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Besides the additional functionality, the fabricated nanoscale devices exhibit enhanced electrical characteristics, e.g., record on/off ratio of up to 1 × 109 for Schottky transistors. This novel nanotransistor technology makes way for a simple and compact hardware platform that can be flexibly reconfigured during operation to perform different logic computations yielding unprecedented circuit design flexibility.

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"Nanowire Field Effect Transistor: Basic Principles and Applications" places an emphasis on the application aspects of nanowire field effect transistors (NWFET). Device physics and electronics are discussed in a compact manner, together with the p-n junction diode and MOSFET, the former as an essential element in NWFET and the latter as a general background of the FET. During this discussion, the photo-diode, solar cell, LED, LD, DRAM, flash EEPROM and sensors are highlighted to pave the way for similar applications of NWFET. Modeling is discussed in close analogy and comparison with MOSFETs. Contributors focus on processing, electrostatic discharge (ESD) and application of NWFET. This includes coverage of solar and memory cells, biological and chemical sensors, displays and atomic scale light emitting diodes. Appropriate for scientists and engineers interested in acquiring a working knowledge of NWFET as well as graduate students specializing in this subject.

This book provides detailed and accurate information on the history, structure, operation, benefits and advanced structures of silicon MESFET, along with modeling and analysis of the device. The authors explain the detailed physics that are important in modeling of SOI-MESFETs, and present the derivations of compact model expressions so that users can recognize the physical meaning of the model equations and parameters. The discussion also includes advanced structures for SOI-MESFET for submicron applications.

A timely reference from leading experts on semiconductor nanowires and their applications.

This book presents research dedicated to solving scientific and technological problems in many areas of electronics, photonics and renewable energy. Energy and information are interconnected and are essential elements for the development of human society. Transmission, processing and storage of information requires energy consumption, while the efficient use and access to new energy sources requires new information (ideas and expertise) and the design of novel systems such as photovoltaic devices, fuel cells and batteries. Semiconductor physics creates the knowledge base for the development of information (computers, cell phones, etc.) and energy (photovoltaic) technologies. The exchange of ideas and expertise between these two technologies is critical and expands beyond semiconductors. Continued progress in information and renewable energy technologies requires miniaturization of devices and reduction of costs, energy and material consumption. The latest generation of electronic devices is now approaching nanometer scale dimensions, new materials are being introduced into electronics manufacturing at an unprecedented rate, and alternative technologies to mainstream CMOS are evolving. Nanotechnology is widely accepted as a source of potential solutions in securing future progress for information and energy technologies. Semiconductor Nanotechnology features chapters that cover the following areas: atomic scale materials design, bio- and molecular electronics, high frequency electronics, fabrication of nanodevices, magnetic materials and spintronics, materials and processes for integrated and subwave optoelectronics, nanoCMOS, new materials for FETs and other devices, nanoelectronics system architecture, nano optics and lasers, non-silicon materials and devices, chemical and biosensors, quantum effects in devices, nano science and technology applications in the development of novel solar energy devices, and fuel cells and batteries.

The purpose of this workshop is to spread the vast amount of information available on semiconductor physics to every possible field throughout the scientific community. As a result, the latest findings, research and discoveries can be quickly disseminated. This workshop provides all participating research groups with an excellent platform for interaction and collaboration with other members of their respective scientific community. This workshop's technical sessions include various current and significant topics for applications and scientific developments, including • Optoelectronics • VLSI & ULSI Technology • Photovoltaics • MEMS & Sensors • Device Modeling and Simulation • High Frequency/ Power Devices • Nanotechnology and Emerging Areas • Organic Electronics • Displays and Lighting Many eminent scientists from various national and international organizations are actively participating with their latest research works and also equally supporting this mega event by joining the various organizing committees.

Brings novel insights to a vibrant research area with high application potential?covering materials, physics, architecture, and integration aspects of future generation CMOS electronics technology Over the last four decades we have seen tremendous growth in semiconductor electronics. This growth has been fueled by the matured complementary metal oxide semiconductor (CMOS) technology. This comprehensive book captures the novel device options in CMOS technology that can be realized using non-silicon semiconductors. It discusses germanium, III-V materials, carbon nanotubes and graphene as semiconducting materials for three-dimensional field-effect transistors. It also covers non-conventional materials such as nanowires and nanotubes. Additionally, nanoelectromechanical switches-based mechanical relays and wide bandgap semiconductor-based terahertz electronics are reviewed as essential add-on electronics for enhanced communication and computational capabilities. Advanced Nanoelectronics: Post-Silicon Materials and Devices begins with a discussion of the future of CMOS. It continues with comprehensive chapter coverage of: nanowire field effect transistors; two-dimensional materials for electronic applications; the challenges and breakthroughs of the integration of germanium into modern CMOS; carbon nanotube logic technology; tunnel field effect transistors; energy efficient computing with negative capacitance; spin-based devices for logic, memory and non-Boolean architectures; and terahertz properties and applications of GaN. -Puts forward novel approaches for future, state-of-the-art, nanoelectronic devices -Discusses emerging materials and architectures such as alternate channel material like germanium, gallium nitride, 1D nanowires/tubes, 2D graphene, and other dichalcogenide materials and ferroelectrics -Examines new physics such as spintronics, negative capacitance, quantum computing, and 3D-IC technology -Brings together the latest developments in the field for easy reference -Enables academic and R&D researchers in semiconductors to "think outside the box" and explore beyond silica An important resource for future generation CMOS electronics technology, Advanced Nanoelectronics: Post-Silicon Materials and Devices will appeal to materials scientists, semiconductor physicists, semiconductor industry, and electrical engineers.

A detailed introduction to the design, modeling, and operation of junctionless field effect transistors (FETs), including advantages and limitations.