

3d Nand Flash Memory Toshiba

This book is an important outcome of the Fifth World Internet Conference. It provides a comprehensive account of the new trends and highlights of global Internet development over the past year, covering network infrastructure, information technology, digital economy, world internet media, cyber security, and international cyberspace governance. This year, the book improves the Global Internet Development Index System and adds more countries into the assessed list, in order to reflect more comprehensively, objectively and accurately the general situation of the world Internet development and thus to provide reference for all countries in promoting Internet development and governance. Nanoelectronics, as a true successor of microelectronics, is certainly a major technology boomer in the 21st century. This has been shown by its several applications and also by its enormous potential to influence all areas of electronics, computers, information technology, aerospace defense, and consumer goods. Although the current semiconductor technology is projected to reach its physical limit in about a decade, nanoscience and nanotechnology promise breakthroughs for the future. The present books provides an in-depth review of the latest advances in the technology of nanoelectronic devices and their developments over the past decades. Moreover, it introduces new concepts for the realization of future nanoelectronic devices. The main focus of the book is on three fundamental branches of semiconductor products or applications: logic, memory, and RF and communication. By pointing out to the key technical challenges, important aspects and characteristics of various designs are used to illustrate mechanisms that overcome the technical barriers. Furthermore, by comparing advantages and disadvantages of different designs, the most promising solutions are indicated for each application.

An important outcome of the Fourth World Internet Conference, this book provides a comprehensive account of the status quo and trends in global Internet development. Covering network infrastructure, information technology, digital economy, e-governance, cyber security, and international cyberspace governance, it presents the Global Internet Development Index System to assess the Internet development of various major countries and emerging economies.

Digital Storage in Consumer Electronics The Essential Guide Springer

Three-dimensional (3D) integration is identified as a possible avenue for continuous performance growth in integrated circuits (IC) as the conventional scaling approach is faced with unprecedented challenges in fundamental and economic limits. Wafer level 3D IC can take several forms, and they usually include a stack of several thinned IC layers that are vertically bonded and interconnected by through silicon via TSV. There is a long string of benefits that one can derive from 3D IC implementation such as form factor, density multiplication, improved delay and power, enhanced bandwidth, and heterogeneous integration. This book presents contributions by key researchers in this field, covering motivations, technology platforms, applications, and other design issues.

A detailed, practical review of state-of-the-art implementations of memory in IoT hardware As the Internet of Things (IoT) technology continues to evolve and become increasingly common across an array of specialized and consumer product applications, the demand on engineers to design new generations of flexible, low-cost, low power embedded memories into IoT hardware becomes ever greater. This book helps them meet that demand. Coauthored by a leading international expert and multiple patent holder, this book gets engineers up to speed on state-of-the-art implementations of memory in IoT hardware. Memories for the Intelligent Internet of Things covers an array of common and cutting-edge IoT embedded memory implementations. Ultra-low-power memories for IoT devices-including plastic and polymer circuitry for specialized applications, such as medical electronics-are described. The authors explore microcontrollers with embedded memory used for smart control of a multitude of Internet devices. They also consider neuromorphic memories made in Ferroelectric RAM (FeRAM), Resistance RAM (ReRAM), and Magnetic RAM (MRAM) technologies to implement artificial intelligence (AI) for the collection, processing, and presentation of large quantities of data generated by IoT hardware. Throughout the focus is on memory technologies which are complementary metal oxide semiconductor (CMOS) compatible, including embedded floating gate and charge trapping EEPROM/Flash along with FeRAMs, FeFETs, MRAMs and ReRAMs. Provides a timely, highly practical look at state-of-the-art IoT memory implementations for an array of product applications Synthesizes basic science with original analysis of memory technologies for Internet of Things (IoT) based on the authors' extensive experience in the field Focuses on practical and timely applications throughout Features numerous illustrations, tables, application requirements, and photographs Considers memory related security issues in IoT devices Memories for the Intelligent Internet of Things is a valuable working resource for electrical engineers and engineering managers working in the electronics system and semiconductor industries. It is also an indispensable reference/text for graduate and advanced undergraduate students interested in the latest developments in integrated circuit devices and systems.

This textbook provides a comprehensive, fully-updated introduction to the essentials of nanometer CMOS integrated circuits. It includes aspects of scaling to even beyond 12nm CMOS technologies and designs. It clearly describes the fundamental CMOS operating principles and presents substantial insight into the various aspects of design implementation and application. Coverage includes all associated disciplines of nanometer CMOS ICs, including physics, lithography, technology, design, memories, VLSI, power consumption, variability, reliability and signal integrity, testing, yield, failure analysis, packaging, scaling trends and road blocks. The text is based upon in-house Philips, NXP Semiconductors, Applied Materials, ASML, IMEC, ST-Ericsson, TSMC, etc., courseware, which, to date, has been completed by more than 4500 engineers working in a large variety of related disciplines: architecture, design, test, fabrication process, packaging, failure analysis and software.

Eminent physicist and economist, Robert Ayres, examines the history of technology as a change agent in society, focusing on societal roots rather than technology as an autonomous, self-perpetuating phenomenon. With rare exceptions, technology is developed in response to societal needs that have evolutionary roots and causes. In our genus Homo, language evolved in response to a need for our ancestors to communicate, both in the moment, and to posterity. A band of hunters had no chance in competition with predators that were larger and faster without this type of organization, which eventually gave birth to writing and music. The steam engine did not leap fully formed from the brain of James Watt. It evolved from a need to pump water out of coal mines, driven by a need to burn coal instead of firewood, in turn due to deforestation. Later, the steam engine made machines and mechanization possible. Even quite simple machines increased human productivity by a factor of hundreds, if not thousands. That was the Industrial Revolution. If we count electricity and the automobile as a second industrial revolution, and the digital computer as the beginning of a third, the world is now on the cusp of a fourth revolution led by microbiology. These industrial revolutions have benefited many in the short term, but devastated the Earth's ecosystems. Can technology save the human race from the catastrophic consequences of its past success? That is the question this book will try to answer.

In response to tremendous growth and new technologies in the semiconductor industry, this volume is organized into five, information-rich sections. Digital Design and Fabrication surveys the latest advances in computer architecture and design as well as the technologies used to manufacture and test them. Featuring contributions from leading experts, the book also includes a new section on memory and storage in addition to a new chapter on nonvolatile memory technologies. Developing advanced concepts, this sharply focused book— Describes new technologies that have become driving factors for the electronic industry Includes new information on semiconductor memory circuits, whose development best illustrates the phenomenal progress encountered by the fabrication and technology sector Contains a section dedicated to issues related to system power consumption Describes reliability and testability of computer systems

Pinpoints trends and state-of-the-art advances in fabrication and CMOS technologies Describes performance evaluation measures, which are the bottom line from the user's point of view Discusses design techniques used to create modern computer systems, including high-speed computer arithmetic and high-frequency design, timing and clocking, and PLL and DLL design

The theme for the 2019 conference is Novel Computing Architectures. Papers will include discussions on the advent of Artificial Intelligence and the promise of quantum computing that are driving disruptive computing architectures; Neuromorphic chip designs on one hand, and Quantum Bits on the other, still in R&D, will introduce new computing circuitry and memory elements, novel materials, and different test methodologies. These novel computing architectures will require further innovation which is best achieved through a collaborative Failure Analysis community composed of chip manufacturers, tool vendors, and universities.

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.

This book constitutes the proceedings of the International Conference on Information and Communication Technologies held in Kochi, Kerala, India in September 2010.

This book walks the reader through the next step in the evolution of NAND flash memory technology, namely the development of 3D flash memories, in which multiple layers of memory cells are grown within the same piece of silicon. It describes their working principles, device architectures, fabrication techniques and practical implementations, and highlights why 3D flash is a brand new technology. After reviewing market trends for both NAND and solid state drives (SSDs), the book digs into the details of the flash memory cell itself, covering both floating gate and emerging charge trap technologies. There is a plethora of different materials and vertical integration schemes out there. New memory cells, new materials, new architectures (3D Stacked, BiCS and P-BiCS, 3D FG, 3D VG, 3D advanced architectures); basically, each NAND manufacturer has its own solution. Chapter 3 to chapter 7 offer a broad overview of how 3D can materialize. The 3D wave is impacting emerging memories as well and chapter 8 covers 3D RRAM (resistive RAM) crosspoint arrays. Visualizing 3D structures can be a challenge for the human brain: this is way all these chapters contain a lot of bird's-eye views and cross sections along the 3 axes. The second part of the book is devoted to other important aspects, such as advanced packaging technology (i.e. TSV in chapter 9) and error correction codes, which have been leveraged to improve flash reliability for decades. Chapter 10 describes the evolution from legacy BCH to the most recent LDPC codes, while chapter 11 deals with some of the most recent advancements in the ECC field. Last but not least, chapter 12 looks at 3D flash memories from a system perspective. Is 14nm the last step for planar cells? Can 100 layers be integrated within the same piece of silicon? Is 4 bit/cell possible with 3D? Will 3D be reliable enough for enterprise and datacenter applications? These are some of the questions that this book helps answering by providing insights into 3D flash memory design, process technology and applications.

Combines in one volume the basics of evolving radio access technologies and their implementation in mobile phones Reviews the evolution of radio access technologies (RAT) used in mobile phones and then focuses on the technologies needed to implement the LTE (Long term evolution) capability Coverage includes the architectural aspects of the RF and digital baseband parts before dealing in more detail with some of the hardware implementation Unique coverage of design parameters and operation details for LTE-A phone transceiver Discusses design of multi-RAT Mobile with the consideration of cost and form factors Provides in one book a review of the evolution of radio access technologies and a good overview of LTE and its implementation in a handset Unveils the concepts and research updates of 5G technologies and the internal hardware and software of a 5G phone

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.

This book shows readers how to design semiconductor devices using the most common and lowest cost logic CMOS processes. Readers will benefit from the author's extensive, industrial experience and the practical approach he describes for designing efficiently semiconductor devices that typically have to be implemented using specialized processes that are expensive, time-consuming, and low-yield. The author presents an integrated picture of semiconductor device physics and manufacturing techniques, as well as numerous practical examples of device designs that are tried and true.

The large scale integration and planar scaling of individual system chips is reaching an expensive limit. If individual chips now, and later terrabyte memory blocks, memory macros, and processing cores, can be tightly linked in optimally designed and processed small footprint vertical stacks, then performance can be increased, power reduced and cost contained. This book reviews for the electronics industry engineer, professional and student the critical areas of development for 3D vertical memory chips including: gate-all-around and junction-less nanowire memories, stacked thin film and double gate memories, terrabit vertical channel and vertical gate stacked NAND flash, large scale stacking of Resistance RAM cross-point arrays, and 2.5D/3D stacking of memory and processor chips with through-silicon-via connections now and remote links later. Key features: Presents a review of the status and trends in 3-dimensional vertical memory chip technologies. Extensively reviews advanced vertical memory chip technology and development Explores technology process routes and 3D chip integration in a single reference

This book provides readers with a broad overview of integrated circuits, also generally referred to as micro-electronics. The presentation is designed to be accessible to readers with limited, technical knowledge and coverage includes key aspects of integrated circuit design, implementation, fabrication and application. The author complements his discussion with a large number of diagrams and photographs, in order to reinforce the explanations. The book is divided into two parts, the first of which is specifically developed for people with almost no or little technical knowledge. It presents an overview of the electronic evolution and discusses the similarity between a chip floor plan and a city plan, using metaphors to help explain concepts. It includes a summary of the chip development cycle, some basic definitions and a variety of applications that use integrated circuits. The second part digs deeper into the details and is perfectly suited for professionals working in one of the semiconductor disciplines who want to broaden their semiconductor horizon.

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. This book provides an introduction to digital storage for consumer electronics. It discusses the various types of digital storage, including emerging non-volatile solid-state storage technologies and their advantages and disadvantages. It discusses the best practices for selecting, integrating, and using storage devices for various applications. It explores the networking of devices into an overall organization that results in always-available home storage combined with digital storage in the cloud to create an infrastructure to support emerging consumer applications and the Internet of Things. It also looks at the role of digital storage devices in creating security and privacy in consumer products.

Digital photography, MP3, digital video, etc. make extensive use of NAND-based Flash cards as storage media. To realize how much NAND Flash memories pervade every aspect of our life, just imagine how our recent habits would change if the NAND memories suddenly disappeared. To take a picture it would be necessary to find a film (as well as a traditional camera...), disks or even magnetic tapes would be used to record a video or to listen a song, and a cellular phone would return to be a simple mean of communication rather than a multimedia console. The development of NAND Flash memories will not be set down on the mere evolution of personal entertainment systems since a new killer application can trigger a further success: the replacement of Hard Disk Drives (HDDs) with Solid State Drives (SSDs). SSD is made up by a microcontroller and several NANDs. As NAND is the technology driver for IC circuits, Flash designers and technologists have to deal with a lot of challenges. Therefore, SSD (system) developers must understand Flash technology in order to exploit its benefits and countermeasure its weaknesses. Inside NAND Flash Memories is a comprehensive guide of the NAND world: from circuits design (analog and digital) to Flash reliability (including radiation effects), from testing issues to high-performance (DDR) interface, from error correction codes to NAND applications like Flash cards and SSDs.

With the advance of semiconductors and ubiquitous computing, the use of system-on-a-chip (SoC) has become an essential technique to reduce product cost. With this progress and continuous reduction of feature sizes, and the development of very large-scale integration (VLSI) circuits, addressing the harder problems requires fundamental understanding of circuit and layout design issues. Furthermore, engineers can often develop their physical intuition to estimate the behavior of circuits rapidly without relying predominantly on computer-aided design (CAD) tools. Introduction to VLSI Systems: A Logic, Circuit, and System Perspective addresses the need for teaching such a topic in terms of a logic, circuit, and system design perspective. To achieve the above-mentioned goals, this classroom-tested book focuses on: Implementing a digital system as a full-custom integrated circuit Switch logic design and useful paradigms that may apply to various static and dynamic logic families The fabrication and layout designs of complementary metal-oxide-semiconductor (CMOS) VLSI Important issues of modern CMOS processes, including deep submicron devices, circuit optimization, interconnect modeling and optimization, signal integrity, power integrity, clocking and timing, power dissipation, and electrostatic discharge (ESD) Introduction to VLSI Systems builds an understanding of integrated circuits from the bottom up, paying much attention to logic circuit, layout, and system designs. Armed with these tools, readers can not only comprehensively understand the features and limitations of modern VLSI technologies, but also have enough background to adapt to this ever-changing field.

NAND flash memories are ubiquitous in their use as portable storage media in cellphones, cameras, music players, and other portable electronic devices. The NAND flash memory device, consisting of a floating-gate transistor cell, is the most aggressively scaled electronic device, as evidenced by ever-increasing memory capacities. In this work, we will examine possible problems arising from continued scaling of these structures, and discuss novel solutions to overcome them. Firstly, we investigate scaling of the conventional poly-silicon floating-gate, aimed at reducing cell-to-cell interference. We experimentally delineate a new reliability concern for the first time, with programming current through ultra-thin poly-silicon floating-gates becoming increasingly ballistic. We also experimentally demonstrate doping-related issues in the poly-silicon floating-gate. We then apply a novel metal-based floating-gate cell for the first time, designed to overcome the problems discussed above. We explore factors that influence the choice of metal, and demonstrate excellent functionality in ultra-thin metal floating-gate cells scaled down to 3 nm TiN floating-gate thickness, thus greatly reducing cell-to-cell interference. Finally, in order to facilitate continued scaling of the control dielectric, we explore replacement of the conventional silicon oxide-nitride dielectric with high-k dielectric materials. We integrate poly-silicon and metal floating-gate cells with Al₂O₃ high-k control dielectric. Further, we establish that a deeper work-

function control gate is helpful in reducing gate-injection. Combining ultra-thin metal floating-gate, high-k control dielectric and deep work-function control gate, we enable the planar floating-gate cell as a scalable candidate.

The subject of this book is to introduce a model-based quantitative performance indicator methodology applicable for performance, cost and reliability optimization of non-volatile memories. The complex example of flash memories is used to introduce and apply the methodology. It has been developed by the author based on an industrial 2-bit to 4-bit per cell flash development project. For the first time, design and cost aspects of 3D integration of flash memory are treated in this book. Cell, array, performance and reliability effects of flash memories are introduced and analyzed. Key performance parameters are derived to handle the flash complexity. A performance and array memory model is developed and a set of performance indicators characterizing architecture, cost and durability is defined. Flash memories are selected to apply the Performance Indicator Methodology to quantify design and technology innovation. A graphical representation based on trend lines is introduced to support a requirement based product development process. The Performance Indicator methodology is applied to demonstrate the importance of hidden memory parameters for a successful product and system development roadmap. Flash Memories offers an opportunity to enhance your understanding of product development key topics such as: · Reliability optimization of flash memories is all about threshold voltage margin understanding and definition; · Product performance parameter are analyzed in-depth in all aspects in relation to the threshold voltage operation window; · Technical characteristics are translated into quantitative performance indicators; · Performance indicators are applied to identify and quantify product and technology innovation within adjacent areas to fulfill the application requirements with an overall cost optimized solution; · Cost, density, performance and durability values are combined into a common factor – performance indicator - which fulfills the application requirements

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

Synthesising fifteen years of research, this authoritative text provides a comprehensive treatment of two major technologies for wireless chip and module interface design, covering technology fundamentals, design considerations and tradeoffs, practical implementation considerations, and discussion of practical applications in neural network, reconfigurable processors, and stacked SRAM. It explains the design principles and applications of two near-field wireless interface technologies for 2.5-3D IC and module integration respectively, and describes system-level performance benefits, making this an essential resource for researchers, professional engineers and graduate students performing research in next-generation wireless chip and module interface design.

The distributed computing infrastructure known as 'the Grid' has undoubtedly been one of the most successful science-oriented large-scale IT projects of the past 20 years. It is now a fully operational international entity, encompassing several hundred computing sites on all continents and giving access to hundreds of thousands of CPU (central processing unit) cores and hundreds of petabytes of storage, all connected by robust national and international scientific networks. It has evolved to become the main computational platform many scientific communities. This book presents lectures from the Enrico Fermi International School of Physics summer school Grid and Cloud computing: Concepts and Practical Applications, held in Varenna, Italy, in July 2014. The school aimed to cover the conceptual and practical aspects of both the Grid and Cloud computing. The proceedings included here are divided into eight chapters, with chapters 1, 2, 3 and 8 covering general applications of Grid and Cloud computing in various scientific fields, while chapters 4, 5, 6 and 7 discuss specific technical areas of Grid and Cloud structures. The book will be of interest to all those whose work involves the use of the Grid or Cloud computing.

The revised second edition of this respected text provides a state-of-the-art overview of the main topics relating to solid state drives (SSDs), covering NAND flash memories, memory controllers (including both hardware and software), I/O interfaces (PCIe/SAS/SATA), reliability, error correction codes (BCH and LDPC), encryption, flash signal processing and hybrid storage. Updated throughout to include all recent work in the field, significant changes for the new edition include: A new chapter on flash memory errors and data recovery procedures in SSDs for reliability and lifetime improvement Updated coverage of SSD Architecture and PCI Express Interfaces moving from PCIe Gen3 to PCIe Gen4 and including a section on NVMe over fabric (NVMe) An additional section on 3D flash memories An update on standard reliability procedures for SSDs Expanded coverage of BCH for SSDs, with a specific section on detection A new section on non-binary Low-Density Parity-Check (LDPC) codes, the most recent advancement in the field A description of randomization in the protection of SSD data against attacks, particularly relevant to 3D architectures The SSD market is booming, with many industries placing a huge effort in this space, spending billions of dollars in R&D and product development. Moreover, flash manufacturers are now moving to 3D architectures, thus enabling an even higher level of storage capacity. This book takes the reader through the fundamentals and brings them up to speed with the most recent developments in the field, and is suitable for advanced students, researchers and engineers alike.

COMPUTER ORGANIZATION AND ARCHITECTURE: THEMES AND VARIATIONS stresses the structure of the complete system (CPU, memory, buses and peripherals) and reinforces that core content with an emphasis on divergent examples. This approach to computer architecture is an effective arrangement that provides sufficient detail at the logic

and organizational levels appropriate for EE/ECE departments as well as for Computer Science readers. The text goes well beyond the minimal curriculum coverage and introduces topics that are important to anyone involved with computer architecture in a way that is both thought provoking and interesting to all. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Seeking the Truth from Mobile Evidence: Basic Fundamentals, Intermediate and Advanced Overview of Current Mobile Forensic Investigations will assist those who have never collected mobile evidence and augment the work of professionals who are not currently performing advanced destructive techniques. This book is intended for any professional that is interested in pursuing work that involves mobile forensics, and is designed around the outcomes of criminal investigations that involve mobile digital evidence. Author John Bair brings to life the techniques and concepts that can assist those in the private or corporate sector. Mobile devices have always been very dynamic in nature. They have also become an integral part of our lives, and often times, a digital representation of where we are, who we communicate with and what we document around us. Because they constantly change features, allow user enabled security, and or encryption, those employed with extracting user data are often overwhelmed with the process. This book presents a complete guide to mobile device forensics, written in an easy to understand format. Provides readers with basic, intermediate, and advanced mobile forensic concepts and methodology Thirty overall chapters which include such topics as, preventing evidence contamination, triaging devices, troubleshooting, report writing, physical memory and encoding, date and time stamps, decoding Multi-Media-Messages, decoding unsupported application data, advanced validation, water damaged phones, Joint Test Action Group (JTAG), Thermal and Non-Thermal chip removal, BGA cleaning and imaging, In-System-Programming (ISP), and more Popular JTAG boxes – Z3X and RIFF/RIFF2 are expanded on in detail Readers have access to the companion guide which includes additional image examples, and other useful materials

Offers a comprehensive overview of NAND flash memories, with insights into NAND history, technology, challenges, evolutions, and perspectives Describes new program disturb issues, data retention, power consumption, and possible solutions for the challenges of 3D NAND flash memory Written by an authority in NAND flash memory technology, with over 25 years' experience

Winner, 2013 PROSE Award, Engineering and Technology Concise, high quality and comparative overview of state-of-the-art electron device development, manufacturing technologies and applications Guide to State-of-the-Art Electron Devices marks the 60th anniversary of the IRE electron devices committee and the 35th anniversary of the IEEE Electron Devices Society, as such it defines the state-of-the-art of electron devices, as well as future directions across the entire field. Spans full range of electron device types such as photovoltaic devices, semiconductor manufacturing and VLSI technology and circuits, covered by IEEE Electron and Devices Society Contributed by internationally respected members of the electron devices community A timely desk reference with fully-integrated colour and a unique lay-out with sidebars to highlight the key terms Discusses the historical developments and speculates on future trends to give a more rounded picture of the topics covered A valuable resource R&D managers; engineers in the semiconductor industry; applied scientists; circuit designers; Masters students in power electronics; and members of the IEEE Electron Device Society.

In the summer of 2009, leading professionals from industry, government, and academia gathered for a free-spirited debate on the future trends of microelectronics. This volume represents the summary of their valuable contributions. Providing a cohesive exploration and holistic vision of semiconductor microelectronics, this text answers such questions as: What is the future beyond shrinking silicon devices and the field-effect transistor principle? Are there green pastures beyond the traditional semiconductor technologies? This resource also identifies the direction the field is taking, enabling microelectronics professionals and students to conduct research in an informed, profitable, and forward-looking fashion.

Our report on 3D stacked memory technology covers the Intellectual Property (Patent) landscape of this rapidly evolving technology and monitors its various sub-domains for licensing activity. We have analyzed the IP portfolios of SanDisk, Micron, Samsung, IBM and other major players to find the focus areas of their patenting efforts. Using our proprietary patent analytics tool, LexScore™, we identify the front runners in this technology domain with strong patent portfolio quality as well as a heavy patent filing activity. Using our proprietary Licensing Heat-map framework, we also predict licensing activity trend in various technology sub domains.

Rising consumer demand for low power consumption electronics has generated a need for scalable and reliable memory devices with low power consumption. At present, scaling memory devices and lowering their power consumption is becoming more difficult due to unresolved challenges, such as short channel effect, Drain Induced Barrier Lowering (DIBL), and sub-surface punch-through effect, all of which cause high leakage currents. As a result, the introduction of different memory architectures or materials is crucial. Nanomaterials-based Charge Trapping Memory Devices provides a detailed explanation of memory device operation and an in-depth analysis of the requirements of future scalable and low powered memory devices in terms of new materials properties. The book presents techniques to fabricate nanomaterials with the desired properties. Finally, the book highlights the effect of incorporating such nanomaterials in memory devices. This book is an important reference for materials scientists and engineers, who are looking to develop low-powered solutions to meet the growing demand for consumer electronic products and devices. Explores in depth memory device operation, requirements and challenges Presents fabrication methods and characterization results of new nanomaterials using techniques, including laser ablation of nanoparticles, ALD growth of nano-islands, and agglomeration-based technique of nanoparticles Demonstrates how nanomaterials affect the performance of memory devices 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.

The release of this second volume of CHIPS 2020 coincides with the 50th anniversary of Moore's Law, a critical year marked by the end of the nanometer roadmap and by a significantly reduced annual rise in chip performance. At the same time, we are witnessing a data explosion in the Internet, which is consuming 40% more electrical power every year, leading to fears of a major blackout of the Internet by 2020. The messages of the first CHIPS 2020, published in 2012, concerned the realization of quantum steps for improving the energy efficiency of all

chip functions. With this second volume, we review these messages and amplify upon the most promising directions: ultra-low-voltage electronics, nanoscale monolithic 3D integration, relevant-data, brain- and human-vision-inspired processing, and energy harvesting for chip autonomy. The team of authors, enlarged by more world leaders in low-power, monolithic 3D, video, and Silicon brains, presents new vistas in nanoelectronics, promising Moore-like exponential growth sustainable through to the 2030s.

Mohammed Rajab proposes different technologies like the error correction coding (ECC), sources coding and offset calibration that aim to improve the reliability of the NAND flash memory with low implementation costs for industrial application. The author examines different ECC schemes based on concatenated codes like generalized concatenated codes (GCC) which are applicable for NAND flash memories by using the hard and soft input decoding. Furthermore, different data compression schemes are examined in order to reduce the write amplification effect and also to improve the error correct capability of the ECC by combining both schemes.

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