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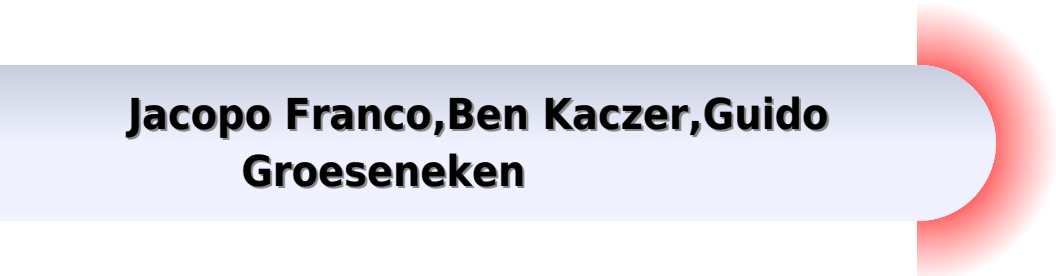
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Advanced Gate Stacks for High-Mobility Semiconductors

 Springer

**Advanced Gate Stacks For High Mobility
Semiconductors Springer Series In Advanced
Microelectronics**

**Jacopo Franco, Ben Kaczer, Guido
Groeseneken**



Advanced Gate Stacks For High Mobility Semiconductors Springer Series In Advanced Microelectronics:

Advanced Gate Stacks for High-Mobility Semiconductors Athanasios Dimoulas, Evgeni Gusev, Paul C. McIntyre, Marc Heyns, 2008-01-01 This book provides a comprehensive monograph on gate stacks in semiconductor technology. It covers the major latest developments and basics and will be useful as a reference work for researchers, engineers, and graduate students alike. The reader will get a clear view of what has been done so far, what is the state of the art, and which are the main challenges ahead before we come any closer to a viable Ge and III V MOS technology. **Handbook for Cleaning for**

Semiconductor Manufacturing Karen A. Reinhardt, Richard F. Reidy, 2011-04-12 Provides an in depth discussion of surface conditioning for semiconductor applications. The Handbook of Cleaning for Semiconductor Manufacturing Fundamentals and Applications provides an in depth discussion of surface conditioning for semiconductor applications. The fundamental physics and chemistry associated with wet processing is reviewed as well as surface and colloidal aspects of cleaning and etching. Topics covered in this new reference include Front end line FEOL and back end of line BEOL cleaning applications such as high k metal gate post etch cleaning and pore sealing, high dose implant stripping and cleaning, and germanium and silicon passivation. Formulation development practices, methodology, and new directions are presented, including chemicals used for preventing corrosion of copper lines, cleaning aluminium lines, reclaiming wafers, and water bonding, as well as the filtering and recirculating of chemicals, including reuse and recycling. Wetting, cleaning, and drying of features such as high aspect ratio features and hydrophilic surface states, especially how to dry without watermarks, the abilities to wet hydrophobic surfaces, and to remove liquid from deep features. The chemical reactions and mechanisms of silicon dioxide etching with hydrofluoric acid, particle removal with ammonium hydroxide, hydrogen peroxide mixture, and metal removal with hydrochloric acid. The Handbook of Cleaning for Semiconductor Manufacturing Fundamentals and Applications is a valuable resource for any engineer or manager associated with using or supplying cleaning and contamination free technologies for semiconductor manufacturing. Engineers working for semiconductor manufacturing, capital equipment, chemicals, or other industries that assure cleanliness of chemicals, material, and equipment in the manufacturing area will also find this handbook an indispensable reference. *Analytical Techniques for Semiconductor Materials and Process*

Characterization 6 (ALTECH 2009) Bernd O. Kolbesen, 2009-09 The proceedings of ALTECH 2009 address recent developments and applications of analytical techniques for semiconductor materials, processes, and devices. The papers comprise techniques of elemental and structural analysis for bulk and surface impurities and defects, thin films, as well as dopants in ultra shallow junctions. **Defects in High-k Gate Dielectric Stacks** Evgeni Gusev, 2006-01-27 The main goal of this book is to review at the nano and atomic scale the very complex scientific issues that pertain to the use of advanced high dielectric constant high k materials in next generation semiconductor devices. One of the key obstacles to integrate this novel class of materials into Si nano technology are the electronic defects in high k dielectrics. It has been established that

defects do exist in high k dielectrics and they play an important role in device operation. The unique feature of this book is a special focus on the important issue of defects. The subject is covered from various angles including silicon technology, processing aspects, materials properties, electrical defects, microstructural studies, and theory. The authors, who have contributed to the book, represent a diverse group of leading scientists from academic, industrial, and governmental labs worldwide who bring a broad array of backgrounds: basic and applied physics, chemistry, electrical engineering, surface science, and materials science. The contributions to this book are accessible to both expert scientists and engineers who need to keep up with leading edge research and newcomers to the field who wish to learn more about the exciting basic and applied research issues relevant to next generation device technology.

Green Photonics and Electronics Gadi Eisenstein, Dieter Bimberg, 2017-11-18. This book focuses on recent breakthroughs in the development of a variety of photonic devices serving distances ranging from mm to many km together with their electronic counterparts e.g. the drivers for lasers, the amplifiers, the detectors, and most important, the relevant advanced VLSI circuits. It explains that as a consequence of the increasing dominance of optical interconnects for high performance workstation clusters and supercomputers, their complete design has to be revised. This book thus covers for the first time the whole variety of interdependent subjects contributing to green photonics and electronics serving communication and energy harvesting. Alternative approaches to generate electric power using organic photovoltaic solar cells, inexpensive and again energy efficient in production, are summarized. In 2015, the use of the internet consumed 5.6% of the raw electricity production in developed countries. Power consumption increases rapidly and without some transformational change will use by the middle of the next decade at the latest the entire electricity production. This apocalyptic outlook led to a redirection of the focus of data center and HPC developers from just increasing bit rates and capacities to energy efficiency. The high speed interconnects are all based on photonic devices. These must and can be energy efficient but they operate in an electronic environment and therefore have to be considered in a wide scope that also requires low energy electronic devices, sophisticated circuit designs, and clever architectures. The development of the next generation of high performance exaFLOP computers suffers from the same problem. Their energy consumption based on present device generations is essentially prohibitive.

Almanach Österreichische Akademie der Wissenschaften, 2009. Vols for 1854-19 include section Die feierliche Jahressitzung called Die feierliche Sitzung 1854-1914. Die statutenmässige Jahressitzung 1915-21 published also separately 1848-99.

Fundamentals of Nanoscaled Field Effect Transistors Amit Chaudhry, 2013-04-23. Fundamentals of Nanoscaled Field Effect Transistors gives comprehensive coverage of the fundamental physical principles and theory behind nanoscale transistors. The specific issues that arise for nanoscale MOSFETs such as quantum mechanical tunneling and inversion layer quantization are fully explored. The solutions to these issues such as high technology strained Si technology, alternate device structures, and graphene technology are also given. Some case studies regarding the above issues and solutions are also given.

in the book **Reliability of High Mobility SiGe Channel MOSFETs for Future CMOS Applications** Jacopo Franco, Ben Kaczer, Guido Groeseneken, 2013-10-19 Due to the ever increasing electric fields in scaled CMOS devices reliability is becoming a showstopper for further scaled technology nodes Although several groups have already demonstrated functional Si channel devices with aggressively scaled Equivalent Oxide Thickness EOT down to 5 a 10 year reliable device operation cannot be guaranteed anymore due to severe Negative Bias Temperature Instability This book focuses on the reliability of the novel Si Ge channel quantum well pMOSFET technology This technology is being considered for possible implementation in next CMOS technology nodes thanks to its benefit in terms of carrier mobility and device threshold voltage tuning We observe that it also opens a degree of freedom for device reliability optimization By properly tuning the device gate stack sufficiently reliable ultra thin EOT devices with a 10 years lifetime at operating conditions are demonstrated The extensive experimental datasets collected on a variety of processed 300mm wafers and presented here show the reliability improvement to be process and architecture independent and as such readily transferable to advanced device architectures as Tri Gate finFET devices We propose a physical model to understand the intrinsically superior reliability of the MOS system consisting of a Ge based channel and a SiO₂ HfO₂ dielectric stack The improved reliability properties here discussed strongly support Si Ge technology as a clear frontrunner for future CMOS technology nodes

Advanced Gate Stacks for Strained Silicon Devices Yanxia Lin, 2005 Keywords Hafnium oxide mobility metal gate electrode *Physics and Technology of High-k Gate Dielectrics III* Samares Kar, 2006-01-01 This issue is the third in the series with this title and it brings state of the art information on all aspects of the high K gate stacks including high mobility substrates high K gate dielectric materials and processing gate electrode materials and processing high K gate dielectric interfaces advanced gate stack reliability high K gate dielectric characterization and methodologies and DRAM and non volatile memory materials

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