

# **Vehicular Communications And Networks Architectures Protocols Operation And Deployment Woodhead Publishing Series In Electronic And Optical Materials**

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**Metallic Films for  
Electronic, Optical and**

**Magnetic Applications -  
Katayun Barmak 2014-02-13**

Metallic films play an important role in modern technologies such as integrated circuits, information storage, displays, sensors, and coatings. **Metallic Films for Electronic, Optical and Magnetic Applications** reviews the structure, processing and properties of metallic films. Part one explores the structure of metallic films using characterization methods such as x-ray diffraction and transmission electron microscopy. This part also encompasses the processing of metallic films, including structure formation during deposition and post-deposition reactions and phase transformations. Chapters in part two focus on the properties of metallic films, including mechanical, electrical, magnetic, optical, and thermal properties. **Metallic Films for Electronic, Optical and Magnetic Applications** is a technical resource for electronics components manufacturers, scientists, and engineers working in the semiconductor

industry, product developers of sensors, displays, and other optoelectronic devices, and academics working in the field. Explores the structure of metallic films using characterization methods such as x-ray diffraction and transmission electron microscopy Discusses processing of metallic films, including structure formation during deposition and post-deposition reactions and phase transformations Focuses on the properties of metallic films, including mechanical, electrical, magnetic, optical, and thermal properties **Biomimetic Technologies** - Trung Dung Ngo 2015-07-24 Biomimetic engineering takes the principles of biological organisms and copies, mimics or adapts these in the design and development of new materials and technologies. **Biomimetic Technologies** reviews the key materials and processes involved in this groundbreaking field, supporting theoretical background by outlining a range of applications.

Beginning with an overview of the key principles and materials associated with biomimetic technologies in Part One, the book goes on to explore biomimetic sensors in more detail in Part Two, with bio-inspired tactile, hair-based, gas-sensing and sonar systems all reviewed. Biomimetic actuators are then the focus of Part Three, with vision systems, tissue growth and muscles all discussed. Finally, a wide range of applications are investigated in Part Four, where biomimetic technology and artificial intelligence are reviewed for such uses as bio-inspired climbing robots and multi-robot systems, microrobots with CMOS IC neural networks locomotion control, central pattern generators (CPG's) and biologically inspired antenna arrays. Includes a solid overview of modern artificial intelligence as background to the principles of biomimetic engineering Reviews a selection of key bio-inspired materials and sensors, highlighting their current

strengths and future potential Features cutting-edge examples of biomimetic technologies employed for a broad range of applications  
**Advances in Non-volatile Memory and Storage Technology** - Yoshio Nishi  
2014-06-24

New solutions are needed for future scaling down of nonvolatile memory. Advances in Non-volatile Memory and Storage Technology provides an overview of developing technologies and explores their strengths and weaknesses. After an overview of the current market, part one introduces improvements in flash technologies, including developments in 3D NAND flash technologies and flash memory for ultra-high density storage devices. Part two looks at the advantages of designing phase change memory and resistive random access memory technologies. It looks in particular at the fabrication, properties, and performance of nanowire phase change memory technologies. Later chapters also consider

modeling of both metal oxide and resistive random access memory switching mechanisms, as well as conductive bridge random access memory technologies. Finally, part three looks to the future of alternative technologies. The areas covered include molecular, polymer, and hybrid organic memory devices, and a variety of random access memory devices such as nano-electromechanical, ferroelectric, and spin-transfer-torque magnetoresistive devices. Advances in Non-volatile Memory and Storage Technology is a key resource for postgraduate students and academic researchers in physics, materials science, and electrical engineering. It is a valuable tool for research and development managers concerned with electronics, semiconductors, nanotechnology, solid-state memories, magnetic materials, organic materials, and portable electronic devices. Provides an overview of developing nonvolatile memory and

storage technologies and explores their strengths and weaknesses Examines improvements to flash technology, charge trapping, and resistive random access memory Discusses emerging devices such as those based on polymer and molecular electronics, and nanoelectromechanical random access memory (RAM)

**Nitride Semiconductor Light-Emitting Diodes (LEDs)** - Jian-Jang Huang  
2014-02-14

The development of nitride-based light-emitting diodes (LEDs) has led to advancements in high-brightness LED technology for solid-state lighting, handheld electronics, and advanced bioengineering applications. Nitride Semiconductor Light-Emitting Diodes (LEDs) reviews the fabrication, performance, and applications of this technology that encompass the state-of-the-art material and device development, and practical nitride-based LED design considerations. Part one

reviews the fabrication of nitride semiconductor LEDs. Chapters cover molecular beam epitaxy (MBE) growth of nitride semiconductors, modern metalorganic chemical vapor deposition (MOCVD) techniques and the growth of nitride-based materials, and gallium nitride (GaN)-on-sapphire and GaN-on-silicon technologies for LEDs. Nanostructured, non-polar and semi-polar nitride-based LEDs, as well as phosphor-coated nitride LEDs, are also discussed. Part two covers the performance of nitride LEDs, including photonic crystal LEDs, surface plasmon enhanced LEDs, color tuneable LEDs, and LEDs based on quantum wells and quantum dots. Further chapters discuss the development of LED encapsulation technology and the fundamental efficiency droop issues in gallium indium nitride (GaInN) LEDs. Finally, part three highlights applications of nitride LEDs, including liquid crystal display (LCD) backlighting, infrared emitters, and automotive

lighting. Nitride Semiconductor Light-Emitting Diodes (LEDs) is a technical resource for academics, physicists, materials scientists, electrical engineers, and those working in the lighting, consumer electronics, automotive, aviation, and communications sectors. Reviews fabrication, performance, and applications of this technology that encompass the state-of-the-art material and device development, and practical nitride-based LED design considerations Covers the performance of nitride LEDs, including photonic crystal LEDs, surface plasmon enhanced LEDs, color tuneable LEDs, and LEDs based on quantum wells and quantum dots Highlights applications of nitride LEDs, including liquid crystal display (LCD) backlighting, infra-red emitters, and automotive lighting  
Sensor Technologies for Civil Infrastructures - Ming L. Wang  
2014-04-26  
Sensors are used for civil

infrastructure performance assessment and health monitoring, and have evolved significantly through developments in materials and methodologies. Sensor Technologies for Civil Infrastructure Volume I provides an overview of sensor hardware and its use in data collection. The first chapters provide an introduction to sensing for structural performance assessment and health monitoring, and an overview of commonly used sensors and their data acquisition systems. Further chapters address different types of sensor including piezoelectric transducers, fiber optic sensors, acoustic emission sensors, and electromagnetic sensors, and the use of these sensors for assessing and monitoring civil infrastructures. Developments in technologies applied to civil infrastructure performance assessment are also discussed, including radar technology, micro-electro-mechanical systems (MEMS) and nanotechnology. Sensor

Technologies for Civil Infrastructure provides a standard reference for structural and civil engineers, electronics engineers, and academics with an interest in the field. Describes sensing hardware and data collection, covering a variety of sensors Examines fiber optic systems, acoustic emission, piezoelectric sensors, electromagnetic sensors, ultrasonic methods, and radar and millimeter wave technology Covers strain gauges, micro-electro-mechanical systems (MEMS), multifunctional materials and nanotechnology for sensing, and vision-based sensing and lasers

*Quantum Information Processing with Diamond* - Steven Praver 2014-05-12  
Diamond nitrogen vacancy (NV) color centers can transform quantum information science into practical quantum information technology, including fast, safe computing. *Quantum Information Processing with Diamond* looks at the principles of quantum information science, diamond

materials, and their applications. Part one provides an introduction to quantum information processing using diamond, as well as its principles and fabrication techniques. Part two outlines experimental demonstrations of quantum information processing using diamond, and the emerging applications of diamond for quantum information science. It contains chapters on quantum key distribution, quantum microscopy, the hybridization of quantum systems, and building quantum optical devices. Part three outlines promising directions and future trends in diamond technologies for quantum information processing and sensing.

Quantum Information Processing with Diamond is a key reference for R&D managers in industrial sectors such as conventional electronics, communication engineering, computer science, biotechnology, quantum optics, quantum mechanics, quantum computing, quantum cryptology, and

nanotechnology, as well as academics in physics, chemistry, biology, and engineering. Brings together the topics of diamond and quantum information processing Looks at applications such as quantum computing, neural circuits, and in vivo monitoring of processes at the molecular scale

### **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

### **Revolutionizing Industrial Automation Through the Convergence of Artificial Intelligence and the Internet of Things** - Mishra,

Divya Upadhyay 2022-09-23

With the development of innovative technologies, the study of industrial automation is obtaining extraordinary attention from academia, governments, researchers, and various industrial communities. The technical innovations in advanced technologies such as deep learning, blockchain, artificial intelligence of things (AIOT), and more have unlocked the potential for bringing intelligent automation and efficiency to the industries to control their various operations. These new technologies provide an efficient and secure way for industries to manage and develop products intelligently. Revolutionizing Industrial Automation Through the Convergence of Artificial Intelligence and the Internet of



Things includes the recent advancements in exploring and developing AIOT-powered strategies and mechanisms for future industrial automation and transforming industrial functions and architectures to help improve various industrial operations. Covering topics such as convolutional neural networks, smart urban logistics, and industrial automation, this premier reference source is an excellent resource for computer scientists, IT managers, engineers, business leaders and executives, logistics managers, students and faculty of higher education, libraries, researchers, and academicians.

*Optical Interconnects for Data Centers* - Tolga Tekin

2016-11-01

Current data centre networks, based on electronic packet switches, are experiencing an exponential increase in network traffic due to developments such as cloud computing. Optical interconnects have emerged as a promising alternative offering

high throughput and reduced power consumption. *Optical Interconnects for Data Centers* reviews key developments in the use of optical interconnects in data centres and the current state of the art in transforming this technology into a reality. The book discusses developments in optical materials and components (such as single and multi-mode waveguides), circuit boards and ways the technology can be deployed in data centres. *Optical Interconnects for Data Centers* is a key reference text for electronics designers, optical engineers, communications engineers and R&D managers working in the communications and electronics industries as well as postgraduate researchers. Summarizes the state-of-the-art in this emerging field Presents a comprehensive review of all the key aspects of deploying optical interconnects in data centers, from materials and components, to circuit boards and methods for integration Contains contributions that are drawn from leading

international experts on the topic

Antenna Design Challenges and Future Directions for Modern Transportation Market

- Moh Chuan Tan 2020-12-02

This book is focused on wireless infrastructure deployment in modern transportation markets, where the wireless infrastructure co-exists with the existing structure. It details the challenges this deployment may face and explores the mitigation measures to overcome the challenges. The book proposes a smart antenna structure to overcome airspace congestion, which improves the overall wireless performance and deployment cost. With the combination of practical know-how and theoretical estimation, this book provides insight on how the modern smart antenna techniques that support most cutting-edge wireless technology can be adopted into the existing infrastructure whilst minimising the distraction to the existing system. This book is suitable for industrial and academic

researchers, practising engineers within the field of smart antennae, and wireless infrastructure designers and developers.

Silicon-On-Insulator (SOI) Technology - O. Kononchuk 2014-06-19

Silicon-On-Insulator (SOI) Technology: Manufacture and Applications covers SOI transistors and circuits, manufacture, and reliability. The book also looks at applications such as memory, power devices, and photonics. The book is divided into two parts; part one covers SOI materials and manufacture, while part two covers SOI devices and applications. The book begins with chapters that introduce techniques for manufacturing SOI wafer technology, the electrical properties of advanced SOI materials, and modeling short-channel SOI semiconductor transistors. Both partially depleted and fully depleted SOI technologies are considered. Chapters 6 and 7 concern junctionless and fin-on-oxide field effect transistors. The

challenges of variability and electrostatic discharge in CMOS devices are also addressed. Part two covers recent and established technologies. These include SOI transistors for radio frequency applications, SOI CMOS circuits for ultralow-power applications, and improving device performance by using 3D integration of SOI integrated circuits. Finally, chapters 13 and 14 consider SOI technology for photonic integrated circuits and for micro-electromechanical systems and nano-electromechanical sensors. The extensive coverage provided by Silicon-On-Insulator (SOI) Technology makes the book a central resource for those working in the semiconductor industry, for circuit design engineers, and for academics. It is also important for electrical engineers in the automotive and consumer electronics sectors. Covers SOI transistors and circuits, as well as manufacturing processes and reliability Looks at applications such as memory,

power devices, and photonics  
**Handbook of Flexible Organic Electronics** -  
Stergios Logothetidis  
2014-12-15

Organic flexible electronics represent a highly promising technology that will provide increased functionality and the potential to meet future challenges of scalability, flexibility, low power consumption, light weight, and reduced cost. They will find new applications because they can be used with curved surfaces and incorporated in to a number of products that could not support traditional electronics. The book covers device physics, processing and manufacturing technologies, circuits and packaging, metrology and diagnostic tools, architectures, and systems engineering. Part one covers the production, properties and characterisation of flexible organic materials and part two looks at applications for flexible organic devices. Reviews the properties and production of various flexible organic materials. Describes

the integration technologies of flexible organic electronics and their manufacturing methods. Looks at the application of flexible organic materials in smart integrated systems and circuits, chemical sensors, microfluidic devices, organic non-volatile memory devices, and printed batteries and other power storage devices.

### Optofluidics, Sensors and Actuators in Microstructured

Optical Fibers - Stavros

Pissadakis 2015-05-19

Combining the positive characteristics of microfluidics and optics, microstructured optical fibres (MOFs) have revolutionized the field of optoelectronics. Tailored guiding, diffractive structures and photonic band-gap effects are used to produce fibres with highly specialised, complex structures, facilitating the development of novel kinds of optical fibre sensors and actuators. Part One outlines the key materials and fabrication techniques used for microstructured optical fibres. Microfluidics and heat flows, MOF-based metamaterials,

novel and liquid crystal infiltrated photonic crystal fibre (PCF) designs, MOFs filled with carbon nanotubes and melting of functional inorganic glasses inside PCFs are all reviewed. Part Two then goes on to investigate sensing and optofluidic applications, with the use of MOFs in structural sensing, sensing units and mechanical sensing explored in detail. PCF's for switching applications are then discussed before the book concludes by reviewing MOFs for specific nucleic acid detection and resonant bio- and chemical sensing. Provides users with the necessary knowledge to successfully design and implement microstructured optical fibres for a broad range of uses Outlines techniques for developing both traditional and novel types of optical fibre Highlights the adaptability of microstructured optical fibres achieved via the use of optofluidics, sensors and actuators, by presenting a diverse selection of applications

## Laser Spectroscopy for Sensing

- Matthieu Baudelet

2014-02-15

Laser spectroscopy is a valuable tool for sensing and chemical analysis.

Developments in lasers, detectors and mathematical analytical tools have led to improvements in the sensitivity and selectivity of spectroscopic techniques and extended their fields of application. Laser Spectroscopy for Sensing examines these advances and how laser spectroscopy can be used in a diverse range of industrial, medical, and environmental applications.

Part one reviews basic concepts of atomic and molecular processes and presents the fundamentals of laser technology for controlling the spectral and temporal aspects of laser excitation. In addition, it explains the selectivity, sensitivity, and stability of the measurements, the construction of databases, and the automation of data analysis by machine learning.

Part two explores laser spectroscopy techniques,

including cavity-based absorption spectroscopy and the use of photo-acoustic spectroscopy to acquire absorption spectra of gases and condensed media. These chapters discuss imaging methods using laser-induced fluorescence and phosphorescence spectroscopies before focusing on light detection and ranging, photothermal spectroscopy and terahertz spectroscopy. Part three covers a variety of applications of these techniques, particularly the detection of chemical, biological, and explosive threats, as well as their use in medicine and forensic science. Finally, the book examines spectroscopic analysis of industrial materials and their applications in nuclear research and industry. The text provides readers with a broad overview of the techniques and applications of laser spectroscopy for sensing. It is of great interest to laser scientists and engineers, as well as professionals using lasers for medical applications,

environmental applications, military applications, and material processing. Presents the fundamentals of laser technology for controlling the spectral and temporal aspects of laser excitation Explores laser spectroscopy techniques, including cavity-based absorption spectroscopy and the use of photo-acoustic spectroscopy to acquire absorption spectra of gases and condensed media Considers spectroscopic analysis of industrial materials and their applications in nuclear research and industry

**Semiconductor Nanowires - J**  
Arbiol 2015-03-31

Semiconductor nanowires promise to provide the building blocks for a new generation of nanoscale electronic and optoelectronic devices. Semiconductor Nanowires: Materials, Synthesis, Characterization and Applications covers advanced materials for nanowires, the growth and synthesis of semiconductor nanowires—including methods such as solution growth,

MOVPE, MBE, and self-organization. Characterizing the properties of semiconductor nanowires is covered in chapters describing studies using TEM, SPM, and Raman scattering. Applications of semiconductor nanowires are discussed in chapters focusing on solar cells, battery electrodes, sensors, optoelectronics and biology. Explores a selection of advanced materials for semiconductor nanowires Outlines key techniques for the property assessment and characterization of semiconductor nanowires Covers a broad range of applications across a number of fields

*Materials Characterization Using Nondestructive Evaluation (NDE) Methods -*  
Gerhard Huebschen  
2016-03-23

Materials Characterization Using Nondestructive Evaluation (NDE) Methods discusses NDT methods and how they are highly desirable for both long-term monitoring and short-term assessment of

materials, providing crucial early warning that the fatigue life of a material has elapsed, thus helping to prevent service failures. Materials Characterization Using Nondestructive Evaluation (NDE) Methods gives an overview of established and new NDT techniques for the characterization of materials, with a focus on materials used in the automotive, aerospace, power plants, and infrastructure construction industries. Each chapter focuses on a different NDT technique and indicates the potential of the method by selected examples of applications. Methods covered include scanning and transmission electron microscopy, X-ray microtomography and diffraction, ultrasonic, electromagnetic, microwave, and hybrid techniques. The authors review both the determination of microstructure properties, including phase content and grain size, and the determination of mechanical

properties, such as hardness, toughness, yield strength, texture, and residual stress. Gives an overview of established and new NDT techniques, including scanning and transmission electron microscopy, X-ray microtomography and diffraction, ultrasonic, electromagnetic, microwave, and hybrid techniques Reviews the determination of microstructural and mechanical properties Focuses on materials used in the automotive, aerospace, power plants, and infrastructure construction industries Serves as a highly desirable resource for both long-term monitoring and short-term assessment of materials

### **Industrial Tomography - Mi**

Wang 2015-03-30

Industrial Tomography: Systems and Applications thoroughly explores the important tomographic techniques of industrial tomography, also discussing image reconstruction, systems, and applications. The text presents complex processes,

including the way three-dimensional imaging is used to create multiple cross-sections, and how computer software helps monitor flows, filtering, mixing, drying processes, and chemical reactions inside vessels and pipelines. Readers will find a comprehensive discussion on the ways tomography systems can be used to optimize the performance of a wide variety of industrial processes. Provides a comprehensive discussion on the different formats of tomography Includes an excellent overview of image reconstruction using a wide range of applications Presents a comprehensive discussion of tomography systems and their application in a wide variety of industrial processes

**Wireless MEMS Networks and Applications** - Deepak Uttamchandani 2016-08-30  
Wireless MEMS Networks and Applications reviews key emerging applications of MEMS in wireless and mobile networks. This book covers the different types of wireless

MEMS devices, also exploring MEMS in smartphones, tablets, and the MEMS used for energy harvesting. The book reviews the range of applications of wireless MEMS networks in manufacturing, infrastructure monitoring, environmental monitoring, space applications, agricultural monitoring for food safety, health applications, and systems for smart cities. Focuses on the use of MEMS in the emerging area of wireless applications Contains comprehensive coverage of the range of applications of MEMS for wireless networks Presents an international range of expert contributors who identify key research in the field

**Cloud and IoT-Based Vehicular Ad Hoc Networks** - Gurinder Singh 2021-06-05  
CLOUD AND IOT-BASED VEHICULAR AD HOC NETWORKS This book details the architecture behind smart cars being fitted and connected with vehicular cloud computing, IoT and VANET as part of the intelligent transport system (ITS). As technology



continues to weave itself more tightly into everyday life, socioeconomic development has become intricately tied to ever-evolving innovations. An example of this is the technology being developed to address the massive increase in the number of vehicles on the road, which has resulted in more traffic congestion and road accidents. This challenge is being addressed by developing new technologies to optimize traffic management operations. This book describes the state-of-the-art of the recent developments of Internet of Things (IoT) and cloud computing-based concepts that have been introduced to improve Vehicular Ad-Hoc Networks (VANET) with advanced cellular networks such as 5G networks and vehicular cloud concepts. 5G cellular networks provide consistent, faster and more reliable connections within the vehicular mobile nodes. By 2030, 5G networks will deliver the virtual reality content in VANET which will support vehicle navigation with

real time communications capabilities, improving road safety and enhanced passenger comfort. In particular, the reader will learn: A range of new concepts in VANETs, integration with cloud computing and IoT, emerging wireless networking and computing models New VANET architecture, technology gap, business opportunities, future applications, worldwide applicability, challenges and drawbacks Details of the significance of 5G Networks in VANET, vehicular cloud computing, edge (fog) computing based on VANET. Audience The book will be widely used by researchers, automotive industry engineers, technology developers, system architects, IT specialists, policymakers and students.

**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.

**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

**Advances in Chemical Mechanical Planarization (CMP)** - Suryadevara Babu

2016-01-09

Advances in Chemical Mechanical Planarization (CMP) provides the latest information on a mainstream process that is critical for high-volume, high-yield semiconductor manufacturing,

and even more so as device dimensions continue to shrink. The technology has grown to encompass the removal and planarization of multiple metal and dielectric materials and layers both at the device and the metallization levels, using different tools and parameters, requiring improvements in the control of topography and defects. This important book offers a systematic review of fundamentals and advances in the area. Part One covers CMP of dielectric and metal films, with chapters focusing on the use of particular techniques and processes, and on CMP of particular various materials, including ultra low-k materials and high-mobility channel materials, and ending with a chapter reviewing the environmental impacts of CMP processes. Part Two addresses consumables and process control for improved CMP, and includes chapters on the preparation and characterization of slurry, diamond disc pad conditioning, the use of FTIR spectroscopy for characterization of surface

processes, and approaches for deflection characterization, mitigation, and reduction. Considers techniques and processes for CMP of dielectric and metal films Includes chapters devoted to CMP for particular materials Addresses consumables and process control for improved CMP  
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.  
**Numerical Optimization in Engineering and Sciences** - Debashis Dutta 2020-04-07

This book presents select peer-reviewed papers presented at the International Conference on Numerical Optimization in Engineering and Sciences (NOIEAS) 2019. The book covers a wide variety of numerical optimization techniques across all major engineering disciplines like mechanical, manufacturing, civil, electrical, chemical,

computer, and electronics engineering. The major focus is on innovative ideas, current methods and latest results involving advanced optimization techniques. The contents provide a good balance between numerical models and analytical results obtained for different engineering problems and challenges. This book will be useful for students, researchers, and professionals interested in engineering optimization techniques.

*Epitaxial Growth of Complex Metal Oxides* - Gertjan Koster  
2015-05-14

The atomic arrangement and subsequent properties of a material are determined by the type and conditions of growth leading to epitaxy, making control of these conditions key to the fabrication of higher quality materials. *Epitaxial Growth of Complex Metal Oxides* reviews the techniques involved in such processes and highlights recent developments in fabrication quality which are facilitating advances in applications for electronic,

magnetic and optical purposes. Part One reviews the key techniques involved in the epitaxial growth of complex metal oxides, including growth studies using reflection high-energy electron diffraction, pulsed laser deposition, hybrid molecular beam epitaxy, sputtering processes and chemical solution deposition techniques for the growth of oxide thin films. Part Two goes on to explore the effects of strain and stoichiometry on crystal structure and related properties, in thin film oxides. Finally, the book concludes by discussing selected examples of important applications of complex metal oxide thin films in Part Three. Provides valuable information on the improvements in epitaxial growth processes that have resulted in higher quality films of complex metal oxides and further advances in applications for electronic and optical purposes Examines the techniques used in epitaxial thin film growth Describes the epitaxial growth and functional properties of complex metal

oxides and explores the effects of strain and defects

*Polymer Optical Fibres - Christian-Alexander Bunge*

2016-08-25

*Polymer Optical Fibres: Fibre Types, Materials, Fabrication, Characterization, and Applications* explores polymer optical fibers, specifically their materials, fabrication, characterization, measurement techniques, and applications.

Optical effects, including light propagation, degrading effects of attenuation, scattering, and dispersion, are explained.

Other important parameters like mechanical strength, operating temperatures, and processability are also described. Polymer optical fibers (POF) have a number of advantages over glass fibers, such as low cost, flexibility, low weight, electromagnetic immunity, good bandwidth, simple installation, and mechanical stability. Provides systematic and comprehensive coverage of materials, fabrication, properties, measurement techniques, and applications of POF Focuses on

industry needs in communication, illumination and sensors, the automotive industry, and medical and biotechnology Features input from leading experts in POF technology, with experience spanning optoelectronics, polymer, and textiles Explains optical effects, including light propagation, degrading effects of attenuation, scattering, and dispersion

*Composite Magnetolectrics - G Srinivasan* 2015-05-11

*Composite Magnetolectrics: Materials, Structures, and Applications* gives the reader a summary of the theory behind magnetoelectric phenomena, later introducing magnetoelectric materials and structures and the techniques used to fabricate and characterize them. Part two of the book looks at magnetoelectric devices. Applications include magnetic and current sensors, transducers for energy harvesting, microwave and millimeter wave devices, miniature antennas and medical imaging. The final

chapter discusses progress towards magnetoelectric memory. Summarises clearly the theory behind magnetoelectric phenomena Strong coverage of fabrication and characterisation techniques Reviews a broad range of current and potential magnetoelectric 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

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 Sensor Technologies for Civil Infrastructures - Ming L. Wang  
2014-05-19

Sensors are used for civil infrastructure performance assessment and health monitoring, and have evolved significantly through developments in materials and methodologies. Sensor Technologies for Civil Infrastructure Volume II provides an overview of sensor data analysis and case studies in assessing and monitoring civil infrastructures. Part one focuses on sensor data interrogation and decision making, with chapters on data



management technologies, data analysis, techniques for damage detection and structural damage detection. Part two is made up of case studies in assessing and monitoring specific structures such as bridges, towers, buildings, dams, tunnels, pipelines, and roads. Sensor Technologies for Civil Infrastructure provides a standard reference for structural and civil engineers, electronics engineers, and academics with an interest in the field. Provides an in-depth examination of sensor data management and analytical techniques for fault detection and localization, looking at prognosis and life-cycle assessment Includes case studies in assessing structures such as bridges, buildings, super-tall towers, dams, tunnels, wind turbines, railroad tracks, nuclear power plants, offshore structures, levees, and pipelines

Vehicular Communications and Networks - Wai Chen

2015-03-09

Vehicular Communications and

Networks: Architectures, Protocols, Operation and Deployment discusses VANETs (Vehicular Ad-hoc Networks) or VCS (Vehicular Communication Systems), which can improve safety, decrease fuel consumption, and increase the capacity of existing roadways and which is critical for the Intelligent Transportation System (ITS) industry. Part one covers architectures for VCS, part two describes the physical layer, antenna technologies and propagation models, part three explores protocols, algorithms, routing and information dissemination, and part four looks at the operation and deployment of vehicular communications and networks. Comprehensive coverage of the fundamental principles behind Vehicular Ad-hoc Networks (VANETS) and the rapidly growing need for their further development Thorough overview of the design and development of key technologies and devices Explores the practical application of this technology by outlining a number of case

studies, testbeds and simulations employing vehicular communications and networks

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  
*Nanosensors for Chemical and Biological Applications* - Kevin C. Honeychurch 2014-02-28  
Nano-scale materials are proving attractive for a new generation of devices, due to their unique properties. They are used to create fast-responding sensors with good sensitivity and selectivity for the detection of chemical species and biological agents. *Nanosensors for Chemical and Biological Applications* provides an overview of developments brought about by the application of nanotechnology for both chemical and biological sensor development. Part one

addresses electrochemical nanosensors and their applications for enhanced biomedical sensing, including blood glucose and trace metal ion analysis. Part two goes on to discuss spectrographic nanosensors, with chapters on the use of nanoparticle sensors for biochemical and environmental sensing and other techniques for detecting nanoparticles in the environment. Nanosensors for Chemical and Biological Applications serves as a standard reference for R&D managers in a range of industrial sectors, including nanotechnology, electronics, biotechnology, magnetic and optical materials, and sensors technology, as well as researchers and academics with an interest in these fields. Reviews the range electrochemical nanosensors, including the use of carbon nanotubes, glucose nanosensors, chemiresistor sensors using metal oxides, and nanoparticles Discusses spectrographic nanosensors, such as surface-enhanced

Raman scattering (SERS) nanoparticle sensors, the use of coated gold nanoparticles, and semiconductor quantum dots  
*Machine-to-machine (M2M) Communications* - Carles Anton-Haro 2014-12-23  
Part one of Machine-to-Machine (M2M) Communications covers machine-to-machine systems, architecture and components. Part two assesses performance management techniques for M2M communications. Part three looks at M2M applications, services, and standardization. Machine-to-machine communications refers to autonomous communication between devices or machines. This book serves as a key resource in M2M, which is set to grow significantly and is expected to generate a huge amount of additional data traffic and new revenue streams, underpinning key areas of the economy such as the smart grid, networked homes, healthcare and transportation. Examines the opportunities in M2M for

businesses Analyses the optimisation and development of M2M communications Chapters cover aspects of access, scheduling, mobility and security protocols within M2M communications

*Rail Vehicle Mechatronics - Maksym Spiryagin 2021-12-09*

This unique and up-to-date work surveys the use of mechatronics in rail vehicles, notably traction, braking, communications, data sharing, and control. The results include improved safety, comfort, and fuel efficiency. Mechatronic systems are a key element in modern rail vehicle design and operation. Starting with an overview of mechatronic theory, the book goes on to cover topics including modeling of mechanical and electrical systems for rail vehicles, open and closed loop control systems, sensors, actuators and microprocessors. Modern simulation techniques and examples are included throughout, and numerical experiments and developed models for railway application are presented and explained.

Case studies are used, alongside practical examples, to ensure that the reader can apply mechatronic theory to real world conditions. These case studies include modeling of a hybrid locomotive and simplified models of railway vehicle lateral dynamics for suspension control studies. Rail Vehicle Mechatronics provides current and in-depth content for design engineers, operations managers, systems engineers and technical consultants world-wide, working with freight, passenger, and urban transit railway systems.

**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.

## **Fundamentals and Applications of Nanophotonics** - Joseph W. Haus

2016-01-09  
Fundamentals and Applications

of Nanophotonics includes a comprehensive discussion of the field of nanophotonics, including key enabling technologies that have the potential to drive economic growth and impact numerous application domains such as ICT, the environment, healthcare, military, transport, manufacturing, and energy. This book gives readers the theoretical underpinnings needed to understand the latest advances in the field. After an introduction to the area, chapters two and three cover the essential topics of electrodynamics, quantum mechanics, and computation as they relate to nanophotonics. Subsequent chapters explore materials for nanophotonics, including nanoparticles, photonic crystals, nanosilicon, nanocarbon, III-V, and II-VI semiconductors. In addition, fabrication and characterization techniques are addressed, along with the importance of plasmonics, and the applications of nanophotonics in devices such as lasers, LEDs, and

photodetectors. Covers electrodynamics, quantum mechanics and computation as these relate to nanophotonics Reviews materials, fabrication and characterization techniques for nanophotonics Describes applications of the technology such as lasers, LEDs and photodetectors

*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

**Vehicular Communications and Networks** - Wai Chen 2015-03-09

Vehicular Communications and Networks: Architectures, Protocols, Operation and Deployment discusses VANETs (Vehicular Ad-hoc Networks) or VCS (Vehicular Communication

Systems), which can improve safety, decrease fuel consumption, and increase the capacity of existing roadways and which is critical for the Intelligent Transportation System (ITS) industry. Part one covers architectures for VCS, part two describes the physical layer, antenna technologies and propagation models, part three explores protocols, algorithms, routing and information dissemination, and part four looks at the operation and deployment of vehicular communications and networks. Comprehensive coverage of the fundamental principles behind Vehicular Ad-hoc Networks (VANETS) and the rapidly growing need for their further development Thorough overview of the design and development of key technologies and devices Explores the practical application of this technology by outlining a number of case studies, testbeds and simulations employing vehicular communications and networks

Graphene - Viera Skakalova

2014-02-16

Graphene: Properties, Preparation, Characterisation and Devices reviews the preparation and properties of this exciting material.

Graphene is a single-atom-thick sheet of carbon with properties, such as the ability to conduct light and electrons, which could make it potentially suitable for a variety of devices and applications, including electronics, sensors, and photonics. Chapters in part one explore the preparation of , including epitaxial growth of graphene on silicon carbide, chemical vapor deposition (CVD) growth of graphene films, chemically derived graphene, and graphene produced by electrochemical exfoliation. Part two focuses on the characterization of graphene using techniques including transmission electron microscopy (TEM), scanning tunneling microscopy (STM), and Raman spectroscopy. These chapters also discuss photoemission of low dimensional carbon systems. Finally, chapters in part three

discuss electronic transport properties of graphene and graphene devices. This part highlights electronic transport in bilayer graphene, single charge transport, and the effect of adsorbents on electronic transport in graphene. It also explores graphene spintronics and nano-electro-mechanics (NEMS). Graphene is a comprehensive resource for academics, materials scientists, and electrical engineers working in the microelectronics and

optoelectronics industries. Explores the graphene preparation techniques, including epitaxial growth on silicon carbide, chemical vapor deposition (CVD), chemical derivation, and electrochemical exfoliation Focuses on the characterization of graphene using transmission electron microscopy (TEM), scanning tunneling microscopy (STM), and Raman spectroscopy A comprehensive resource for academics, materials scientists, and electrical engineers