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The Physics of Submicron Semiconductor Devices Numerical Simulation of Submicron Semiconductor Devices Physics of Submicron Devices Sub-Micron Semiconductor Devices The Physics of Submicron Structures The Physics of Submicron Lithography Physics and Technology of Submicron Structures Characterization Methods for Submicron MOSFETs Low Power Design in Deep Submicron Electronics Two Dimensional Monte Carlo Simulations of Submicron Unipolar and Bipolar Compound Semiconductor Devices with Ballistic Injection Cathodes Quantum Transport in Semiconductor Submicron Structures Fundamentals of Semiconductor Physics and Devices Silicon Devices and Process Integration Fundamentals Of Semiconductor Physics And Devices Silicon Processing for the VLSI Era Sub-Micron Semiconductor Devices Quantum Transport in Submicron Devices Physics of Submicron Devices Submicron Silicon Field Effect Transistors for High Speed Digital Integrated Circuits The Physics and Technology of Submicron MOS Devices Progress in Solid State Electronics Research Modeling Electron Transport and Degradation Mechanisms in Semiconductor Submicron Devices Submicron Integrated Circuits Solid State Electronics Research Advances Modeling of Chemical Vapor Deposition of Tungsten Films Semiconductor Equations Submicron Research Hierarchical Device Simulation Chip Design for Submicron VLSI VLSI Electronics Numerical Simulation of Semiconductor Structures Matching Properties of Deep Sub-Micron MOS Transistors Spin Electronics Electrochemical Processing in ULSI Fabrication and Semiconductor/metal Deposition II Introduction To Semiconductor Device Modelling Simulation of Semiconductor Devices and Processes Mosfet Modeling for VLSI Simulation Compound Semiconductor Electronics, The Age Of Maturity Low-dimensional Semiconductors Hot Carriers in Semiconductor

Nanostructures

Modeling of Chemical Vapor Deposition of Tungsten Films May 22 2022 Semiconductor equipment modeling has in recent years become a field of great interest, because it offers the potential to support development and optimization of manufacturing equipment and hence reduce the cost and improve the quality of the reactors. This book is the result of two parallel lines of research dealing with the same subject - Modeling of Tungsten CVD processes -, which were per formed independently under very different boundary conditions. On the one side, Chris Kleijn, working in an academic research environment, was able to go deep enough into the subject to laya solid foundation and prove the validity of all the assumptions made in his work. On the other side, Christoph Werner, working in the context of an industrial research lab, was able to closely interact with manufacturing and development engineers in a modern submicron semiconductor processing line. Because of these different approaches, the informal collaboration during the course of the projects proved to be extremely helpful to both sides, even though - or perhaps because - different computer codes, different CVD reactors and also slightly different models were used. In spite of the inconsistencies which might arise from this double approach, we feel that the presentation of both sets of results in one book will be very useful for people working in similar projects.

Spin Electronics Sep 13 2021 The history of scientific research and technological development is replete with examples of breakthroughs that have advanced the frontiers of knowledge, but seldom does it record events that constitute paradigm shifts in broad areas of intellectual pursuit. One notable exception, however, is that of spin electronics (also called spintronics, magnetoelectronics or magnetronics), wherein information is carried by electron spin in addition to, or in place of, electron charge. It is now well established in scientific and engineering communities that Moore's Law, having been an excellent predictor of integrated circuit density and computer performance since the 1970s, now faces great challenges as the scale of electronic devices has been reduced to the level where quantum effects become significant factors in device operation. Electron spin is

one such effect that offers the opportunity to continue the gains predicted by Moore's Law, by taking advantage of the confluence of magnetics and semiconductor electronics in the newly emerging discipline of spin electronics. From a fundamental viewpoine, spin-polarization transport in a material occurs when there is an imbalance of spin populations at the Fermi energy. In ferromagnetic metals this imbalance results from a shift in the energy states available to spin-up and spin-down electrons. In practical applications, a ferromagnetic metal may be used as a source of spin-polarized electronics to be injected into a semiconductor, a superconductor or a normal metal, or to tunnel through an insulating barrier.

Quantum Transport in Semiconductor Submicron Structures Aug 05 2023 The articles in this book have been selected from the lectures of a NATO Advanced Study Institute held at Bad Lauterberg (Germany) in August 1995. Internationally well-known researchers in the field of mesoscopic quantum physics provide insight into the fundamental physics underlying the mesoscopic transport phenomena in structured semiconductor inversion layers. In addition, some of the most recent achievements are reported in contributed papers. The aim of the volume is not to give an overview over the field. Instead, emphasis is on interaction and correlation phenomena that turn out to be of increasing importance for the understanding of the phenomena in the quantum Hall regime, and in the transport through quantum dots. The present status of the quantum Hall experiments and theory is reviewed. As a "key example" for non-Fermi liquid behavior the Luttinger liquid is introduced, including some of the most recent developments. It is not only of importance for the fractional quantum Hall effect, but also for the understanding of transport in quantum wires. Furthermore, the chaotic and the correlation aspects of the transport in quantum dot systems are described. The status of the experimental work in the area of persistent currents in semiconductor systems is outlined. The construction of one of the first single-electron transistors is reported. The theoretical approach to mesoscopic transport, presently a most active area, is treated, and some aspects of time-dependent transport phenomena are also discussed.

Characterization Methods for Submicron MOSFETs Nov 08 2023 It is

true that the Metal-Oxide-Semiconductor Field-Eeffect Transistor (MOSFET) is a key component in modern microelectronics. It is also true that there is a lack of comprehensive books on MOSFET characterization in gen eral. However there is more than that as to the motivation and reasons behind writing this book. During the last decade, device physicists, researchers and engineers have been continuously faced with new elements which made the task of MOSFET characterization more and more crucial as well as difficult. The progressive miniaturization of devices has caused several phenomena to emerge and modify the performance of scaled-down MOSFETs. Localized degradation induced by hot carrier injection and Random Telegraph Signal (RTS) noise generated by individual traps are examples of these phenomena. Therefore, it was inevitable to develop new models and new characterization methods or at least adapt the existing ones to cope with the special nature of these new phenomena. The need for more deep and extensive characterization of MOSFET param eters has further increased as the applications of this device have gained ground in many new fields in which its performance has become more and more sensi tive to the properties of its Si - Si0 interface. MOS transistors have crossed 2 the borders of high speed electronics where they operate at GHz frequencies. Moreover, MOSFETs are now widely employed in the subthreshold regime in neural circuits and biomedical applications.

Sub-Micron Semiconductor Devices Feb 28 2023 This comprehensive reference text discusses novel semiconductor devices, including nanostructure field-effect transistors, photodiodes, high electron mobility transistors, and oxide-based devices. The text covers submicron semiconductor devices, device modeling, novel materials for devices, novel semiconductor devices, optimization techniques, and their application in detail. It covers such important topics as negative capacitance devices, surface-plasmon resonance devices, Fermi-level pinning, external stimuli-based optimization techniques, optoelectronic devices, and architecture-based optimization techniques. The book: Covers novel semiconductor devices with submicron dimensions Discusses comprehensive device optimization techniques Examines conceptualization and modeling of semiconductor devices Covers circuit and sensor-based application

of the novel devices Discusses novel materials for next-generation devices This text will be useful for graduate students and professionals in fields including electrical engineering, electronics and communication engineering, materials science, and nanoscience.

***Two Dimensional Monte Carlo Simulations of Submicron Unipolar and Bipolar Compound Semiconductor Devices with Ballistic Injection Cathodes** Sep 06 2023*

Matching Properties of Deep Sub-Micron MOS Transistors Oct 15 2021 Matching Properties of Deep Sub-Micron MOS Transistors examines this interesting phenomenon. Microscopic fluctuations cause stochastic parameter fluctuations that affect the accuracy of the MOSFET. For analog circuits this determines the trade-off between speed, power, accuracy and yield. Furthermore, due to the down-scaling of device dimensions, transistor mismatch has an increasing impact on digital circuits. The matching properties of MOSFETs are studied at several levels of abstraction: A simple and physics-based model is presented that accurately describes the mismatch in the drain current. The model is illustrated by dimensioning the unit current cell of a current-steering D/A converter. The most commonly used methods to extract the matching properties of a technology are bench-marked with respect to model accuracy, measurement accuracy and speed, and physical contents of the extracted parameters. The physical origins of microscopic fluctuations and how they affect MOSFET operation are investigated. This leads to a refinement of the generally applied 1/area law. In addition, the analysis of simple transistor models highlights the physical mechanisms that dominate the fluctuations in the drain current and transconductance. The impact of process parameters on the matching properties is discussed. The impact of gate line-edge roughness is investigated, which is considered to be one of the roadblocks to the further down-scaling of the MOS transistor. Matching Properties of Deep Sub-Micron MOS Transistors is aimed at device physicists, characterization engineers, technology designers, circuit designers, or anybody else interested in the stochastic properties of the MOSFET.

Physics of Submicron Devices Dec 29 2022

Fundamentals of Semiconductor Physics and Devices Jul 04 2023

This book is an introduction to the principles of semiconductor physics, linking its scientific aspects with practical applications. It is addressed to both readers who wish to learn semiconductor physics and those seeking to understand semiconductor devices. It is particularly well suited for those who want to do both.Intended as a teaching vehicle, the book is written in an expository manner aimed at conveying a deep and coherent understanding of the field. It provides clear and complete derivations of the basic concepts of modern semiconductor physics. The mathematical arguments and physical interpretations are well balanced: they are presented in a measure designed to ensure the integrity of the delivery of the subject matter in a fully comprehensible form. Experimental procedures and measured data are included as well. The reader is generally not expected to have background in quantum mechanics and solid state physics beyond the most elementary level. Nonetheless, the presentation of this book is planned to bring the student to the point of research/design capability as a scientist or engineer. Moreover, it is sufficiently well endowed with detailed knowledge of the field, including recent developments bearing on submicron semiconductor structures, that the book also constitutes a valuable reference resource.In Chapter 1, basic features of the atomic structures, chemical nature and the macroscopic properties of semiconductors are discussed. The band structure of ideal semiconductor crystals is treated in Chapter 2, together with the underlying one-electron picture and other fundamental concepts. Chapter 2 also provides the requisite background of the tight binding method and the k.p-method, which are later used extensively. The electron states of shallow and deep centers, clean semiconductor surfaces, quantum wells and superlattices, as well as the effects of external electric and magnetic fields, are treated in Chapter 3. The one- or multi-band effective mass theory is used wherever this method is applicable. A summary of group theory for application in semiconductor physics is given in an Appendix. Chapter 4 deals with the statistical distribution of charge carriers over the band and localized states in thermodynamic equilibrium. Non-equilibrium processes in semiconductors are treated in Chapter 5. The physics of semiconductor junctions (pn-, hetero-, metal-, and insulator-) is developed in Chapter 6 under conditions of

thermodynamic equilibrium, and in Chapter 7 under non-equilibrium conditions. On this basis, the most important electronic and opto-electronic semiconductor devices are treated, among them uni- and bi-polar transistors, photodetectors, solar cells, and injection lasers. A summary of group theory for applications in semiconductors is given in an Appendix.

Hot Carriers in Semiconductor Nanostructures Feb 04 2021 Nonequilibrium hot charge carriers play a crucial role in the physics and technology of semiconductor nanostructure devices. This book, one of the first on the topic, discusses fundamental aspects of hot carriers in quasi-two-dimensional systems and the impact of these carriers on semiconductor devices. The work will provide scientists and device engineers with an authoritative review of the most exciting recent developments in this rapidly moving field. It should be read by all those who wish to learn the fundamentals of contemporary ultra-small, ultra-fast semiconductor devices. Topics covered include Reduced dimensionality and quantum wells Carrier-phonon interactions and hot phonons Femtosecond optical studies of hot carrier Ballistic transport Submicron and resonant tunneling devices

The Physics of Submicron Structures Feb 11 2024 Research on electronic transport in ultra small dimensions has been highly stimulated by the sensational developments in silicon technology and very large scale integration. The papers in this volume, however, have been influenced to no lesser extent by the advent of molecular beam epitaxy and metal/organic chemical vapor deposition which has made possible the control of semiconductor boundaries on a quantum level. This new control of boundary condi tions in ultra small electronic research is the mathematical reason for a whole set of innovative ideas. For the first time in the history of semiconductors, it is possible to design device functions from physical considerations involving ~ngstom scale dimensions. At the time the meeting was held, July 1982, it was one of the first strong signals of the powerful developments in this area. During the meeting, important questions have been answered concerning ballistic transport, Monte Carlo simulations of high field transport and other developments pertinent to new device concepts and the understanding of small devices from physics to function. The committee members want to express their

deep appreciation to the speakers who have made the meeting a success. The USER pro ject of DOD has been a vital stimulous and thanks go to the Army Research Office and the Office of Naval Research for financial sup port. Urbana, January 1984 K. Hess, Conference Chairman J. R. Brews L. R. Cooper, Ex Officio D. K. Ferry H. L. Grubin G. J. Iafrate M. I. Nathan A. F.

Chip Design for Submicron VLSI Jan 18 2022 This book teaches the principles of physical design, layout, and simulation of CMOS integrated circuits. It is written around a very powerful CAD program called Microwind that is available on the accompanying CD-ROM. Featuring a friendly interface, Microwind is both educational and useful for designing CMOS chips.

Submicron Research Mar 20 2022

Physics of Submicron Devices Apr 13 2024 The purposes of this book are many. First, we must point out that it is not a device book, as a proper treatment of the range of important devices would require a much larger volume even without treating the important physics for submicron devices. Rather, the book is written principally to pull together and present in a single place, and in a (hopefully) uniform treatment, much of the understanding on relevant physics for submicron devices. Indeed, the understand ing that we are trying to convey through this work has existed in the literature for quite some time, but has not been brought to the full attention of those whose business is the making of submicron devices. It should be remarked that much of the important physics that is discussed here may not be found readily in devices at the 1.0-JLm level, but will be found to be dominant at the O.I-JLm level. The range between these two is rapidly being covered as technology moves from the 256K RAM to the 16M RAM chips.

Submicron Silicon Field Effect Transistors for High Speed Digital Integrated Circuits Nov 27 2022

Low Power Design in Deep Submicron Electronics Oct 07 2023 Low Power Design in Deep Submicron Electronics deals with the different aspects of low power design for deep submicron electronics at all levels of abstraction from system level to circuit level and technology. Its objective is to guide industrial and academic engineers and researchers in the selection of methods, technologies and tools and to

provide a baseline for further developments. Furthermore the book has been written to serve as a textbook for postgraduate student courses. In order to achieve both goals, it is structured into different chapters each of which addresses a different phase of the design, a particular level of abstraction, a unique design style or technology. These design-related chapters are amended by motivations in Chapter 2, which presents visions both of future low power applications and technology advancements, and by some advanced case studies in Chapter 9. From the Foreword: `... This global nature of design for low power was well understood by Wolfgang Nebel and Jean Mermet when organizing the NATO workshop which is the origin of the book. They invited the best experts in the field to cover all aspects of low power design. As a result the chapters in this book are covering deep-submicron CMOS digital system design for low power in a systematic way from process technology all the way up to software design and embedded software systems. Low Power Design in Deep Submicron Electronics is an excellent guide for the practicing engineer, the researcher and the student interested in this crucial aspect of actual CMOS design. It contains about a thousand references to all aspects of the recent five years of feverish activity in this exciting aspect of design.' Hugo de Man Professor, K.U. Leuven, Belgium Senior Research Fellow, IMEC, Belgium

Numerical Simulation of Semiconductor Structures Nov 15 2021 The investigation of new materials, devices and techniques to improve the performance of telecommunications, spectroscopy and radar systems applications, has caused that the study of non-stationary effects of space charge in semiconductor structures be a strategy research area in the field of high speed semiconductor devices. Therefore, this book focuses in the study of the non-stationary effects of the space charge in semiconductor structures, where the nonlinear wave interaction in active media may serve to improve the high-frequency performance of semiconductor devices.

Fundamentals Of Semiconductor Physics And Devices May 02 2023 This book is an introduction to the principles of semiconductor physics, linking its scientific aspects with practical applications. It is addressed to both readers who wish to learn semiconductor physics and those seeking to understand semiconductor devices. It is

particularly well suited for those who want to do both.Intended as a teaching vehicle, the book is written in an expository manner aimed at conveying a deep and coherent understanding of the field. It provides clear and complete derivations of the basic concepts of modern semiconductor physics. The mathematical arguments and physical interpretations are well balanced: they are presented in a measure designed to ensure the integrity of the delivery of the subject matter in a fully comprehensible form. Experimental procedures and measured data are included as well. The reader is generally not expected to have background in quantum mechanics and solid state physics beyond the most elementary level. Nonetheless, the presentation of this book is planned to bring the student to the point of research/design capability as a scientist or engineer. Moreover, it is sufficiently well endowed with detailed knowledge of the field, including recent developments bearing on submicron semiconductor structures, that the book also constitutes a valuable reference resource.In Chapter 1, basic features of the atomic structures, chemical nature and the macroscopic properties of semiconductors are discussed. The band structure of ideal semiconductor crystals is treated in Chapter 2, together with the underlying one-electron picture and other fundamental concepts. Chapter 2 also provides the requisite background of the tight binding method and the k.p-method, which are later used extensively. The electron states of shallow and deep centers, clean semiconductor surfaces, quantum wells and superlattices, as well as the effects of external electric and magnetic fields, are treated in Chapter 3. The one- or multi-band effective mass theory is used wherever this method is applicable. A summary of group theory for application in semiconductor physics is given in an Appendix. Chapter 4 deals with the statistical distribution of charge carriers over the band and localized states in thermodynamic equilibrium. Non-equilibrium processes in semiconductors are treated in Chapter 5. The physics of semiconductor junctions (pn-, hetero-, metal-, and insulator-) is developed in Chapter 6 under conditions of thermodynamic equilibrium, and in Chapter 7 under non-equilibrium conditions. On this basis, the most important electronic and opto-electronic semiconductor devices are treated, among them uni- and bi-polar transistors, photodetectors, solar cells, and injection lasers. A

summary of group theory for applications in semiconductors is given in an Appendix.

Numerical Simulation of Submicron Semiconductor Devices May 14 2024 Describes the basic theory of carrier transport, develops numerical algorithms used for transport problems or device simulations, and presents real-world examples of implementation.

Modeling Electron Transport and Degradation Mechanisms in Semiconductor Submicron Devices Aug 25 2022

The Physics of Submicron Lithography Jan 10 2024 This book is devoted to the physics of electron-beam, ion-beam, optical, and x-ray lithography. The need for this book results from the following considerations. The astonishing achievements in microelectronics are in large part connected with successfully applying the relatively new technology of processing (changing the prop erties of) a material into a device whose component dimensions are submicron, called photolithography. In this method the device is imaged as a pattern on a metal film that has been deposited onto a transparent substrate and by means of a broad stream of light is transferred to a semiconductor wafer within which the physical structure of the devices and the integrated circuit connections are formed layer by layer. The smallest dimensions of the device components are limited by the diffraction of the light when the pattern is transferred and are approximately the same as the wavelength of the light. Photolithography by light having a wavelength of A ~ 0.4 flm has made it possible to serially produce integrated circuits having devices whose minimal size is 2-3 flm in the 4 pattern and having 10-105 transistors per circuit.

Low-dimensional Semiconductors Mar 08 2021 This text is a first attempt to pull together the whole of semiconductor science and technology since 1970 in so far as semiconductor multilayers are concerned. Material, technology, physics and device issues are described with approximately equal emphasis, and form a single coherant point of view. The subject matter is the concern of over half of today's active semiconductor scientists and technologists, the remainder working on bulk semiconductors and devices. It is now routine to design and the prepare semiconductor multilayers at a time, with independent control over the dropping and composition in each layer. In turn these multilayers can be patterned with features that as a

small as a few atomic layers in lateral extent. The resulting structures open up many new ares of exciting solid state and quantum physics. They have also led to whole new generations of electronic and optoelectronic devices whose superior performance relates back to the multilayer structures. The principles established in the field have several decades to go, advancing towards the ultimate of materials engineering, the design and preparation of solids atom by atom. The book should appeal equally to physicists, electronic engineers and materials scientists.

The Physics of Submicron Semiconductor Devices Jun 15 2024 The papers contained in the volume represent lectures delivered as a 1983 NATO ASI, held at Urbino, Italy. The lecture series was designed to identify the key submicron and ultrasubmicron device physics, transport, materials and contact issues. Nonequilibrium transport, quantum transport, interfacial and size constraints issues were also highlighted. The ASI was supported by NATO and the European Research Office. H. L. Grubin D. K. Ferry C. Jacoboni v CONTENTS MODELLING OF SUB-MICRON DEVICES..... ..... 1 E. Constant BOLTZMANN TRANSPORT EQUATION... ... . 33 K. Hess TRANSPORT AND MATERIAL CONSIDERATIONS FOR SUBMICRON DEVICES. . .. . 45 H. L. Grubin EPITAXIAL GROWTH FOR SUB MICRON STRUCTURES..... 179 C. E. C. Wood INSULATOR/SEMICONDUCTOR INTERFACES..... 195 C. W. Wilms en THEORY OF THE ELECTRONIC STRUCTURE OF SEMICONDUCTOR SURFACES AND INTERFACES..... 223 C. Calandra DEEP LEVELS AT COMPOUND-SEMICONDUCTOR INTERFACES..... 253 W. Monch ENSEMBLE MONTE CARLO TECHNlqUES..... 289 C. Jacoboni NOISE AND DIFFUSION IN SUBMICRON STRUCTURES..... 323 L. Reggiani SUPERLATTICES. . . . . 361 . . . . . K. Hess SUBMICRON LITHOGRAPHY 373 C. D. W. Wilkinson and S. P. Beaumont QUANTUM EFFECTS IN DEVICE STRUCTURES DUE TO SUBMICRON CONFINEMENT IN ONE DIMENSION.... ..... 401 B. D. McCombe vii viii CONTENTS PHYSICS OF HETEROSTRUCTURES AND HETEROSTRUCTURE DEVICES..... 445 P. J. Price CORRELATION

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Submicron Integrated Circuits Jul 24 2022 Comprehensive treatment of integrated circuits in the submicron range. First chapters cover basic devices used in circuits such as silicon MOSFET's, bipolar transistors, GaA MESFET's and HEMT's. There is also a chapter on the relatively new GaA's resonant tunneling diode and transistor. Middle chapters address architecture and circuit wiring. Last chapters discuss rapid thermal processing and lithography.

Introduction To Semiconductor Device Modelling Jul 12 2021 This book deals mainly with physical device models which are developed from the carrier transport physics and device geometry considerations. The text concentrates on silicon and gallium arsenide devices and includes models of silicon bipolar junction transistors, junction field effect transistors (JFETs), MESFETs, silicon and GaAs MESFETs, transferred electron devices, pn junction diodes and Schottky varactor diodes. The modelling techniques of more recent devices such as the heterojunction bipolar transistors (HBT) and the high electron mobility transistors are discussed. This book contains details of models for both equilibrium and non-equilibrium transport conditions. The modelling Technique of Small-scale devices is discussed and techniques applicable to submicron-dimensioned devices are included. A section on modern quantum transport analysis techniques is included. Details of essential numerical schemes are given and a variety of device models are used to illustrate the application of these techniques in various fields.

Quantum Transport in Submicron Devices Jan 30 2023 The aim of this book is to resolve the problem of electron and hole transport with a coherent and consistent theory that is relevant to the understanding of transport phenomena in submicron devices. Along the road, readers encounter landmarks in theoretical physics as the authors guide them through the strong and weak aspects of various

hypotheses.

Silicon Devices and Process Integration Jun 03 2023 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.

Silicon Processing for the VLSI Era Apr 01 2023

Hierarchical Device Simulation Feb 16 2022 This monograph is the first on physics-based simulations of novel strained Si and SiGe devices. It provides an in-depth description of the full-band monte-carlo method for SiGe and discusses the common theoretical background of the drift-diffusion, hydrodynamic and Monte-Carlo models and their synergy.

Sub-Micron Semiconductor Devices Mar 12 2024 This comprehensive reference text discusses novel semiconductor devices, including nanostructure field-effect transistors, photodiodes, high electron mobility transistors, and oxide-based devices. The text covers submicron semiconductor devices, device modeling, novel materials for devices, novel semiconductor devices, optimization techniques, and their application in detail. It covers such important topics as negative capacitance devices, surface-plasmon resonance devices, Fermi-level pinning, external stimuli-based optimization techniques,

optoelectronic devices, and architecture-based optimization techniques. The book: Covers novel semiconductor devices with submicron dimensions Discusses comprehensive device optimization techniques Examines conceptualization and modeling of semiconductor devices Covers circuit and sensor-based application of the novel devices Discusses novel materials for next-generation devices This text will be useful for graduate students and professionals in fields including electrical engineering, electronics and communication engineering, materials science, and nanoscience.

VLSI Electronics Dec 17 2021 VLSI Electronics

Simulation of Semiconductor Devices and Processes Jun 10 2021 The "Fifth International Conference on Simulation of Semiconductor Devices and Processes" (SISDEP 93) continues a series of conferences which was initiated in 1984 by K. Board and D. R. J. Owen at the University College of Wales, Swansea, where it took place a second time in 1986. Its organization was succeeded by G. Baccarani and M. Rudan at the University of Bologna in 1988, and W. Fichtner and D. Aemmer at the Federal Institute of Technology in Zurich in 1991. This year the conference is held at the Technical University of Vienna, Austria, September 7 - 9, 1993. This conference shall provide an international forum for the presentation of out standing research and development results in the area of numerical process and de vice simulation. The miniaturization of today's semiconductor devices, the usage of new materials and advanced process steps in the development of new semiconduc tor technologies suggests the design of new computer programs. This trend towards more complex structures and increasingly sophisticated processes demands advanced simulators, such as fully three-dimensional tools for almost arbitrarily complicated geometries. With the increasing need for better models and improved understand ing of physical effects, the Conference on Simulation of Semiconductor Devices and Processes brings together the simulation community and the process- and device en gineers who need reliable numerical simulation tools for characterization, prediction, and development.

The Physics and Technology of Submicron MOS Devices Oct 27 2022

Semiconductor Equations Apr 20 2022 In recent years the mathematical modeling of charge transport in semi conductors has

become a thriving area in applied mathematics. The drift diffusion equations, which constitute the most popular model for the simula tion of the electrical behavior of semiconductor devices, are by now mathe matically quite well understood. As a consequence numerical methods have been developed, which allow for reasonably efficient computer simulations in many cases of practical relevance. Nowadays, research on the drift diffu sion model is of a highly specialized nature. It concentrates on the explora tion of possibly more efficient discretization methods (e.g. mixed finite elements, streamline diffusion), on the improvement of the performance of nonlinear iteration and linear equation solvers, and on three dimensional applications. The ongoing miniaturization of semiconductor devices has prompted a shift of the focus of the modeling research lately, since the drift diffusion model does not account well for charge transport in ultra integrated devices. Extensions of the drift diffusion model (so called hydrodynamic models) are under investigation for the modeling of hot electron effects in submicron MOS-transistors, and supercomputer technology has made it possible to employ kinetic models (semiclassical Boltzmann-Poisson and Wigner Poisson equations) for the simulation of certain highly integrated devices.

Progress in Solid State Electronics Research Sep 25 2022 This important book presents the latest research in solid state electronics which includes applications of solid-state physics and technology to electronics, including theory and design, measurement techniques, preparation of semiconductor devices, and also materials growth, measurement and evaluation; the physics and modelling of submicron and nanoscale microelectronic devices, including methods of processing, measurement, and evaluation; and applications of numerical methods to the modelling and simulation of solid-state devices and processes.

Electrochemical Processing in ULSI Fabrication and Semiconductor/metal Deposition II Aug 13 2021

Solid State Electronics Research Advances Jun 22 2022 Solid state electronics includes applications of solid-state physics and technology to electronics, including theory and design, measurement techniques, preparation of semiconductor devices, and also materials

growth, measurement and evaluation; the physics and modelling of submicron and nanoscale microelectronic devices, including methods of processing, measurement, and evaluation; and applications of numerical methods to the modelling and simulation of solid-state devices and processes. This Advanced book gathers research from around the world in this field.

Compound Semiconductor Electronics, The Age Of Maturity Apr 08 2021 In many respects, compound semiconductor technology has reached the age of maturity when applications will have been defined, yields are high enough and well established, and gallium arsenide and related compounds have carved many important niches in electronics. This book reviews the state-of-the-art of compound semiconductor electronics. It covers the microwave, millimeter wave, and submillimeter wave devices, monolithic microwave and digital integrated circuits made from compound semiconductors and emerging wide band semiconductor materials. The book is written by leading experts in compound semiconductor electronics from industry and academia and strikes the balance between practical applications, record-breaking results, and design and modeling tools specific for compound semiconductor technology. Engineers, scientists, and graduate students working in solid state electronics and especially in the area of compound semiconductor electronics will find this book very useful. It could also be used as a text or a supplementary text for graduate courses in this field.

Mosfet Modeling for VLSI Simulation May 10 2021 A reprint of the classic text, this book popularized compact modeling of electronic and semiconductor devices and components for college and graduate-school classrooms, and manufacturing engineering, over a decade ago. The first comprehensive book on MOS transistor compact modeling, it was the most cited among similar books in the area and remains the most frequently cited today. The coverage is device-physics based and continues to be relevant to the latest advances in MOS transistor modeling. This is also the only book that discusses in detail how to measure device model parameters required for circuit simulations. The book deals with the MOS Field Effect Transistor (MOSFET) models that are derived from basic semiconductor theory. Various models are developed, ranging from simple to more

sophisticated models that take into account new physical effects observed in submicron transistors used in today's (1993) MOS VLSI technology. The assumptions used to arrive at the models are emphasized so that the accuracy of the models in describing the device characteristics are clearly understood. Due to the importance of designing reliable circuits, device reliability models are also covered. Understanding these models is essential when designing circuits for state-of-the-art MOS ICs.

Physics and Technology of Submicron Structures Dec 09 2023 This volume presents a discussion of the latest results in the physics of low-dimensional structures. At the winter school major breakthroughs were reported, and some of the excitement of the participants is reflected in the contributions. The topics treated range from the fabrication of microstructures and the physical background of future semiconductor devices to vertical transport in nanostructures, universal conductance fluctuations, and the transition from two-dimensional to one-dimensional conduction in semiconductor structures.

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- *Physics Of Submicron Devices*
- *Sub Micron Semiconductor Devices*
- *The Physics Of Submicron Structures*
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- *Modeling Electron Transport And Degradation Mechanisms In Semiconductor Submicron Devices*
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- *Solid State Electronics Research Advances*
- *Modeling Of Chemical Vapor Deposition Of Tungsten Films*
- *Semiconductor Equations*
- *Submicron Research*
- *Hierarchical Device Simulation*
- *Chip Design For Submicron VLSI*
- *VLSI Electronics*
- *Numerical Simulation Of Semiconductor Structures*
- *Matching Properties Of Deep Sub Micron MOS Transistors*
- *Spin Electronics*
- *Electrochemical Processing In ULSI Fabrication And Semiconductor metal Deposition II*
- *Introduction To Semiconductor Device Modelling*
- *Simulation Of Semiconductor Devices And Processes*
- *Mosfet Modeling For VLSI Simulation*
- *Compound Semiconductor Electronics The Age Of Maturity*
- *Low dimensional Semiconductors*
- *Hot Carriers In Semiconductor Nanostructures*