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Designs in nanoelectronics

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often lead to challenging simulation problems and include strong feedback couplings. Industry demands provisions for variability in order to guarantee quality and yield. It also requires the

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incorporation of higher abstraction levels to allow for system simulation in order to shorten the design cycles, while at the same time preserving accuracy. The methods developed here

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promote a methodology for circuit-and-system-level modelling and simulation based on best practice rules, which are used to deal with coupled electromagnetic field-circuit-heat problems, as well

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as coupled electro-thermal-stress problems that emerge in nanoelectronic designs. This book covers: (1) advanced monolithic/multirate/co-simulation techniques, which are combined with

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envelope/wavelet approaches to create efficient and robust simulation techniques for strongly coupled systems that exploit the different dynamics of sub-systems within multiphysics problems, and

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which allow designers to predict reliability and ageing; (2) new generalized techniques in Uncertainty Quantification (UQ) for coupled problems to include a variability capability such that robust design and

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optimization, worst case analysis, and yield estimation with tiny failure probabilities are possible (including large deviations like 6-sigma); (3) enhanced sparse, parametric Model Order Reduction

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techniques with a posteriori error estimation for coupled problems and for UQ to reduce the complexity of the sub-systems while ensuring that the operational and coupling parameters can still be varied

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and that the reduced models offer higher abstraction levels that can be efficiently simulated. All the new algorithms produced were implemented, transferred and tested by the EDA vendor

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MAGWEL. Validation was conducted on industrial designs provided by end-users from the semiconductor industry, who shared their feedback, contributed to the measurements, and supplied

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both material data and process data. In closing, a thorough comparison to measurements on real devices was made in order to demonstrate the algorithms' industrial applicability.

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Organic Electronics is a novel field of electronics that has gained an incredible attention over the past few decades. New materials, device architectures and applications have been continuously

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introduced by the academic and also industrial communities, and novel topics have raised strong interest in such communities, as molecular doping, thermoelectrics, bioelectronics

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and many others. Organic Flexible Electronics is mainly divided into three sections. The first part is focused on the fundamentals of organic electronics, such as charge transport models in these

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systems and new approaches for the design and synthesis of novel molecules. The first section addresses the main challenges that are still open in this field, including the important role of interfaces for

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achieving high-performing devices or the novel approaches employed for improving reliability issues. The second part discusses the most innovative devices which have been developed in recent

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years, such as devices for energy harvesting, flexible batteries, high frequency circuits, and flexible devices for tattoo electronics and bioelectronics. Finally the book reviews the most important

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applications moving from more standard flexible back panels to wearable and textile electronics and more futuristic applications like ingestible systems. Reviews the fundamental properties and

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methods for optimizing organic electronic materials including chemical doping and techniques to address stability issues; Discusses the most promising organic electronic devices for energy, electronics,

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and biomedical applications;
Addresses key applications of
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difficulty and more clearly associated with specific chapter sections.

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microelectronic circuits for energy harvesting, broadband energy conversion, new methods and technologies for energy conversion. The author also discusses the design of power management circuits and the implementation of voltage

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device characteristics, represents a major challenge for materials scientists. Continuous semiconducting thin films with large carrier mobilities are particularly desirable for high-speed microelectronic applications,

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potentially providing new opportunities for the development of low-cost, large-area, flexible computing devices, displays, sensors, and solar cells. To date, the majority of solution-processing research has focused on molecular

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and polymeric organic films. In contrast, this book reviews recent achievements in the search for solution-processed inorganic semiconductors and other critical electronic components. These components offer the potential for

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better performance and more robust thermal and mechanical stability than comparable organic-based systems. Solution Processing of Inorganic Materials covers everything from the more traditional fields of sol-gel processing and

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chemical bath deposition to the cutting-edge use of nanomaterials in thin-film deposition. In particular, the book focuses on materials and techniques that are compatible with high-throughput, low-cost, and low-temperature deposition processes

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such as spin coating, dip coating, printing, and stamping. Throughout the text, illustrations and examples of applications are provided to help the reader fully appreciate the concepts and opportunities involved in this exciting field. In addition to

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presenting the state-of-the-art research, the book offers extensive background material. As a result, any researcher involved or interested in electronic device fabrication can turn to this book to become fully versed in the solution-processed

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inorganic materials that are set to revolutionize the electronics industry.

This book guides readers through the entire complex of interrelated theoretical and practical aspects of the end-to-end design and

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organization of production of silicon submicron integrated circuits. The discussion includes the theoretical foundations of the operation of field-effect- and bipolar transistors, the methods and peculiarities of the structural and schematic design,

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basic circuit-design and system-design engineering solutions for bipolar, CMOS, BiCMOS and TTL integrated circuits, standard design libraries, and typical design flows. Provides a detailed description of the physical mechanisms and

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electronic devices for private and industrial purposes lead designers and researchers to explore new electronic devices and circuits that can perform several tasks efficiently with low IC area and low power consumption. In addition, the

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increasing demand for portable devices intensifies the call from industry to design sensor elements, an efficient storage cell, and large capacity memory elements. Several industry-related issues have also forced a redesign of basic electronic

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components for certain specific applications. The researchers, designers, and students working in the area of electronic devices, circuits, and materials sometimes need standard examples with certain specifications. This

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practical circuit designs. This work presents a total of over 300 practical circuits, diagrams, and tables.

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2 to 9 deal with a specific type of waveform generator, including sine, square, triangular, sawtooth, and special waveform generators pulse. These chapters also include pulse generator, time

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IC generator, and waveform synthesizer circuits. Chapter 10 examines the characteristics of phase-locked loop circuits, while Chapter 11 looks into the miscellaneous applications of

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the ubiquitous "555" timer type of integrated circuit. The appendix presents a number of useful waveform generator design charts, as an aid to those readers who wish to design or modify

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generator circuits to their own specifications. This book will prove useful to practical design engineers, technicians, experimenters, and electronics students.

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includes pioneering results of research on magnetoelectronics of millimetric waves.

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electronics throughout the book. Extensive pedagogical features including numerous design examples, problem solving technique sections, Test Your Understanding questions, and chapter checkpoints lend to this classic text. The author, Don Neamen, has many years experience as an

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provided answers have all been updated. Design Applications are included at the end of chapters. A specific electronic design related to that chapter is presented. The various stages in the design of an electronic thermometer are explained throughout the text. Specific Design Problems and

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*Examples are highlighted throughout
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hold some fairly large conferences and numerous workshops, have a journal, and there are over one hundred books on testing. Still, a full course on testing is offered only at a few universities, mostly by

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professors who have a research interest in this area. Apparently, most professors would not have taken a course on electronic testing when they were students. Other than the computer engineering

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curriculum being too crowded, the major reason cited for the absence of a course on electronic testing is the lack of a suitable textbook. For VLSI the foundation was provided by semiconductor device techn-

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ogy, circuit design, and electronic testing. In a computer engineering curriculum, therefore, it is necessary that foundations should be taught before applications. The field of VLSI has expanded to systems-

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This issue of ECS Transactions features eight invited and sixty-seven regular papers on technology, devices, systems, optoelectronics, modeling and characterization; all either directly or indirectly related to microelectronics. The topics presented herein reveal the multidisciplinary

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character of this field, which definitely incites the highly cooperative trace of human nature.

The need for advanced thermal management materials in electronic packaging has been widely recognized as thermal challenges become barriers to the electronic industry's ability to

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provide continued improvements in device and system performance. With increased performance requirements for smaller, more capable, and more efficient electronic power devices, systems ranging from active electronically scanned radar arrays to web servers all require components

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that can dissipate heat efficiently. This requires that the materials have high capability of dissipating heat and maintaining compatibility with the die and electronic packaging. In response to critical needs, there have been revolutionary advances in thermal management materials and

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provides: solutions to the book's problems; additional homework problems without solutions; SPICE simulation examples using HSPICE, LTspice, and WinSpice; layout tools and examples for actually fabricating a chip; and videos to aid learning Art and Science of Microelectronic

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A collection of abstracts for talks presented at the 2014 CMOS Emerging Technologies Research Symposium in Grenoble, France, July 6-8, 2014. The CMOS Emerging Technologies Research Symposium is a research and business event for those who want to discuss and find out about new exciting high tech opportunities. The

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This book covers the fundamentals and significance of 2-D materials and related semiconductor transistor technologies for the next-generation ultra low power applications. It provides comprehensive coverage on advanced low power transistors such as NCFETs, FinFETs, TFETs, and

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flexible transistors for future ultra low power applications owing to their better subthreshold swing and scalability. In addition, the text examines the use of field-effect transistors for biosensing applications and covers design considerations and compact modeling of advanced low power transistors such as NCFETs, FinFETs, and

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TFETs. TCAD simulation examples are also provided. FEATURES Discusses the latest updates in the field of ultra low power semiconductor transistors Provides both experimental and analytical solutions for TFETs and NCFETs Presents synthesis and fabrication processes for FinFETs Reviews details on 2-D materials and 2-D transistors

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Explores the application of FETs for biosensing in the healthcare field This book is aimed at researchers, professionals, and graduate students in electrical engineering, electronics and communication engineering, electron devices, nanoelectronics and nanotechnology, microelectronics, and solid-state circuits.

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Sensors and Their Applications XII discusses novel research in the areas of sensors and transducers and provides insight into new and topical applications of this technology. It covers the underlying physics, fabrication technologies, and commercial applications of sensors. Some of the topics discussed include optical sensing, sensing

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materials, no

The proceedings of the Fourth Electronic Materials and Processing Conference, held in Montreal in 1991, cover the latest developments in multichip modules, surface mount technology, microelectronic interconnections, electronic and fiber optic connectors, and microelectronic corrosion

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