

Logic Non Volatile Memory The Nvm Solutions From Ememory International Series On Advances In Solid State Electronics And Technology Asset

This book is an introduction to the fundamentals of emerging non-volatile memories and provides an overview of future trends in the field. Readers will find coverage of seven important memory technologies, including Ferroelectric Random Access Memory (FeRAM), Ferromagnetic RAM (FMRAM), Multiferroic RAM (MFRAM), Phase-Change Memories (PCM), Oxide-based Resistive RAM (RRAM), Probe Storage, and Polymer Memories. Chapters are structured to reflect diffusions and clashes between different topics. Emerging Non-Volatile Memories is an ideal book for graduate students, faculty, and professionals working in the area of non-volatile memory. This book also: Covers key memory technologies, including Ferroelectric Random Access Memory (FeRAM), Ferromagnetic RAM (FMRAM), and Multiferroic RAM (MFRAM), among others. Provides an overview of non-volatile memory fundamentals. Broadens readers' understanding of future trends in non-volatile memories.

EEPROM, non volatile memory (NVM), 0,35[my]m-CMOS, tunneloxide, smart card controller, mobile communication.

Field-coupled nanocomputing (FCN) paradigms offer fundamentally new approaches to digital information processing that do not utilize transistors or require charge transport. Information transfer and computation are achieved in FCN via local field interactions between nanoscale building blocks that are organized in patterned arrays. Several FCN paradigms are currently under active investigation, including quantum-dot cellular automata (QCA), molecular quantum cellular automata (MQCA), nanomagnetic logic (NML), and atomic quantum cellular automata (AQCA). Each of these paradigms has a number of unique features that make it attractive as a candidate for post-CMOS nanocomputing, and each faces critical challenges to realization. This State-of-the-Art-Survey provides a snapshot of the current developments and novel research directions in the area of FCN. The book is divided into five sections. The first part, Field-Coupled Nanocomputing Paradigms, provides valuable background information and perspectives on the QDCA, MQCA, NML, and AQCA paradigms and their evolution. The second section, Circuits and Architectures, addresses a wide variety of current research on FCN clocking strategies, logic synthesis, circuit design and test, logic-in-memory, hardware security, and architecture. The third section, Modeling and Simulation, considers the theoretical modeling and computer simulation of large FCN circuits, as well as the use of simulations for gleaning physical insight into elementary FCN building blocks. The fourth section, Irreversibility and Dissipation, considers the dissipative consequences of irreversible information loss in FCN circuits, their quantification, and their connection to circuit structure. The fifth section, The Road Ahead: Opportunities and Challenges, includes an edited transcript of the panel discussion that concluded the FCN 13 workshop.

Memory Design Techniques for Low Energy Embedded Systems centers one of the most outstanding problems in chip design for embedded application. It guides the reader through different memory organizations and technologies and it reviews the most successful strategies for optimizing them in the power and performance plane.

Market research guide to the infotech industry a tool for strategic planning, competitive intelligence, employment searches or financial research. Contains trends, statistical tables, and an industry glossary. Includes one page profiles of infotech industry firms, which provides data such as addresses, phone numbers, and executive names.

This book offers a balanced and comprehensive guide to the core principles, fundamental properties, experimental approaches, and state-of-the-art applications of two major groups of emerging non-volatile memory technologies, i.e. spintronics-based devices as well as resistive switching devices, also known as Resistive Random Access Memory (RRAM). The first section presents different types of spintronic-based devices, i.e. magnetic tunnel junction (MTJ), domain wall, and skyrmion memory devices. This section describes how their developments have led to various promising applications, such as microwave oscillators, detectors, magnetic logic, and neuromorphic engineered systems. In the second half of the book, the underlying device physics supported by different experimental observations and modelling of RRAM devices are presented with memory array level implementation. An insight into RRAM desired properties as synaptic element in neuromorphic computing platforms from material and algorithms viewpoint is also discussed with specific example in automatic sound classification framework.

For the new millenium, Wai-Kai Chen introduced a monumental reference for the design, analysis, and prediction of VLSI circuits: The VLSI Handbook. Still a valuable tool for dealing with the most dynamic field in engineering, this second edition includes 13 sections comprising nearly 100 chapters focused on the key concepts, models, and equations. Written by a stellar international panel of expert contributors, this handbook is a reliable, comprehensive resource for real answers to practical problems. It emphasizes fundamental theory underlying professional applications and also reflects key areas of industrial and research focus. WHAT'S IN THE SECOND EDITION? Sections on... Low-power electronics and design VLSI signal processing Chapters on... CMOS fabrication Content-addressable memory Compound semiconductor RF circuits High-speed circuit design principles SiGe HBT technology Bipolar junction transistor amplifiers Performance modeling and analysis using SystemC Design languages, expanded from two chapters to twelve Testing of digital systems Structured for convenient navigation and loaded with practical solutions, The VLSI Handbook, Second Edition remains the first choice for answers to the problems and challenges faced daily in engineering practice.

This book provides a comprehensive introduction to embedded flash memory, describing the history, current status, and future projections for technology, circuits, and systems applications. The authors describe current main-stream embedded flash technologies from floating-gate 1Tr, floating-gate with split-gate (1.5Tr), and 1Tr/1.5Tr SONOS flash technologies and their successful creation of various applications. Comparisons of these embedded flash technologies and future projections are also provided. The authors demonstrate a variety of embedded applications for auto-motive, smart-IC cards, and

low-power, representing the leading-edge technology developments for eFlash. The discussion also includes insights into future prospects of application-driven non-volatile memory technology in the era of smart advanced automotive system, such as ADAS (Advanced Driver Assistance System) and IoE (Internet of Everything). Trials on technology convergence and future prospects of embedded non-volatile memory in the new memory hierarchy are also described. Introduces the history of embedded flash memory technology for micro-controller products and how embedded flash innovations developed; Includes comprehensive and detailed descriptions of current main-stream embedded flash memory technologies, sub-system designs and applications; Explains why embedded flash memory requirements are different from those of stand-alone flash memory and how to achieve specific goals with technology development and circuit designs; Describes a mature and stable floating-gate 1Tr cell technology imported from stand-alone flash memory products - that then introduces embedded-specific split-gate memory cell technologies based on floating-gate storage structure and charge-trapping SONOS technology and their eFlash sub-system designs; Describes automotive and smart-IC card applications requirements and achievements in advanced eFlash beyond 40nm node.

Presented here is an all-inclusive treatment of Flash technology, including Flash memory chips, Flash embedded in logic, binary cell Flash, and multilevel cell Flash. The book begins with a tutorial of elementary concepts to orient readers who are less familiar with the subject. Next, it covers all aspects and variations of Flash technology at a mature engineering level: basic device structures, principles of operation, related process technologies, circuit design, overall design tradeoffs, device testing, reliability, and applications.

In Security Trends for FPGA's the authors present an analysis of current threats against embedded systems and especially FPGAs. They discuss about requirements according to the FIPS standard in order to build a secure system. This point is of paramount importance as it guarantees the level of security of a system. Also highlighted are current vulnerabilities of FPGAs at all the levels of the security pyramid. It is essential from a design point of view to be aware of all the levels in order to provide a comprehensive solution. The strength of a system is defined by its weakest point; there is no reason to enhance other protection means, if the weakest point remains untreated. Many severe attacks have considered this weakness in order not to face brute force attack complexity. Several solutions are proposed in Security Trends for FPGA's especially at the logical, architecture and system levels in order to provide a global solution.

As a step toward ultimate low-power computing, this book introduces normally-off computing, which involves inactive components of computer systems being aggressively powered off with the help of new non-volatile memories (NVMs). Because the energy consumption of modern information devices strongly depends on both hardware and software, co-design and co-optimization of hardware and software are indispensable to improve energy efficiency. The book discusses various topics including (1) details of low-power technologies including power gating, (2) characteristics of several new-generation NVMs, (3) normally-off computing architecture, (4) important technologies for implementing normally-off computing, (5) three practical implementations: healthcare, mobile information devices, and sensor network systems for smart city applications, and (6) related research and development. Bridging computing methodology and emerging memory devices, the book is designed for both hardware and software designers, engineers, and developers as comprehensive material for understanding normally-off computing.

This book analyzes energy and reliability as major challenges faced by designers of computing frameworks in the nanometer technology regime. The authors describe the existing solutions to address these challenges and then reveal a new reconfigurable computing platform, which leverages high-density nanoscale memory for both data storage and computation to maximize the energy-efficiency and reliability. The energy and reliability benefits of this new paradigm are illustrated and the design challenges are discussed. Various hardware and software aspects of this exciting computing paradigm are described, particularly with respect to hardware-software co-designed frameworks, where the hardware unit can be reconfigured to mimic diverse application behavior. Finally, the energy-efficiency of the paradigm described is compared with other, well-known reconfigurable computing platforms.

This reference book is a complete guide to the trends and leading companies in the engineering, research, design, innovation and development business fields: those firms that are dominant in engineering-based design and development, as well leaders in technology-based research and development. We have included companies that are making significant investments in research and development via as many disciplines as possible, whether that research is being funded by internal investment, by fees received from clients or by fees collected from government agencies. In this carefully-researched volume, you'll get all of the data you need on the American Engineering & Research Industry, including: engineering market analysis, complete industry basics, trends, research trends, patents, intellectual property, funding, research and development data, growth companies, investments, emerging technologies, CAD, CAE, CAM, and more. The book also contains major statistical tables covering everything from total U.S. R&D expenditures to the total number of scientists working in various disciplines, to amount of U.S. government grants for research. In addition, you'll get expertly written profiles of nearly 400 top Engineering and Research firms - the largest, most successful corporations in all facets of Engineering and Research, all cross-indexed by location, size and type of business. These corporate profiles include contact names, addresses, Internet addresses, fax numbers, toll-free numbers, plus growth and hiring plans, finances, research, marketing, technology, acquisitions and much more. This book will put the entire Engineering and Research industry in your hands. Purchasers of either the book or PDF version can receive a free copy of the company profiles database on CD-ROM, enabling key word search and export of key information, addresses, phone numbers and executive names with titles for every company profiled.

This is the first book to comprehensively record the authors' authoritative knowledge and practical experience of IC manufacturing, including the tremendous developments of recent years. With its strong application orientation, this is a must-have book for professionals in semiconductor industries.

This book presents the latest techniques for characterization, modeling and design for nano-scale non-volatile memory (NVM) devices. Coverage focuses on fundamental NVM device fabrication and characterization, internal state identification of memristic dynamics with physics modeling, NVM circuit design and hybrid NVM memory system design-space optimization. The authors discuss design methodologies for nano-scale NVM devices from a circuits/systems perspective, including the general foundations for the fundamental memristic dynamics in NVM devices. Coverage includes physical modeling, as well as the development of a platform to explore novel hybrid CMOS and NVM circuit and system design. • Offers readers a systematic and comprehensive treatment of emerging nano-scale non-volatile memory (NVM) devices; • Focuses on the internal state of NVM memristic dynamics, novel NVM readout and memory cell circuit design and hybrid NVM memory system optimization; • Provides both theoretical analysis and practical examples to illustrate design methodologies; • Illustrates design and analysis for recent developments in spin-torque-transfer, domain-wall racetrack and memristors.

Nowadays it is hard to find an electronic device which does not use codes: for example, we listen to music via heavily encoded audio CD's and we watch movies via encoded DVD's. There is at least one area where the use of encoding/decoding is not so developed, yet: Flash non-volatile memories. Flash memory high-density, low power, cost effectiveness, and scalable design make it an ideal choice to fuel the explosion of multimedia products, like USB keys, MP3 players, digital cameras and solid-state disk. In ECC for Non-Volatile Memories the authors expose the basics of coding theory needed to understand the application to memories, as well as the relevant design topics, with reference to both NOR and NAND Flash architectures. A collection of

software routines is also included for better understanding. The authors form a research group (now at Qimonda) which is the typical example of a fruitful collaboration between mathematicians and engineers.

Advances in Nonvolatile Memory and Storage Technology, Second Edition, addresses recent developments in the non-volatile memory spectrum, from fundamental understanding, to technological aspects. The book provides up-to-date information on the current memory technologies as related by leading experts in both academia and industry. To reflect the rapidly changing field, many new chapters have been included to feature the latest in RRAM technology, STT-RAM, memristors and more. The new edition describes the emerging technologies including oxide-based ferroelectric memories, MRAM technologies, and 3D memory. Finally, to further widen the discussion on the applications space, neuromorphic computing aspects have been included. This book is a key resource for postgraduate students and academic researchers in physics, materials science and electrical engineering. In addition, it will be a valuable tool for research and development managers concerned with electronics, semiconductors, nanotechnology, solid-state memories, magnetic materials, organic materials and portable electronic devices. Discusses emerging devices and research trends, such as neuromorphic computing and oxide-based ferroelectric memories Provides an overview on developing nonvolatile memory and storage technologies and explores their strengths and weaknesses Examines improvements to flash technology, charge trapping and resistive random access memory

"This book covers a great variety of topics such as materials, environment, electronics, and computing, offering a vital source of information detailing the latest architectures, frameworks, methodologies, and research on energy-aware systems and networking for sustainable initiatives"--

This book introduces readers to the latest advances in sensing technology for a broad range of non-volatile memories (NVMs). Challenges across the memory technologies are highlighted and their solutions in mature technology are discussed, enabling innovation of sensing technologies for future NVMs. Coverage includes sensing techniques ranging from well-established NVMs such as hard disk, flash, Magnetic RAM (MRAM) to emerging NVMs such as ReRAM, STTRAM, FeRAM and Domain Wall Memory will be covered.

The hafnium based ferroelectric memories offer a low power consumption, ultra-fast operation, non-volatile retention as well as the small relative cell size as the main requirements for future memories. These remarkable properties of ferroelectric memories make them promising candidates for non-volatile memories that would bridge the speed gap between fast logic and slow off-chip, long term storage. Even though the retention of hafnia based ferroelectric memories can be extrapolated to a ten-year specification target, they suffer from a rather limited endurance. Therefore, this work targets relating the field cycling behavior of hafnia based ferroelectric memories to the physical mechanisms taking place within the film stack. Establishing a correlation between the performance of the device and underlying physical mechanisms is the first step toward understanding the device and engineering guidelines for novel, superior devices. In the frame of this work, an in-depth ferroelectric and dielectric characterization, analysis and TEM study was combined with comprehensive modeling approach. Drift and diffusion based vacancy redistribution was found as the main cause for the phase transformation and consequent increase of the remnant polarization, while domain pinning and defect generation is identified to be responsible for the device fatigue. Finally, based on Landau theory, a simple way to utilize the high endurance strength of anti-ferroelectric (AFE) materials and achieve non-volatility in state-of-the-art DRAM stacks was proposed and the fabrication of the world's first non-volatile AFE-RAM is reported. These findings represent an important milestone and pave the way toward a commercialization of (anti)ferroelectric non-volatile memories based on simple binary-oxides.

Written for scientists, researchers, and engineers, Non-volatile Memories describes the recent research and implementations in relation to the design of a new generation of non-volatile electronic memories. The objective is to replace existing memories (DRAM, SRAM, EEPROM, Flash, etc.) with a universal memory model likely to reach better performances than the current types of memory: extremely high commutation speeds, high implantation densities and retention time of information of about ten years.

Photo-Electroactive Non-Volatile Memories for Data Storage and Neuromorphic Computing summarizes advances in the development of photo-electroactive memories and neuromorphic computing systems, suggests possible solutions to the challenges of device design, and evaluates the prospects for commercial applications. Sections covers developments in electro-photoactive memory, and photonic neuromorphic and in-memory computing, including discussions on design concepts, operation principles and basic storage mechanism of optoelectronic memory devices, potential materials from organic molecules, semiconductor quantum dots to two-dimensional materials with desirable electrical and optical properties, device challenges, and possible strategies. This comprehensive, accessible and up-to-date book will be of particular interest to graduate students and researchers in solid-state electronics. It is an invaluable systematic introduction to the memory characteristics, operation principles and storage mechanisms of the latest reported electro-photoactive memory devices. Reviews the most promising materials to enable emerging computing memory and data storage devices, including one- and two-dimensional materials, metal oxides, semiconductors, organic materials, and more Discusses fundamental mechanisms and design strategies for two- and three-terminal device structures Addresses device challenges and strategies to enable translation of optical and optoelectronic technologies

This book provides a comprehensive overview of the different technological approaches currently being studied to fulfill future memory requirements. Two main research paths are identified and discussed. Different "evolutionary paths" based on new materials and new transistor structures are investigated to extend classical floating gate technology to the 32 nm node. "Disruptive paths" are also covered, addressing 22 nm and smaller IC generations. Finally, the main factors at the origin of these phenomena are identified and analyzed, providing pointers on future research activities and developments in this area.

This book provides a comprehensive introduction to spintronics-based computing for the next generation of ultra-low power/highly reliable logic. It will cover aspects from device to system-level, including magnetic memory cells, device modeling, hybrid circuit structure, design methodology, CAD tools, and technological integration methods. This book is accessible to a variety of readers and little or no background in magnetism and spin electronics are required to understand its content. The multidisciplinary team of expert authors from circuits, devices, computer architecture, CAD and system design reveal to readers the potential of spintronics nanodevices to reduce power consumption, improve reliability and enable new functionality.

This book constitutes the thoroughly refereed post-conference proceedings of the 15th International Conference on Smart Card Research and Advanced Applications, CARDIS 2016, held in Cannes, France, in November 2016. The 15 revised full papers presented in this book were carefully reviewed and selected from 29 submissions. The focus of the conference was on all aspects of the design, development, deployment, validation, and application of smart cards or smart personal devices.

Would you like to add the capabilities of the Non-Volatile Memory (NVM) as a storage element in your silicon integrated logic circuits, and as a trimming sector in your high voltage driver and other silicon

integrated analog circuits? Would you like to learn how to embed the NVM into your silicon integrated circuit products to improve their performance? This book is written to help you. It provides comprehensive instructions on fabricating the NVM using the same processes you are using to fabricate your logic integrated circuits. We at our eMemory company call this technology the embedded Logic NVM. Because embedded Logic NVM has simple fabrication processes, it has replaced the conventional NVM in many traditional and new applications, including LCD driver, LED driver, MEMS controller, touch panel controller, power management unit, ambient and motion sensor controller, micro controller unit (MCU), security ID setting tag, RFID, NFC, PC camera controller, keyboard controller, and mouse controller. The recent explosive growth of the Logic NVM indicates that it will soon dominate all NVM applications. The embedded Logic NVM was invented and has been implemented in users' applications by the 200+ employees of our eMemory company, who are also the authors and author-assistants of this book. This book covers the following Logic NVM products: One Time Programmable (OTP) memory, Multiple Times Programmable (MTP) memory, Flash memory, and Electrically Erasable Programmable Read Only Memory (EEPROM). The fundamentals of the NVM are described in this book, which include: the physics and operations of the memory transistors, the basic building block of the memory cells and the access circuits. All of these products have been used continuously by the industry worldwide. In-depth readers can attain expert proficiency in the implementation of the embedded Logic NVM technology in their products.

This book describes the basic technologies and operation principles of charge-trapping non-volatile memories. The authors explain the device physics of each device architecture and provide a concrete description of the materials involved as well as the fundamental properties of the technology. Modern material properties used as charge-trapping layers, for new applications are introduced.

Abstracts for presentations at the ETCMOS 2016 conference in Montreal, Canada, May 25 - 27, 2016.

Plunkett's InfoTech Industry Almanac presents a complete analysis of the technology business, including the convergence of hardware, software, entertainment and telecommunications. This market research tool includes our analysis of the major trends affecting the industry, from the rebound of the global PC and server market, to consumer and enterprise software, to super computers, open systems such as Linux, web services and network equipment. In addition, we provide major statistical tables covering the industry, from computer sector revenues to broadband subscribers to semiconductor industry production. No other source provides this book's easy-to-understand comparisons of growth, expenditures, technologies, imports/exports, corporations, research and other vital subjects. The corporate profile section provides in-depth, one-page profiles on each of the top 500 InfoTech companies. We have used our massive databases to provide you with unique, objective analysis of the largest and most exciting companies in: Computer Hardware, Computer Software, Internet Services, E-Commerce, Networking, Semiconductors, Memory, Storage, Information Management and Data Processing. We've been working harder than ever to gather data on all the latest trends in information technology. Our research effort includes an exhaustive study of new technologies and discussions with experts at dozens of innovative tech companies. Purchasers of the printed book or PDF version may receive a free CD-ROM database of the corporate profiles, enabling export of vital corporate data for mail merge and other uses.

The electronics and information technology revolution continues, but it is a critical time in the development of technology. Once again, we stand on the brink of a new era where emerging research will yield exciting applications and products destined to transform and enrich our daily lives! The potential is staggering and the ultimate impact is unimaginable, considering the continuing marriage of technology with fields such as medicine, communications and entertainment, to name only a few. But who will actually be responsible for transforming these potential new products into reality? The answer, of course, is today's (and tomorrow's) design engineers! The design of integrated circuits today remains an essential discipline in support of technological progress, and the authors of this book have taken a giant step forward in the development of a practice-oriented treatise for design engineers who are interested in the practical, industry-driven world of integrated circuit design.

Logic Non-volatile Memory: The Nvm Solutions For EmemoryWorld Scientific

In this volume drawn from the VLSI Handbook, the focus is on logic design and compound semiconductor digital integrated circuit technology. Expert discussions cover topics ranging from the basics of logic expressions and switching theory to sophisticated programmable logic devices and the design of GaAs MESFET and HEMT logic circuits. Logic Design

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