Gallium Nitride Gan Physics Devices And Technology Devices Circuits And Systems

Physics Based Virtual Source Compact Model of Gallium-nitride High Electron Mobility Transistors
Power GaN Devices
Radiation Detection Systems
Radiation Detection Systems
GaN Power Devices and Applications
Sources, Detectors, Advanced Materials, and Light-matter Interactions
Materials, Physics, Design, and Applications
Technologies for Smart Sensors and Sensor Fusion
Gallium Nitride Materials and Devices
Narrow and Broadband Standards, EMC, and Advanced Processing
High-Speed Devices and Circuits with THz Applications
Technology of Gallium Nitride Crystal Growth
Low Power Circuits for Emerging Applications in Communications, Computing, and Sensing
Sensor Materials, Systems, Technology, and Characterization Measurements
Physics, Devices, and Technology
Emerging Trends in Terahertz Solid-State Physics and Devices
GaN-based Materials and Devices
Technology and Applications
Modeling Gallium-nitride Based High Electron Mobility Transistors
GaN Transistors for Efficient Power Conversion
Nitride Semiconductor Devices
Flexible, Wearable, and Stretchable Electronics
Gallium Nitride and Silicon Carbide Power Devices
Gallium Nitride Power Devices
Handbook of GaN Semiconductor Materials and Devices
Linking Device Physics to High Voltage and High Frequency Circuit Design
MIMO Power Line Communications
Two Volume Set
Wide Bandgap Semiconductor Power Devices
Thermal Management of Gallium Nitride Electronics
Nitride Semiconductor Technology
Gallium Nitride (GaN)
Principles and Simulation
Iii-nitride Materials, Devices And Nano-structures
Growth, Fabrication, Characterization and Performance
Power Electronics and Optoelectronic Devices
Entrepreneurship in Power Semiconductor Devices, Power Electronics, and Electric Machines and Drive Systems
Smart Grids

ELLISON ALINA

Physics Based Virtual Source Compact Model of Gallium-nitride High Electron Mobility Transistors Springer
The book has two intentions. First, it assembles the latest research in the field of medical imaging technology in one place. Detailed descriptions of current state-of-the-art medical imaging systems (comprised of x-ray CT, MRI, ultrasound, and nuclear medicine) and data processing techniques are discussed. Information is provided that will give interested engineers and scientists a solid foundation from which to build with additional resources. Secondly, it exposes the reader to myriad applications that medical imaging technology has enabled.
Power GaN Devices World Scientific
Metallic Spintronic Devices provides a balanced view of the present state of the art of metallic spintronic devices, addressing both mainstream and emerging applications from magnetic tunneling junction sensors and spin torque oscillators to spin torque memory and logic. Featuring contributions from well-known and respected industrial and academic experts, this cutting-edge work not only presents the latest research and developments but also: Describes spintronic applications in current and future magnetic recording devices Discusses spin-transfer torque magnetoresistive random-access memory (STT-MRAM) device architectures and modeling Explores prospects of STT-MRAM scaling, such as detailed multilevel cell structure analysis Investigates spintronic device write and read optimization in light of spintronic memristive effects Considers spintronic research directions based on yttrium iron garnet thin films, including spin pumping, magnetic proximity, spin hall, and spin Seebeck effects Proposes unique solutions for low-power spintronic device applications where memory is closely integrated with logic Metallic Spintronic Devices aims to equip anyone who is serious about metallic spintronic devices with up-to-date design, modeling, and processing knowledge. It can be used either by an expert in the field or a graduate student in course curriculum.
Radiation Detection Systems John Wiley & Sons
This book provides a current view of the research and commercial landscape of diagnostics devices, particularly those that utilize microscale technologies, intended for both patient and laboratory use. Common diagnostic devices that are based on microfluidic principles include glucose sensors for diabetic patients and over-the-counter pregnancy tests. Other diagnostic devices are being developed to quickly test a patient for bacterial and viral infections, and other diseases. The chapters, written by experts from around the world, discuss how to fabricate, apply, and market microfluidic diagnostic chips – for lab and at-home use. Most importantly, the book also contains a discussion of topics relevant to the private sector, including patient-focused, market-oriented development of diagnostics devices.
Radiation Detection Systems CRC Press
This book focusses on III-V high electron mobility transistors (HEMTs) including basic physics, material used, fabrications details, modeling, simulation, and other important aspects. It initiates by describing principle of operation, material systems and material technologies followed by description of the structure, I-V characteristics, modeling of DC and RF parameters of AlGaN/GaN HEMTs. The book also provides information about source/drain engineering, gate engineering and channel engineering techniques used to improve the DC-RF and breakdown performance of HEMTs. Finally, the book also highlights the importance of metal oxide semiconductor high electron mobility transistors (MOS-HEMT). Key Features Combines III-As/P/N HEMTs with reliability and current status in single volume Includes AC/DC modelling and (sub)millimeter wave devices with reliability analysis Covers all theoretical and experimental aspects of HEMTs Discusses AlGaN/GaN transistors Presents DC, RF and breakdown characteristics of HEMTs on various material systems using graphs and plots
CRC Press
During the last 30 years, significant progress has been made to improve our understanding of gallium nitride and silicon carbide device structures, resulting in experimental demonstration of their enhanced performances for power electronic systems. Gallium nitride power devices made by the growth of the material on silicon substrates have gained a lot of interest. Power device products made from these materials have become available during the last five years from many companies. This comprehensive book discusses the physics of operation and design of gallium nitride and silicon carbide power devices. It can be used as a reference by practicing engineers in the power electronics industry and as a textbook for a power device or power electronics course in universities. Request Inspection Copy
GaN Power Devices and Applications Springer Science & Business Media
Group III-Nitrides semiconductor materials, including GaN, InN, AlN, InGaN, AlGaN and AlInGaN, i.e. (Al, In, Ga)N, are excellent semiconductors, covering the spectral range from deep ultraviolet (DUV) to UV, visible and infrared, with unique properties very suitable for modern electronic and optoelectronic applications. Remarkable breakthroughs have been achieved in recent years for research and development (R&D) in these materials and devices, such as high-power and high brightness UV-blue-green-white light emitting diodes (LEDs), UV-blue-green laser diodes (LDs), photo-detectors and various optoelectronics and electronics devices and applications. The Nobel Prize in Physics 2014 was awarded jointly to Isamu Akasaki, Hiroshi Amano and Shuji Nakamura "for the invention of efficient blue light-emitting diodes which has enabled bright and energy-saving white light sources". Red and green diodes had been invented since 1960s-70s but without blue LED. Despite considerable efforts, the blue LED had remained a challenge for a long time. The success and inventions on GaN-based LEDs were revolutionary and benefiting for mankind. III-Nitrides-based industry has formed and acquired rapid developments over the world. Incandescent light bulbs lit the 20th century and the 21st century will be lit by LED lamps. Before this book, the editor has edited two books, III-Nitride Semiconductor Materials (2006) and III-Nitride Devices and Nanoengineering (2008), both published by ICP/WSP, in the fields of III-Nitride. The developments of these materials and devices are moving rapidly. Many data or knowledge, some even just published only recently, have been modified and needed to be upgraded. This new book, III-Nitride Materials, Devices and Nano-Structures as the third instalment, will cover the rapid new

developments and achievements in the III-Nitride fields, particularly those made since 2009.
Contents:General:Comprehensive Theoretical and Experimental Studies on III-Nitrides, Doping, Nano-Structures and LEDs (Jinmin Li, Zhiqiang Liu, Xiaoyan Yi and Junxi Wang)Waste Energy Harvesting Using III-Nitride Materials (E Ghafari, E Witkoske, Y Liu, C Zhang, X Jiang, A Bukowski, B Kucukgok, M Lundstrom; I T Ferguson and N Lu)III-Nitride Nanostructures for Intersubband Optoelectronics (C B Lim, A Ajay, J Lähnemann, D A Browne and E Monroy)GaN-Based Photodetectors (Ke Jiang, Xiaojuan Sun, Hang Song and Dabing Li)III-Nitride Materials:Single Crystal AlN: Growth by Modified Physical Vapor Transport and Properties (Honglei Wu and Ruisheng Zheng)Towards Understanding and Control of Nanoscale Phase Segregation in Indium-Gallium-Nitride Alloys (Yohannes Abate, Viktoriia E Babicheva, Vladislav S Yakovlev and Nikolaus Dietz)Investigating Structural and Optical Characteritics of III-Nitride Semiconductor Materials (Yi Liang, Xiaodong Jiang, Devki N Talwar, Liangyu Wan, Gu Xu and Zhe Chuan Feng)III-Nitride Devices and Nano-Structures:III-Nitride Nano-Structures and Improving the Luminescence Efficiency for Quantum Well LEDs (Peng Chen)Fabrication and Characterization of Green Resonant-Cavity Light-Emitting Diodes Prepared by Wafer Transfer Technologies (Shih-Yung Huang and Ray-Hua Horng)Nanotexturing Effects in GaN/InGaN Multi-Quantum-Wells LED Planar Structures (S J Xu)Group III-Nitride Nanostructures for Light-Emitting Devices and Beyond (Je-Hyung Kim, Young-Ho Ko and Yong-Hoon Cho) Readership: Scientists; material growers and evaluators; device design, processing engineers; postgraduate and graduate students in electrical & electronic engineering and materials engineering.
Sources, Detectors, Advanced Materials, and Light-matter Interactions Woodhead Publishing
One of the first publications of its kind in the exciting field of multiple input multiple output (MIMO) power line communications (PLC), MIMO Power Line Communications: Narrow and Broadband Standards, EMC, and Advanced Processing contains contributions from experts in industry and academia, making it practical enough to provide a solid understanding of how PLC technologies work, yet scientific enough to form a base for ongoing R&D activities. This book is subdivided into five thematic parts. Part I looks at narrow- and broadband channel characterization based on measurements from around the globe. Taking into account current regulations and electromagnetic compatibility (EMC), part II describes MIMO signal processing strategies and related capacity and throughput estimates. Current narrow- and broadband PLC standards and specifications are described in the various chapters of part III. Advanced PLC processing options are treated in part IV, drawing from a wide variety of research areas such as beamforming/precoding, time reversal, multi-user processing, and relaying. Lastly, part V contains case studies and field trials, where the advanced technologies of tomorrow are put into practice today. Suitable as a reference or a handbook, MIMO Power Line Communications: Narrow and Broadband Standards, EMC, and Advanced Processing features self-contained chapters with extensive cross-referencing to allow for a flexible reading path.
Materials, Physics, Design, and Applications CRC Press
This book presents in-depth coverage of magnetic sensors in industrial applications. It is divided into three sections: devices and technology for magnetic sensing, industrial applications (automotive, navigation), and emerging applications. Topics include transmission speed sensor ICs, dynamic differential Hall ICs, chopped Hall switches, programmable linear output Hall sensors, low power Hall ICs, self-calibrating differential Hall ICs for wheel speed sensing, dynamic differential Hall ICs, uni- and bipolar Hall IC switches, chopped mono cell Hall ICs, and electromagnetic levitation.
Technologies for Smart Sensors and Sensor Fusion John Wiley & Sons
Thermal Management of Gallium Nitride Electronics outlines the technical approaches undertaken by leaders in the community, the challenges they have faced, and the resulting advances in the field. This book serves as a one-stop reference for compound semiconductor device researchers tasked with solving this engineering challenge for future material systems based on ultra-wide bandgap semiconductors. A number of perspectives are included, such as the growth methods of nanocrystalline diamond, the materials integration of polycrystalline diamond through wafer bonding, and the new physics of thermal transport across heterogeneous interfaces. Over the past 10 years, the book's authors have performed pioneering experiments in the integration of nanocrystalline diamond capping layers into the fabrication process of compound semiconductor devices. Significant research efforts of integrating diamond and GaN have been reported by a number of groups since then, thus resulting in active thermal management options that do not necessarily lead to performance derating to avoid self-heating during radio frequency or power switching operation of these devices. Self-heating refers to the increased channel temperature caused by increased energy transfer from electrons to the lattice at high power. This book chronicles those breakthroughs. Includes the fundamentals of thermal management of wide-bandgap semiconductors, with historical context, a review of common heating issues, thermal transport physics, and characterization methods Reviews the latest strategies to overcome heating issues through materials modeling, growth and device design strategies Touches on emerging, real-world applications for thermal management strategies in power electronics
Gallium Nitride Materials and Devices CRC Press
The book addresses the need to investigate new approaches to lower energy requirement in multiple application areas and serves as a guide into emerging circuit technologies. It explores revolutionary device concepts, sensors, and associated circuits and architectures that will greatly extend the practical engineering limits of energy-efficient computation. The book responds to the need to develop disruptive new system architecutres, circuit microarchitectures, and attendant device and interconnect technology aimed at achieving the highest level of computational energy efficiency for general purpose computing systems. Features Discusses unique technologies and material only available in specialized journal and conferences Covers emerging applications areas, such as ultra low power communications, emerging bio-electronics, and operation in extreme environments Explores broad circuit operation, ex. analog, RF, memory, and digital circuits Contains practical applications in the engineering field, as well as graduate studies Written by international experts from both academia and industry
Narrow and Broadband Standards, EMC, and Advanced Processing CRC Press
This unique new resource provides a comparative introduction to vertical Gallium Nitride (GaN) and Silicon Carbide (SiC) power devices using real commercial device data, computer, and physical models. This book uses commercial examples from

recent years and presents the design features of various GaN and SiC power components and devices. Vertical verses lateral power semiconductor devices are explored, including those based on wide bandgap materials. The abstract concepts of solid state physics as they relate to solid state devices are explained with particular emphasis on power solid state devices. Details about the effects of photon recycling are presented, including an explanation of the phenomenon of the family tree of photon-recycling. This book offers in-depth coverage of bulk crystal growth of GaN, including hydride vapor-phase epitaxial (HVPE) growth, high-pressure nitrogen solution growth, sodium-flux growth, ammonothermal growth, and sublimation growth of SiC. The fabrication process, including ion implantation, diffusion, oxidation, metallization, and passivation is explained. The book provides details about metal-semiconductor contact, unipolar power diodes, and metal-insulator-semiconductor (MIS) capacitors. Bipolar power diodes, power switching devices, and edge terminations are also covered in this resource.

High-Speed Devices and Circuits with THz Applications CRC Press

Optical Imaging Devices: New Technologies and Applications delivers a comprehensive introduction to optical imaging and sensing, from devices to system-level applications. Drawing upon the extensive academic and industrial experience of its prestigious editors and renowned chapter authors, this authoritative text: Explains the physical principles of optical imaging and sensing Covers topics such as silicon-based imaging characteristics, nanophotonic phased arrays, thin-film sensors, label-free DNA sensors, and in vivo flow cytometry Presents the contributions of leading researchers, real-world examples from biomedicine, recommendations for further reading, and all measurements in SI units Optical Imaging Devices: New Technologies and Applications provides an essential understanding of the design, operation, and practical applications of optical imaging and sensing systems, making it a handy reference for students and practitioners alike.

Technology of Gallium Nitride Crystal Growth Woodhead Publishing

Wide Bandgap Semiconductor Power Devices: Materials, Physics, Design and Applications provides readers with a single resource on why these devices are superior to existing silicon devices. The book lays the groundwork for an understanding of an array of applications and anticipated benefits in energy savings. Authored by the Founder of the Power Semiconductor Research Center at North Carolina State University (and creator of the IGBT device), Dr. B. Jayant Baliga is one of the highest regarded experts in the field. He thus leads this team who comprehensively review the materials, device physics, design considerations and relevant applications discussed. Comprehensively covers power electronic devices, including materials (both gallium nitride and silicon carbide), physics, design considerations, and the most promising applications Addresses the key challenges towards the realization of wide bandgap power electronic devices, including materials defects, performance and reliability Provides the benefits of wide bandgap semiconductors, including opportunities for cost reduction and social impact

Low Power Circuits for Emerging Applications in Communications, Computing, and Sensing World Scientific Publishing Company

This is the first book to be published on physical principles, mathematical models, and practical simulation of GaN-based devices. The first part of the book covers electronic, optical, and thermal material parameters of nitride semiconductors that are employed in device models.

Sensor Materials, Systems, Technology, and Characterization Measurements CRC Press

The advances in semiconductor detectors, scintillators, photodetectors such as SiPM, and readout electronics in the past decades have led to significant progress in terms of performance and greater choice of the detection tools in many applications. This second edition of Radiation Detection Systems presents the state-of-the-art in the design of detectors and integrated circuit design, in the context of medical imaging using ionizing radiation. The material in the book has been divided into two volumes. The first volume on Sensor Materials, Systems, Technology and Characterization Measurements puts more emphasis on sensor materials, detector and front electronics technology and designs as well as system optimization for different applications. It also includes characterization measurements of the developed detection systems. The second volume on Medical Imaging, Industrial Testing and Security Applications is devoted to more specific applications of detection systems in medical imaging, industrial testing and security applications. However, there is an unavoidable certain overlap in topics between both volumes. With its combined coverage of new materials and innovative new system approaches, as well as a succinct overview of recent developments, this two volumes set is an invaluable tool for any engineer, professional, or student working in electronics or an associated field.

Physics, Devices, and Technology Society of Photo Optical

Gallium Nitride (GaN) based high electron mobility transistors (HEMTs) outperform Gallium Arsenide (GaAs) and silicon based transistors for radio frequency (RF) applications in terms of output power and efficiency due to its large bandgap (~3.4 eV@300 K) and high carrier mobility property (1500 - 2300 cm^2/(V-s)). These advantages have made GaN technology a promising candidate for future high-power microwave and potential millimeter-wave applications. Current GaN HEMT models used by the industry, such as Angelov Model, EEHEMT Model and DynaFET (Dynamic FET) model, are empirical or semi-empirical. Lacking the physical description of the device operations, these empirical models are not directly scalable. Circuit design that uses the models requires multiple iterations between the device and circuit levels, becoming a lengthy and expensive process. Conversely existing physics based models, such as surface potential model, are computationally intensive and thus impractical for full scale circuit simulation and optimization. To enable efficient GaN-based RF circuit design, computationally efficient physics based compact models are required. In this thesis, a physics based Virtual Source (VS) compact model is developed for GaN HEMTs targeting RF applications. While the intrinsic current and charge model are developed based on the Virtual Source model originally proposed by MIT researchers, the gate current model and parasitic element network are proposed based on our applications with a new efficient parameter extraction flow. Both direct current (DC) of drain and gate currents and RF measurements are conducted for model parameter extractions. The new flow first extracts device parasitic resistive values based on the DC measurement of gate current. Then parameters related with the intrinsic region are determined based on the transport characteristics in the subthreshold and above threshold regimes. Finally, the parasitic resistance, capacitance and inductance values are optimized based on the S-parameter measurement. This new extraction flow provides reliable and accurate extraction

for parasitic element values while achieving reasonable resolutions holistically with both DC and RF characteristics. The model is validated against measurement data in terms of drain current, gate current and scattering parameter (S-parameter). This model provides simple yet clear physical description for GaN HEMTs with only a short list of model parameters compared with other empirical or physics based models. It can be easily integrated in circuit simulators for RF circuit design.

Emerging Trends in Terahertz Solid-State Physics and Devices CRC Press

Addresses a Growing Need for High-Power and High-Frequency Transistors Gallium Nitride (GaN): Physics, Devices, and Technology offers a balanced perspective on the state of the art in gallium nitride technology. A semiconductor commonly used in bright light-emitting diodes, GaN can serve as a great alternative to existing devices used in microelectronics. It has a wide band gap and high electron mobility that gives it special properties for applications in optoelectronic, high-power, and high-frequency devices, and because of its high off-state breakdown strength combined with excellent on-state channel conductivity, GaN is an ideal candidate for switching power transistors. Explores Recent Progress in High-Frequency GaN Technology Written by a panel of academic and industry experts from around the globe, this book reviews the advantages of GaN-based material systems suitable for high-frequency, high-power applications. It provides an overview of the semiconductor environment, outlines the fundamental device physics of GaN, and describes GaN materials and device structures that are needed for the next stage of microelectronics and optoelectronics. The book details the development of radio frequency (RF) semiconductor devices and circuits, considers the current challenges that the industry now faces, and examines future trends. In addition, the authors: Propose a design in which multiple LED stacks can be connected in a series using interband tunnel junction (TJ) interconnects Examine GaN technology while in its early stages of high-volume deployment in commercial and military products Consider the potential use of both sunlight and hydrogen as promising and prominent energy sources for this technology Introduce two unique methods, PEC oxidation and vapor cooling condensation methods, for the deposition of high-quality oxide layers A single-source reference for students and professionals, Gallium Nitride (GaN): Physics, Devices, and Technology provides an overall assessment of the semiconductor environment, discusses the potential use of GaN-based technology for RF semiconductor devices, and highlights the current and emerging applications of GaN.

GaN-based Materials and Devices Springer Science & Business Media

An increasing number of technologies are being used to detect minute quantities of biomolecules and cells. However, it can be difficult to determine which technologies show the most promise for high-sensitivity and low-limit detection in different applications. Microfluidics and Nanotechnology: Biosensing to the Single Molecule Limit details proven approaches for the detection of single cells and even single molecules—approaches employed by the world’s foremost microfluidics and nanotechnology laboratories. While similar books concentrate only on microfluidics or nanotechnology, this book focuses on the combination of soft materials (elastomers and other polymers) with hard materials (semiconductors, metals, and glass) to form integrated detection systems for biological and chemical targets. It explores physical and chemical—as well as contact and noncontact—detection methods, using case studies to demonstrate system capabilities. Presenting a snapshot of the current state of the art, the text: Explains the theory behind different detection techniques, from mechanical resonators for detecting cell density to fiber-optic methods for detecting DNA hybridization, and beyond Examines microfluidic advances, including droplet microfluidics, digital microfluidics for manipulating droplets on the microscale, and more Highlights an array of technologies to allow for a comparison of the fundamental advantages and challenges of each, as well as an appreciation of the power of leveraging scalability and integration to achieve sensitivity at low cost Microfluidics and Nanotechnology: Biosensing to the Single Molecule Limit not only serves as a quick reference for the latest achievements in biochemical detection at the single-cell and single-molecule levels, but also provides researchers with inspiration for further innovation and expansion of the field.

Technology and Applications CRC Press

This book discusses the important technological aspects of the growth of GaN single crystals by HVPE, MOCVD, ammonothermal and flux methods for the purpose of free-standing GaN wafer production.

Modeling Gallium-nitride Based High Electron Mobility Transistors John Wiley & Sons

This book presents the first comprehensive overview of the properties and fabrication methods of GaN-based power transistors, with contributions from the most active research groups in the field. It describes how gallium nitride has emerged as an excellent material for the fabrication of power transistors; thanks to the high energy gap, high breakdown field, and saturation velocity of GaN, these devices can reach breakdown voltages beyond the kV range, and very high switching frequencies, thus being suitable for application in power conversion systems. Based on GaN, switching-mode power converters with efficiency in excess of 99 % have been already demonstrated, thus clearing the way for massive adoption of GaN transistors in the power conversion market. This is expected to have important advantages at both the environmental and economic level, since power conversion losses account for 10 % of global electricity consumption. The first part of the book describes the properties and advantages of gallium nitride compared to conventional semiconductor materials. The second part of the book describes the techniques used for device fabrication, and the methods for GaN-on-Silicon mass production. Specific attention is paid to the three most advanced device structures: lateral transistors, vertical power devices, and nanowire-based HEMTs. Other relevant topics covered by the book are the strategies for normally-off operation, and the problems related to device reliability. The last chapter reviews the switching characteristics of GaN HEMTs based on a systems level approach. This book is a unique reference for people working in the materials, device and power electronics fields; it provides interdisciplinary information on material growth, device fabrication, reliability issues and circuit-level switching investigation.

- Are You There God? It's Me, Margaret.
- Happy Place By Emily Henry
- Leigh Howard And The Ghosts Of Simmons-pierce Manor
- The Inmate: A Gripping Psychological Thriller By Freida Mcfadden
- The Summer Of Broken Rules
- The Five-star Weekend
- Rich Dad Poor Dad: What The Rich Teach Their Kids About Money That The Poor And Middle Class Do Not!
- Baking Yesteryear: The Best Recipes From The 1900s To The 1980s By B. Dylan Hollis
- A Court Of Mist And Fury (a Court Of Thorns And Roses, 2)
- Iron Flame (the Empyrean, 2)