, as well as academics in the field and government policy advisors.

OpenGL - Build high performance graphics - Muhammad Mobeen Movania 2017-05-29

Gain proficiency with OpenGL and build compelling graphics for your games and applications About This Book Get to grips with a wide range of techniques for implementing shadows using shadow maps, shadow volumes, and more Explore interactive, real-time visualizations of large 2D and 3D datasets or models, including the use of more advanced techniques such as stereoscopic 3D rendering Create stunning visuals on the latest platforms including mobile phones and state-of-the-art wearable computing devices Who This Book Is For The course is appropriate for anyone who wants to develop the skills and techniques essential for working with OpenGL to develop compelling 2D and 3D graphics. What You Will Learn Off-screen rendering and environment mapping techniques to render mirrors Shadow mapping techniques, including variance shadow mapping Implement a particle system using shaders Utilize noise in shaders Make use of compute shaders for physics, animation, and general computing Create interactive applications using GLFW to handle user inputs and the Android Sensor framework to detect gestures and motions on mobile devices Use OpenGL primitives to plot 2-D datasets (such as time series) dynamically Render complex 3D volumetric datasets with techniques such as data slicers and multiple viewpoint projection In Detail OpenGL is a fully functional, cross-platform API widely adopted across the industry for 2D and 3D graphics development. It is mainly used for game development and applications,

but is equally popular in a vast variety of additional sectors. This practical course will help you gain proficiency with OpenGL and build compelling graphics for your games and applications. OpenGL Development Cookbook - This is your go-to guide to learn graphical programming techniques and implement 3D animations with OpenGL. This straight-talking Cookbook is perfect for intermediate C++ programmers who want to exploit the full potential of OpenGL. Full of practical techniques for implementing amazing computer graphics and visualizations using OpenGL. OpenGL 4.0 Shading Language Cookbook, Second Edition - With Version 4, the language has been further refined to provide programmers with greater power and flexibility, with new stages such as tessellation and compute. OpenGL Shading Language 4 Cookbook is a practical guide that takes you from the fundamentals of programming with modern GLSL and OpenGL, through to advanced techniques. OpenGL Data Visualization Cookbook - This easy-to-follow, comprehensive Cookbook shows readers how to create a variety of real-time, interactive data visualization tools. Each topic is explained in a step-by-step format. A range of hot topics is included, including stereoscopic 3D rendering and data visualization on mobile/wearable platforms. By the end of this guide, you will be equipped with the essential skills to develop a wide range of impressive OpenGL-based applications for your unique data visualization needs. This Learning Path combines some of the best that Packt has to offer in one complete, curated package. It includes content from the following Packt products, OpenGL Development Cookbook by Muhammad Mobeen Movania, OpenGL 4.0 Shading Language Cookbook, Second Edition by David Wolff, OpenGL Data Visualization Cookbook by Raymond C. H. Lo, William C. Y. Lo Style and approach Full of easy-to-follow hands-on tutorials, this course teaches you to develop a wide range of impressive OpenGL-based applications in a step-by-step format.

Atomic and Molecular Spectroscopy - Sune Svanberg 2023-01-06

A wide-ranging review of modern spectroscopic techniques such as X-ray, photoelectron, optical and laser spectroscopy, and radiofrequency and microwave techniques. On the fundamental side the book focuses on physical principles and the impact of spectroscopy on our understanding of the building blocks of matter, while in the area of applications particular attention is given to those in chemical analysis, photochemistry, surface characterisation, environmental and medical diagnostics, remote sensing and astrophysics. The Fourth Edition also provides the reader with an update on laser cooling and trapping, Bose-Einstein condensation, ultra-fast spectroscopy, high-power laser/matter interaction, satellite-based astronomy and spectroscopic aspects of laser medicine.

Essential Principles of Image Sensors - Takao Kuroda 2017-12-19

Providing a succinct introduction to the systemization, noise sources, and signal processes of image sensor technology, Essential Principles of Image Sensors discusses image information and its four factors: space, light intensity, wavelength, and time. Featuring clarifying and insightful illustrations, this must-have text: Explains how image sensors convert optical image information into image signals Treats space, wavelength, and time as digitized built-in coordinate points in image sensors and systems Details the operational principles, pixel technology, and evolution of CCD, MOS, and CMOS sensors with updated technology Describes sampling theory, presenting unique figures demonstrating the importance of phase Explores causes for the decline of image information quality In a straightforward manner suitable for beginners and experts alike, Essential Principles of Image Sensors covers key topics related to digital imaging including semiconductor physics, component elements necessary for image sensors, silicon as a sensitive material, noises in sensors, and more.

Industrial Wireless Sensor Networks - R Budampati 2015-10-23

Industrial Wireless Sensor Networks: Monitoring, Control and Automation explores the explosive growth that has occurred in the use of wireless sensor networks in a variety of applications during the last few years. As wireless technology can reduce costs, increase productivity, and ease maintenance, the book looks at the progress in standardization efforts regarding reliability, security, performance, power consumption,

and integration. Early sections of the book discuss issues such as media access control (MAC), antenna design and site survey, energy harvesting, and explosion-proof design. Subsequent sections present WSN standards, including ISA100, ZigBee™, WiFi™, WirelessHART™ and 6LoWPAN, and the applications of WSNs in the oil and gas, chemical, food, and nuclear power industries. Reviews technologies and standards for industrial wireless sensor networks Considers particular applications for the technology and their ability to reduce costs, increase productivity, and ease maintenance Focuses on industry needs and standardization efforts regarding reliability, security, performance, power consumption, and integration.
Solid State Technology - 1977

High Performance Silicon Imaging - Daniel Durini
2014-05-14

High Performance Silicon Imaging covers the fundamentals of silicon image sensors, with a focus on existing performance issues and potential solutions. The book considers several applications for the technology as well. Silicon imaging is a fast growing area of the semiconductor industry. Its use in cell phone cameras is already well established, and emerging applications include web, security, automotive, and digital cinema cameras. Part one begins with a review of the fundamental principles of photosensing and the operational principles of silicon image sensors. It then focuses in on charged coupled device (CCD) image sensors and complementary metal oxide semiconductor (CMOS) image sensors. The performance issues considered include image quality, sensitivity, data transfer rate, system level integration, rate of power consumption, and the potential for 3D imaging. Part two then discusses how CMOS technology can be used in a range of areas, including in mobile devices, image sensors for automotive applications, sensors for several forms of scientific imaging, and sensors for medical applications. High Performance Silicon Imaging is an excellent resource for both academics and engineers working in the optics, photonics, semiconductor, and electronics industries. Covers the fundamentals of silicon-based image sensors and technical advances, focusing on performance issues Looks at image sensors in applications such as mobile phones, scientific imaging, TV broadcasting, automotive, and biomedical applications
Optical Engineering - 1991

Publishes papers reporting on research and development in optical science and engineering and the practical applications of known optical science, engineering, and technology.

Modern Utilization of Infrared Technology - Irving J. Spiro 1975

Advances in Delay-tolerant Networks (DTNs) - J Rodrigues
2014-11-20

Part one looks at delay-tolerant network architectures and platforms including DTN for satellite communications and deep-space communications, underwater networks, networks in developing countries, vehicular networks and emergency communications. Part two covers delay-tolerant network routing, including issues such as congestion control, naming, addressing and interoperability. Part three explores services and applications in delay-tolerant networks, such as web browsing, social networking and data streaming. Part four discusses enhancing the performance, reliability, privacy and security of delay-tolerant networks. Chapters cover resource sharing, simulation and modeling and testbeds. Reviews the different types of DTN and shows how they can be applied in satellite and deep-space communications, vehicular and underwater communications, and during large-scale disasters Considers the potential for rapid selection and dissemination of urgent messages is considered Reviews the breadth of areas in which DTN is already providing solutions and the prospects for its wider adoption

RF and mm-Wave Power Generation in Silicon - Hua Wang
2015-12-10

This book presents the challenges and solutions of designing power amplifiers at RF and mm-Wave frequencies in a silicon-based process technology. It covers practical power amplifier design methodologies, energy- and spectrum-efficient power amplifier design examples in the RF frequency for cellular and wireless connectivity applications, and power amplifier and power

generation designs for enabling new communication and sensing applications in the mm-Wave and THz frequencies. With this book you will learn: Power amplifier design fundamentals and methodologies Latest advances in silicon-based RF power amplifier architectures and designs and their integration in wireless communication systems State-of-the-art mm-Wave/THz power amplifier and power generation circuits and systems in silicon Extensive coverage from fundamentals to advanced design topics, focusing on various layers of abstraction: from device modeling and circuit design strategy to advanced digital and mixed-signal architectures for highly efficient and linear power amplifiers New architectures for power amplifiers in the cellular and wireless connectivity covering detailed design methodologies and state-of-the-art performances Detailed design techniques, trade-off analysis and design examples for efficiency enhancement at power back-off and linear amplification for spectrally-efficient non-constant envelope modulations Extensive coverage of mm-Wave power-generation techniques from the early days of the 60 GHz research to current state-of-the-art reconfigurable, digital mm-Wave PA architectures Detailed analysis of power generation challenges in the higher mm-Wave and THz frequencies and novel technical solutions for a wide range for potential applications, including ultrafast wireless communication to sensing, imaging and spectroscopy Contributions from the world-class experts from both academia and industry

Smart CMOS Image Sensors and Applications - Jun Ohta
2020-05-12

Revised and expanded for this new edition, Smart CMOS Image Sensors and Applications, Second Edition is the only book available devoted to smart CMOS image sensors and applications. The book describes the fundamentals of CMOS image sensors and optoelectronic device physics, and introduces typical CMOS image sensor structures, such as the active pixel sensor (APS). Also included are the functions and materials of smart CMOS image sensors and present examples of smart imaging. Various applications of smart CMOS image sensors are also discussed. Several appendices supply a range of information on constants, illuminance, MOSFET characteristics, and optical resolution. Expansion of smart materials, smart imaging and applications, including biotechnology and optical wireless communication, are included. Features • Covers the fundamentals and applications including smart materials, smart imaging, and various applications • Includes comprehensive references • Discusses a wide variety of applications of smart CMOS image sensors including biotechnology and optical wireless communication • Revised and expanded to include the state of the art of smart image sensors

Photon Counting - Nikolay Britun 2018-03-21

Photon counting is a unified name for the techniques using single-photon detection for accumulative measurements of the light flux, normally occurring under extremely low-light conditions. Nowadays, this approach can be applied to the wide variety of the radiation wavelengths, starting from X-ray and deep ultraviolet transitions and ending with far-infrared part of the spectrum. As a special tribute to the photon counting, the studies of cosmic microwave background radiation in astronomy, the experiments with muon detection, and the large-scale fundamental experiments on the nature of matter should be noted. The book provides readers with an overview on the fundamentals and state-of-the-art applications of photon counting technique in the applied science and everyday life.

Porous Silicon for Biomedical Applications - Helder A. Santos 2021-10-23

Porous Silicon for Biomedical Applications, Second Edition, provides an updated guide to the diverse range of biomedical applications of porous silicon, from biosensing and imaging to tissue engineering and cancer therapy. Across biomedical disciplines, there is an ongoing search for biomaterials that are biocompatible, modifiable, structurally sound, and versatile. Porous silicon possesses a range of properties that make it ideal for a variety of biomedical applications, such as controllable geometry, tunable nanoporous structure, large pore volume/high specific surface area, and versatile surface chemistry. This book provides a fully updated and detailed overview of the range of biomedical applications for porous silicon. Part One offers the reader a helpful insight into the fundamentals and

beneficial properties of porous silicon, including thermal properties and stabilization, photochemical and nonthermal chemical modification, protein modification, and biocompatibility. The book then builds on the systematic detailing of each biomedical application using porous silicon, from bioimaging and sensing to drug delivery and tissue engineering. This new edition also includes new chapters on in-vivo assessment of porous silicon, photodynamic and photothermal therapy, micro- and nanoneedles, Raman imaging, cancer immunotherapy, and more. With its acclaimed editor and international team of expert contributors, *Porous Silicon for Biomedical Applications, Second Edition*, is a technical resource and indispensable guide for all those involved in the research, development, and application of porous silicon and other biomaterials, while providing a comprehensive introduction for students and academics interested in this field. Reviews the fundamental aspects of porous silicon, including the fabrication and unique properties of this useful material. Discusses a broad selection of biomedical applications, offering a detailed insight into the benefits of porous silicon in both research and clinical settings. Includes fully updated content from the previous edition, as well as brand new chapters, covering topics such as porous silicon micro- and nanoneedles, and cancer immunotherapy.

Rare Earth and Transition Metal Doping of Semiconductor Materials - Volkmar Dierolf 2016-01-23

Rare Earth and Transition Metal Doping of Semiconductor Material explores traditional semiconductor devices that are based on control of the electron's electric charge. This book looks at the semiconductor materials used for spintronics applications, in particular focusing on wide band-gap semiconductors doped with transition metals and rare earths. These materials are of particular commercial interest because their spin can be controlled at room temperature, a clear opposition to the most previous research on Gallium Arsenide, which allowed for control of spins at supercold temperatures. Part One of the book explains the theory of magnetism in semiconductors, while Part Two covers the growth of semiconductors for spintronics. Finally, Part Three looks at the characterization and properties of semiconductors for spintronics, with Part Four exploring the devices and the future direction of spintronics. Examines materials which are of commercial interest for producing smaller, faster, and more power-efficient computers and other devices Analyzes the theory behind magnetism in semiconductors and the growth of semiconductors for spintronics Details the properties of semiconductors for spintronics

Nanolithography - M Feldman 2014-02-13

Integrated circuits, and devices fabricated using the techniques developed for integrated circuits, have steadily gotten smaller, more complex, and more powerful. The rate of shrinking is astonishing - some components are now just a few dozen atoms wide. This book attempts to answer the questions, "What comes next?" and "How do we get there?" Nanolithography outlines the present state of the art in lithographic techniques, including optical projection in both deep and extreme ultraviolet, electron and ion beams, and imprinting. Special attention is paid to related issues, such as the resists used in lithography, the masks (or lack thereof), the metrology needed for nano-features, modeling, and the limitations caused by feature edge roughness. In addition emerging technologies are described, including the directed assembly of wafer features, nanostructures and devices, nano-photonics, and nano-fluidics. This book is intended as a guide to the researcher new to this field, reading related journals or facing the complexities of a technical conference. Its goal is to give enough background information to enable such a researcher to understand, and appreciate, new developments in nanolithography, and to go on to make advances of his/her own. Outlines the current state of the art in alternative nanolithography technologies in order to cope with the future reduction in size of semiconductor chips to nanoscale dimensions Covers lithographic techniques, including optical projection, extreme ultraviolet (EUV), nanoimprint, electron beam and ion beam lithography Describes the emerging applications of nanolithography in nanoelectronics, nanophotonics and microfluidics

Reactive Polymers Fundamentals and Applications -

Johannes Karl Fink 2013-04-11

The use of reactive polymers enables manufacturers to make chemical changes at a late stage in the production process—these in turn cause changes in performance and properties. Material selection and control of the reaction are essential to achieve optimal performance. The second edition of *Reactive Polymers Fundamentals and Applications* introduces engineers and scientists to the range of reactive polymers available, explains the reactions that take place, and details applications and performance benefits. Basic principles and industrial processes are described for each class of reactive resin (thermoset), as well as additives, the curing process, and applications and uses. The initial chapters are devoted to individual resin types (e.g. epoxides, cyanacrylates, etc.); followed by more general chapters on topics such as reactive extrusion and dental applications. Material new to this edition includes the most recent developments, applications and commercial products for each chemical class of thermosets, as well as sections on fabrication methods, reactive biopolymers, recycling of reactive polymers, and case studies. Injection molding of reactive polymers, radiation curing, thermosetting elastomers, and reactive extrusion equipment are all covered as well. Most comprehensive source of information about reactive polymers Covers basics as well as most recent developments, including reactive biopolymers, recycling of reactive polymers, nanocomposites, and fluorosilicones Indispensable guide for engineers and advanced students alike—providing extensive literature and patent review

Graphene for Post-Moore Silicon Optoelectronics - Yang Xu 2023-01-18

Graphene for Post-Moore Silicon Optoelectronics Provides timely coverage of an important research area that is highly relevant to advanced detection and control technology Projecting device performance beyond the scaling limits of Moore's law requires technologies based on novel materials and device architecture. Due to its excellent electronic, thermal, and optical properties, graphene has emerged as a scalable, low-cost material with enormous integration possibilities for numerous optoelectronic applications. *Graphene for Post-Moore Silicon Optoelectronics* presents an up-to-date overview of the fundamentals, applications, challenges, and opportunities of integrating graphene and other 2D materials with silicon (Si) technologies. With an emphasis on graphene-silicon (Gr/Si) integrated devices in optoelectronics, this valuable resource also addresses emerging applications such as optoelectronic synaptic devices, optical modulators, and infrared image sensors. The book opens with an introduction to graphene for silicon optoelectronics, followed by chapters describing the growth, transfer, and physics of graphene/silicon junctions. Subsequent chapters each focus on a particular Gr/Si application, including high-performance photodetectors, solar energy harvesting devices, and hybrid waveguide devices. The book concludes by offering perspectives on the future challenges and prospects of Gr/Si optoelectronics, including the emergence of wafer-scale systems and neuromorphic optoelectronics. Illustrates the benefits of graphene-based electronics and hybrid device architectures that incorporate existing Si technology Covers all essential aspects of Gr/Si devices, including material synthesis, device fabrication, system integration, and related physics Summarizes current progress and future challenges of wafer-scale 2D-Si integrated optoelectronic devices Explores a wide range of Gr/Si devices, such as synaptic phototransistors, hybrid waveguide modulators, and graphene thermopile image sensors *Graphene for Post-Moore Silicon Optoelectronics* is essential reading for materials scientists, electronics engineers, and chemists in both academia and industry working with the next generation of Gr/Si devices.

Directed Self-assembly of Block Co-polymers for Nano-manufacturing - Roel Gronheid 2015-07-17

The directed self-assembly (DSA) method of patterning for microelectronics uses polymer phase-separation to generate features of less than 20nm, with the positions of self-assembling materials externally guided into the desired pattern. *Directed self-assembly of Block Co-polymers for Nano-manufacturing* reviews the design, production, applications and future developments needed to facilitate the widescale adoption of this promising technology. Beginning with a solid overview of the

physics and chemistry of block copolymer (BCP) materials, Part 1 covers the synthesis of new materials and new processing methods for DSA. Part 2 then goes on to outline the key modelling and characterization principles of DSA, reviewing templates and patterning using topographical and chemically modified surfaces, line edge roughness and dimensional control, x-ray scattering for characterization, and nanoscale driven assembly. Finally, Part 3 discusses application areas and related issues for DSA in nano-manufacturing, including for basic logic circuit design, the inverse DSA problem, design decomposition and the modelling and analysis of large scale, template self-assembly manufacturing techniques. Authoritative outlining of theoretical principles and modeling techniques to give a thorough introduction to the topic Discusses a broad range of practical applications for directed self-assembly in nano-manufacturing Highlights the importance of this technology to both the present and future of nano-manufacturing by exploring its potential use in a range of fields
Detection of Optical Signals - Antoni Rogalski

2022-06-06

Detection of Optical Signals provides a comprehensive overview of important technologies for photon detection, from the X-ray through ultraviolet, visible, infrared to far-infrared spectral regions. It uniquely combines perspectives from many disciplines, particularly within physics and electronics, which are necessary to have a complete understanding of optical receivers. This interdisciplinary textbook aims to: • Guide readers into more detailed and technical treatments of readout optical signals • Give a broad overview of optical signal detection including terahertz region and two-dimensional material • Help readers further their studies by offering chapter-end problems and recommended reading. This is an invaluable resource for graduate students in physics and engineering, as well as a helpful refresher for those already working with aerospace sensors and systems, remote sensing, thermal imaging, military imaging, optical telecommunications, infrared spectroscopy, and light detection.
Amorphous and Heterogeneous Silicon Thin Films - Howard M. Branz 1999