Determination Of Bandgap Narrowing And Parasitic Energy

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CatalogSilicon-germanium Heterojunction Bipolar Transistors
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Hall Effect Devices, Second Edition
Proceedings of the Symposium on Low Temperature Electronics
CatalogSilicon Heterostructure Handbook
Properties of Crystalline Silicon
Spontaneous Ordering in Semiconductor Alloys
Physics of Semiconductor Devices
Research Abstracts
Energy Research Abstracts
Strained Silicon Heterostructures
1998 European Solid State Device Research Conference Proceedings (Essderc)
NBS Special Publication
Numerical Model and Analysis of Transistors with Polysilicon Emitters
Journal of Energy
ERDA Energy Research Abstracts
Semiconductor Power Devices
Semiconductors and Semimetals
Technical Digest, IEDM
New Perspectives on Surface Passivation: Understanding the Si-Al2O3 Interface
Department of Commerce Technology Programs
Fundamentals of Power Semiconductor Devices
Silicon Solid State Devices and Radiation Detection
Intersubband Infrared Photodetectors
Compound Semiconductors
1994, Proceedings of the Twenty-First INT Symposium on Compound Semiconductors held in San Diego, California, 18-22 September 1994
Microelectronics Failure Analysis
The semiconductor industry is a fundamental building block of the new economy, there is no area of modern life untouched by the progress of nanoelectronics. The electronic chip is becoming an ever-increasing portion of system solutions, starting initially from less than 5% in the 1970 microcomputer era, to more than 60% of the final cost of a mobile telephone, 50% of the price of a personal computer (representing nearly 100% of the functionalities) and 30% of the price of a monitor in the early 2000's. Interest in utilizing the (sub-)mm-wave frequency spectrum for commercial and research applications has also been steadily increasing. Such applications, which constitute a diverse but sizeable future market, span a large variety of areas such as health, material science, mass transit, industrial automation, communications, and space exploration. Silicon-Germanium Heterojunction Bipolar Transistors for mm-Wave Systems Technology, Modeling and Circuit Applications provides an overview of results of the DOTSEVEN EU research project, and as such focusses on key material developments for mm-Wave Device Technology. It starts with the motivation at the beginning of the project and a summary of its major achievements. The subsequent chapters provide a detailed description of the obtained research results in the various areas of process development, device simulation, compact device modeling, experimental characterization, reliability, (sub-)mm-wave circuit design and systems. This informative, new resource presents the first comprehensive treatment of silicon-germanium heterojunction bipolar transistors (SiGe HBTs). It offers you a complete, from-the-ground-up understanding of SiGe HBT devices and technology, from a very broad perspective. The book covers motivation, history, materials, fabrication, device physics, operational principles, and circuit-level properties associated with this new cutting-edge semiconductor device technology. Including over 400 equations and more than 300 illustrations, this hands-on reference shows you in clear and concise language how to design, simulate, fabricate, and measure a SiGe HBT. "The fourth edition of this book has been widely revised. It includes additional chapters and some sections are complemented with either new ones or an extension of their content. In this latest edition a complete treatment of the physics and properties of semiconductors is presented, covering transport phenomena in semiconductors, scattering mechanisms, radiation effects and displacement...
damages. Furthermore, this edition presents a comprehensive treatment of the Coulomb scattering on screened nuclear potentials resulting from electrons, protons, light- and heavy-ions -- ranging from (very) low up to ultra-relativistic kinetic energies -- and allowing one to derive the corresponding NIEL (non-ionizing energy-loss) doses deposited in any material. The contents are organized into two parts: Chapters 1 to 7 cover Particle Interactions and Displacement Damage while the remaining chapters focus on Radiation Environments and Particle Detection. This book can serve as reference for graduate students and final-year undergraduates and also as supplement for courses in particle, astroparticle, space physics and instrumentation. A section of the book is directed toward courses in medical physics. Researchers in experimental particle physics at low, medium, and high energy who are dealing with instrumentation will also find the book useful."

--Includes bibliographical references and index.

Device and Circuit Cryogenic Operation for Low Temperature Electronics is a first in reviewing the performance and physical mechanisms of advanced devices and circuits at cryogenic temperatures that can be used for many applications. The first two chapters cover bulk silicon and SOI MOSFETs. The electronic transport in the inversion layer, the influence of impurity freeze-out, the special electrical properties of SOI structures, the device reliability and the interest of a low temperature operation for the ultimate integration of silicon down to nanometer dimensions are described. The next two chapters deal with Silicon-Germanium and III-V Heterojunction Bipolar Transistors, as well as III-V High Electron Mobility Transistors (HEMT). The basic physics of the SiGe HBT and its unique cryogenic capabilities, the optimization of such bipolar devices, and the performance of SiGe HBT BiCMOS technology at liquid nitrogen temperature are examined. The physical effects in III-V semiconductors at low temperature, the HEMT and HBT static, high frequency and noise properties, and the comparison of various cooled III-V devices are also addressed. The next chapter treats quantum effect devices made of silicon materials. The major quantum effects at low temperature, quantum wires, quantum dots as well as single electron devices and applications are investigated. The last chapter overviews the performances of cryogenic circuits and their applications. The low temperature properties and performance of inverters, multipliers, adders, operational amplifiers, memories, microprocessors, imaging devices, circuits and systems, sensors and read-out circuits are analyzed. Device and Circuit Cryogenic Operation for Low Temperature Electronics is useful for researchers, engineers, Ph.D. and M.S. students working in the field of advanced electron devices and circuits, new semiconductor materials, and low temperature electronics and physics. This book addresses the fundamental principles of interaction between radiation and matter, the principles of working and the operation of particle detectors based on silicon solid state devices. It covers a broad scope in the fields of application of radiation detectors based on silicon solid state devices from low to high energy physics experiments, including in outer space and in the medical environment. This book also covers state-of-the-art detection techniques in the use of radiation detectors based on silicon solid state devices and their readout electronics, including the latest developments on pixelated silicon radiation detector and their application. The content and coverage of the book benefit from the extensive experience of the two authors who have made significant contributions as researchers as well as in teaching physics students in various universities. Contents: Interactions of Charged Particles and Photons with Matter; Physics and Properties of Silicon Semiconductors; Transport Phenomena in Semiconductors; Properties of the p-n Junctions of Silicon Radiation Devices; Charged Particle Detectors; Photon Detectors and Dosimetric Devices; Examples of Applications of Silicon Devices in Physics and Medical Physics; Appendix A: General Properties and Physical Constants; Readership: Graduate students, researchers and professionals involved in space research and medical researchers using silicon based radiation detectors. Keywords: Interactions of Charged Particles and Photons with Matter; Physics and Properties of Semiconductors; Charge Transport in Semiconductors; Application of Silicon in Charged Particle Detectors; Microstrip; Pixel Silicon Detectors; Photon Detectors and Dosimetric Devices; Application of Silicon in Physics Experiments (Including Space) and Medical Physics. Key Features: A detailed presentation of the fundamental principles of
interaction between radiation and matter, combined with the principles of working and operation of particle detectors based on silicon solid state devices. Complete coverage of applications in physics experiments from low to high energy, space physics and medical fields, including imaging applications. Detailed presentation and explanations for all topics treated in the book benefitting from the large experience of the two authors. Several topics are clearly unique at this time such as the section on pixel detectors. 

Fundamentals of Power Semiconductor Devices provides an in-depth treatment of the physics of operation of power semiconductor devices that are commonly used by the power electronics industry. Analytical models for explaining the operation of all power semiconductor devices are shown. The treatment here focuses on silicon devices but includes the unique attributes and design requirements for emerging silicon carbide devices. The book will appeal to practicing engineers in the power semiconductor device community. The preparation of silicon germanium microstructures, their physical, chemical and electrical characterization, and their device processing and application are reviewed in this book. Special emphasis is given to ultrathin Si/Ge superlattices. Topics covered include: Wafer preparation and epitaxial growth; surface effects driven phenomena, such as clustering, segregation, 'surfactants'; Analysis, both in situ and ex situ; Strain adjustment methods; High quality buffers; Modification of material properties by quantum wells and superlattices; Devices: Novel concepts, processing, modelling, demonstrators. The questions highlighted, particularly those articles comparing related or competing activities, will provide a wealth of knowledge for all those interested in the future avenues of theory and applications in this field.

The book addresses the problem of passivation at the surface of crystalline silicon solar cells. More specifically, it reports on a high-throughput, industrially compatible deposition method for Al2O3, enabling its application to commercial solar cells. One of the main focus is on the analysis of the physics of Al2O3 as a passivating dielectric for silicon surfaces. This is accomplished through a comprehensive study, which moves from the particular, the case of aluminium oxide on silicon, to the general, the physics of surface recombination, and is able to connect theory with practice, highlighting relevant commercial applications.

Silicon Devices and Process Integration covers state-of-the-art silicon devices, their characteristics, and their interactions with process parameters. It serves as a comprehensive guide which addresses both the theoretical and practical aspects of modern silicon devices and the relationship between their electrical properties and processing conditions. The book is compiled from the author’s industrial and academic lecture notes and reflects years of experience in the development of silicon devices. Features include: A review of silicon properties which provides a foundation for understanding the device properties discussion, including mobility-enhancement by straining silicon; State-of-the-art technologies on high-K gate dielectrics, low-K dielectrics, Cu interconnects, and SiGe BiCMOS; CMOS-only applications, such as subthreshold current and parasitic latch-up; Advanced Enabling processes and process integration. This book is written for engineers and scientists in semiconductor research, development and manufacturing. The problems at the end of each chapter and the numerous charts, figures and tables also make it appropriate for use as a text in graduate and advanced undergraduate courses in electrical engineering and materials science.

Semiconductor power devices are the heart of power electronics. They determine the performance of power converters and allow topologies with high efficiency. Semiconductor properties, pn-junctions and the physical phenomena for understanding power devices are discussed in depth. Working principles of state-of-the-art power diodes, thyristors, MOSFETs and IGBTs are explained in detail, as well as key aspects of semiconductor device production technology. In practice, not only the semiconductor, but also the thermal and mechanical properties of packaging and interconnection technologies are essential to predict device behavior in circuits. Wear and aging mechanisms are identified and reliability analyses principles are developed. Unique information on destructive mechanisms, including typical failure pictures, allows assessment of the ruggedness of power devices. Also parasitic effects, such as device induced electromagnetic interference problems, are addressed. The book concludes with modern power electronic system
integration techniques and trends. This is the second edition of a very popular 1991 book describing the physics and technology of semiconductor electronic devices exploiting the Hall effect. These are magnetic field sensitive devices such as Hall elements, magnetoresistors, and magnetotransistors. Hall effect devices are commonly used as magnetic field sensors and as means for characterizing semiconductors. The book provides a clear analysis of the relationship between the basic physical phenomena in solids, the appropriate materials characteristics, and the characteristics of Hall effect devices. Particular emphasis is placed on important developments inspired and made possible by recent advances in microelectronics. A special feature of the book is its broad scope. The book provides physical basics of Hall effect devices, clear guidelines for the design of practical Hall elements, detailed descriptions of the best interface electronic circuits, examples of the most successful industrial products in the field, and interesting examples of their applications. In recent years, the development of powerful epitaxial growth techniques such as molecular beam epitaxy (MBE), ultra-high vacuum chemical vapour deposition (UHVCVD) and other low temperature epitaxy techniques have given rise to a new area of research of bandgap engineering in silicon based materials. This development has paved the way for heterojunction bipolar and field effect transistors, as well as for novel quantum devices. This title provides a comprehensive introduction to silicon heterostructures, including growth and characterization of materials and descriptions of new heterostructure devices, making it a useful reference for postgraduate students, researchers and scientists. A unique and well-organised reference, this book provides illuminating data, distinctive insight and expert guidance on silicon properties. Advances in Electronics and Electron Physics A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in Scientific and technical aerospace reports (STAR) and International aerospace abstracts (IAA). As part of the effort to increase the contribution of solar cells (photovoltaics) to our energy mix, this book addresses three main areas: making existing technology cheaper, promoting advanced technologies based on new architectural designs, and developing new materials to serve as light absorbers. Leading scientists throughout the world create a fundamental platform for knowledge sharing that combines the physics, materials, and device architectures of high-efficiency solar cells. While providing a comprehensive introduction to the field, the book highlights directions for further research, and is intended to stimulate readers' interest in the development of novel materials and technologies for solar energy applications. Infrared technologies are very important for a wide range of military, scientific and commercial applications. Devices and systems based on semiconductor heterostructure and quantum well and quantum dot structures open up a new era in infrared technologies. This book deals with various topics related to the latest achievements in the development of intersubband infrared photodetectors, reviewed by top experts in the field. It covers physical aspects of the operation of the devices as well as details of their design in different applications. The papers included in the book will be useful for researchers and engineers interested in the physics of optoelectronic devices as well as their practical design and applications. Contents: Quantum Well Infrared Photoconductors in Infrared Detectors Technology (A Rogalski) Imaging Performance of Advanced QWIP Focal Plane Arrays (A Goldberg) GaAs/AlGaAs Multi-Quantum-Well-Based Infrared Focal Plane Arrays for Infrared Imaging Applications (S D Gunapala & S V Bandara) Corrugated Quantum Well Infrared Photodetectors and Arrays (K K Choi) Multi-Color, Broadband Quantum Well Infrared Photodetectors for Mid-, Long-, and Very Long-Wavelength Infrared Applications (S S Li) QWIPs Designed for High Absorption and High Operating Temperature (H C Liu et al.) Quantum Structures for Far-Infrared Detection (A G U Perera & S G Matsik) Germanium Self-Assembled Quantum Dots in Silicon for Mid-Infrared Photodetectors (A I Yakimov & A V Dvurechenskii) QWIP–LED Pixelless Thermal Imaging Device (H C Liu et al.) Electrodynamic Response of Multiple Quantum Wells. The Intersubband Resonance Region (M Zaluzny & W Zietkowski) Readership: Graduate students, researchers and practitioners in electrical & electronic engineering, optoelectronics and physics. Keywords: Infrared Radiation; Photodetector; Quantum
The phenomenon of spontaneous ordering in semiconductor alloys, which can be categorized as a self-organized process, is observed to occur spontaneously during epitaxial growth of certain ternary alloy semiconductors and results in a modification of their structural, electronic, and optical properties. There has been a great deal of interest in learning how to control this phenomenon so that it may be used for tailoring desirable electronic and optical properties. There has been even greater interest in exploiting the phenomenon for its unique ability in providing an experimental environment of controlled alloy statistical fluctuations. As such, it impacts areas of semiconductor science and technology related to the materials science of epitaxial growth, statistical mechanics, and electronic structure of alloys and electronic and photonic devices. During the past two decades, significant progress has been made toward understanding the mechanisms that drive this phenomenon and the changes in physical properties that result from it. A variety of experimental techniques have been used to probe the phenomenon and several attempts made at providing theoretical models both for the ordering mechanisms as well as electronic structure changes. The various chapters of this book provide a detailed account of these efforts during the past decade. The first chapter provides an elaborate account of the phenomenon, with an excellent perspective of the structural and electronic modifications it induces. Compound Semiconductors 1994 provides a comprehensive overview of research and applications of gallium arsenide, indium phosphide, silicon carbide, and other compound semiconducting materials. Contributed by leading experts, the book discusses growth, characterization, processing techniques, device applications, high-power, high-temperature semiconductor devices, visible emitters and optoelectronic integrated circuits (OEICs), heterojunction transistors, nanoelectronics, and nanophotonics, and simulation and modeling. The book is an essential reference for researchers working on the fabrication of semiconductors, characterization of materials, and their applications for devices, such as lasers, photodiodes, sensors, and transistors, particularly in the high-speed telecommunications industries. An extraordinary combination of material science, manufacturing processes, and innovative thinking spurred the development of SiGe heterojunction devices that offer a wide array of functions, unprecedented levels of performance, and low manufacturing costs. While there are many books on specific aspects of Si heterostructures, the Silicon Heterostructure Handbook: Materials, Fabrication, Devices, Circuits, and Applications of SiGe and Si Strained-Layer Epitaxy is the first book to bring all aspects together in a single source. Featuring broad, comprehensive, and in-depth discussion, this handbook distills the current state of the field in areas ranging from materials to fabrication, devices, CAD, circuits, and applications. The editor includes "snapshots" of the industrial state-of-the-art for devices and circuits, presenting a novel perspective for comparing the present status with future directions in the field. With each chapter contributed by expert authors from leading industrial and research institutions worldwide, the book is unequalled not only in breadth of scope, but also in depth of coverage, timeliness of results, and authority of references. It also includes a foreword by Dr. Bernard S. Meyerson, a pioneer in SiGe technology. Containing nearly 1000 figures along with valuable appendices, the Silicon Heterostructure Handbook authoritatively surveys materials, fabrication, device physics, transistor optimization, optoelectronics components, measurement, compact modeling, circuit design, and device simulation. The topic of this monograph is the physical modeling of heterostructure devices. A detailed discussion of physical models and parameters for compound semiconductors is presented including the relevant aspects of modern submicron heterostructure devices. More than 25 simulation examples for different types of Si(Ge)-based, GaAs-based, InP-based, and GaN-based heterostructure bipolar transistors (HBTs) and high electron mobility transistors (HEMTs) are given in comparison with experimental data from state-of-the-art devices. Semiconductors and Semimetals For newcomers cast into the waters to sink or swim as well as seasoned professionals who want authoritative guidance desk-side, this hefty volume updates the previous (1999) edition. It contains the work of expert contributors who rallied to the job in response to a committee's call for help (the committee was assigned to the update
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