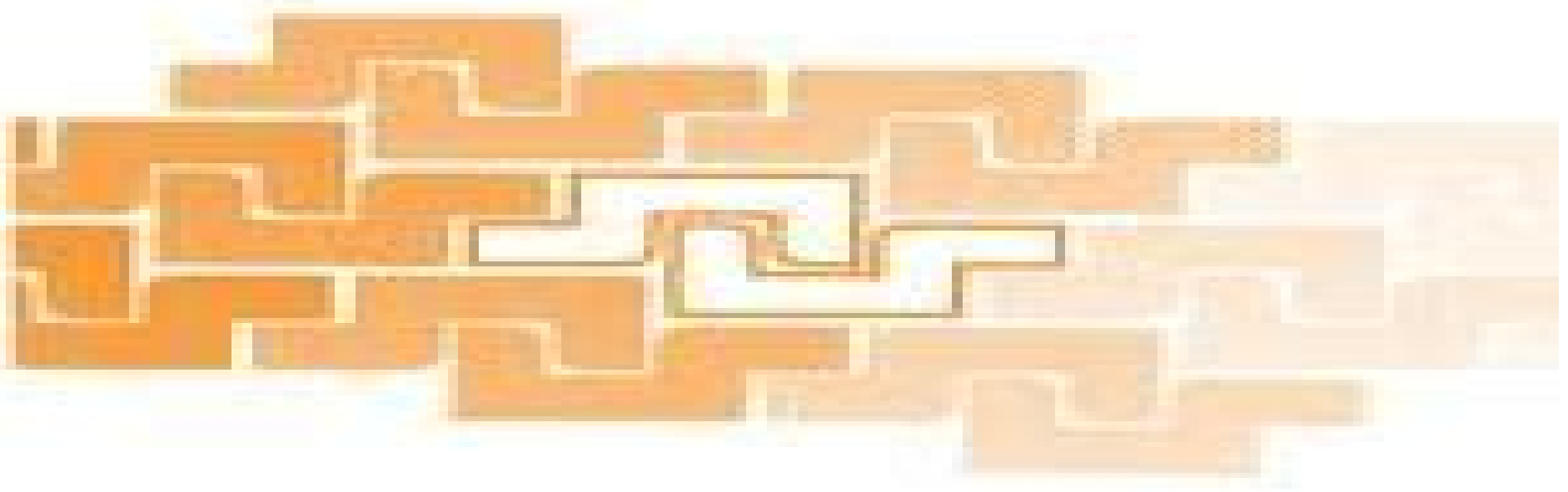




Novel Silicon Based Technologies

Edited by
R. A. Lowy

WILEY-Interscience

WILEY-Interscience, Applied Sciences, 1981, 1982

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Y. Shiraki, T.P. Pearsall, Erwin Kasper



Novel Silicon Based Technologies:

Novel Silicon Based Technologies R.A. Levy, 2012-12-06 Silicon as an electronic substrate has sparked a technological revolution that has allowed the realization of very large scale integration VLSI of circuits on a chip These 6 fingernail sized chips currently carry more than 10 components consume low power cost a few dollars and are capable of performing data processing numerical computations and signal conditioning tasks at gigabit per second rates Silicon as a mechanical substrate promises to spark another technological revolution that will allow computer chips to come with the eyes ears and even hands needed for closed loop control systems The silicon VLSI process technology which has been perfected over three decades can now be extended towards the production of novel structures such as epitaxially grown optoelectronic GaAs devices buried layers for three dimensional integration micromechanical mechanisms integrated photonic circuits and artificial neural networks This book begins by addressing the processing of electronic and optoelectronic devices produced by using lattice mismatched epitaxial GaAs films on Si Two viable technologies are considered In one silicon is used as a passive substrate in order to take advantage of its favorable properties over bulk GaAs in the other GaAs and Si are combined on the same chip in order to develop IC configurations with improved performance and increased levels of integration The relationships between device operation and substrate quality are discussed in light of potential electronic and optoelectronic applications

SiGe Based Technologies Y. Shiraki, T.P. Pearsall, Erwin Kasper, 1993-02-18 The preparation of silicon germanium microstructures their physical chemical and electrical characterization and their device processing and application are reviewed in this book Special emphasis is given to ultrathin Si Ge superlattices Topics covered include Wafer preparation and epitaxial growth surface effects driven phenomena such as clustering segregation surfactants Analysis both in situ and ex situ Strain adjustment methods High quality buffers Modification of material properties by quantum wells and superlattices Devices Novel concepts processing modelling demonstrators The questions highlighted particularly those articles comparing related or competing activities will provide a wealth of knowledge for all those interested in the future avenues of theory and applications in this field

Beyond Si-Based CMOS Devices Sangeeta Singh, Shashi Kant Sharma, Durgesh Nandan, 2024-09-02 This book focuses on summarizing recent research trends for new beyond CMOS and beyond silicon devices circuits and architectures for computing It reports the recent achievements in this field from leading research trends around the globe specifically focusing on nanoscale beyond silicon materials and devices functional nanomaterials nanoscale devices beyond CMOS devices materials and their opportunities and challenges The book is devoted to the fast evolving field of modern material science and nanoelectronics particularly to the physics and technology of functional nanomaterials and devices

Silicon Heterostructure Devices John D. Cressler, 2018-10-03 SiGe HBTs are the most mature of the Si heterostructure devices and not surprisingly the most completely researched and discussed in the technical literature However new effects and nuances of device operation are uncovered year after year as transistor scaling

advances and application targets march steadily upward in frequency and sophistication Providing a comprehensive treatment of SiGe HBTs Silicon Heterostructure Devices covers an amazingly diverse set of topics ranging from basic transistor physics to noise radiation effects reliability and TCAD simulation Drawn from the comprehensive and well reviewed Silicon Heterostructure Handbook this text explores SiGe heterojunction bipolar transistors HBTs heterostructure FETs various other heterostructure devices as well as optoelectronic components The book provides an overview characteristics and derivative applications for each device covered It discusses device physics broadband noise performance limits reliability engineered substrates and self assembling nanostructures Coverage of optoelectronic devices includes Si SiGe LEDs near infrared detectors photonic transistors for integrated optoelectronics and quantum cascade emitters In addition to this substantial collection of material the book concludes with a look at the ultimate limits of SiGe HBTs scaling It contains easy to reference appendices on topics including the properties of silicon and germanium the generalized Moll Ross relations and the integral charge control model and sample SiGe HBT compact model parameters

Advances in Integrated Optics M. Bertolotti, Arthur N. Chester, S. Martellucci, 2012-12-06 This volume contains the Proceedings of a two week summer conference titled Advances in Integrated Optics held June 1 9 1993 in Erice Sicily This was the 18th annual course organized by the International School of Quantum Electronics under the auspices of the Ettore Majorana Centre for Scientific Culture The term Integrated Optics signifies guided wave optical circuits consisting of two or more devices on a single substrate Since its inception in the late 1960 s Integrated Optics has evolved from a specialized research topic into a broad field of work ranging from basic research through commercial applications Today many devices are available on market while a big effort is devoted to research on integrated nonlinear optical devices This conference was organized to provide a comprehensive survey of the frontiers of this technology including fundamental concepts nonlinear optical materials devices both in the linear and nonlinear regimes and selected applications These Proceedings update and augment the material contained in a previous ISQE volume Integrated Optics Physics and Applications S Martellucci and A N Chester Eds NATO ASI Series B Vol 91 Plenum 1983 For some closely related technology the reader may also wish to consult the ISQE volumes Optical Fiber Sensors A N Chester S Martellucci and A M Scheggi Eds NATO ASI Series E Vol 132 Nijhoff 1987 and Nonlinear Optics and Optical Computing S Martellucci and A N Chester Eds E Majorana Int Science Series Vol 49 plenum 1990

Silicon Heterostructure Handbook John D. Cressler, 2018-10-03 An extraordinary combination of material science manufacturing processes and innovative thinking spurred the development of SiGe heterojunction devices that offer a wide array of functions unprecedented levels of performance and low manufacturing costs While there are many books on specific aspects of Si heterostructures the Silicon Heterostructure Handbook Materials Fabrication Devices Circuits and Applications of SiGe and Si Strained Layer Epitaxy is the first book to bring all aspects together in a single source Featuring broad comprehensive and in depth discussion this handbook distills the current state of the field in areas ranging from

materials to fabrication devices CAD circuits and applications The editor includes snapshots of the industrial state of the art for devices and circuits presenting a novel perspective for comparing the present status with future directions in the field With each chapter contributed by expert authors from leading industrial and research institutions worldwide the book is unequalled not only in breadth of scope but also in depth of coverage timeliness of results and authority of references It also includes a foreword by Dr Bernard S Meyerson a pioneer in SiGe technology Containing nearly 1000 figures along with valuable appendices the Silicon Heterostructure Handbook authoritatively surveys materials fabrication device physics transistor optimization optoelectronics components measurement compact modeling circuit design and device simulation

Frontiers In Electronics: Future Chips, Proceedings Of The 2002 Workshop On Frontiers In Electronics (Wofe-02) Yoon Soo Park, Michael S Shur, William Tang, 2003-01-29 The 2002 Workshop on Frontiers in Electronics was the third in the series of WOFE workshops Over 70 leading experts from academia industry and government agencies reported on the most recent developments in their fields and exchanged views on future trends and directions of the electronics and photonics industry The issues they addressed ranged from system on chip to DNA doping from ultrathin SOI to electrotiles from photonics integration on the ULSI platform to wide band gap semiconductor devices and solid state lighting The rapid pace of electronic technology evolution compels a merger of different technical areas and WOFE 02 provided a unique opportunity for cross fertilization of the emerging fields of microelectronics photonics and nanoelectronics The workshop was informal and stimulated provocative views visionary outlooks and discussions on controversial issues Diffraction Optics and Optical Microsystems S. Martellucci, Arthur N. Chester, 2013-06-29 Proceedings of the 20th Course of the International School of Quantum Electronics held in Erice Italy November 14 24 1996 **Vertical 3D Memory Technologies** Betty Prince, 2014-08-13 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 **Complementary Metal Oxide Semiconductor** Kim Ho Yeap, Humaira Nisar, 2018-08-01 In this book Complementary Metal Oxide Semiconductor CMOS devices are extensively discussed The topics encompass the technology advancement in the fabrication process of metal oxide semiconductor field effect transistors

or MOSFETs which are the fundamental building blocks of CMOS devices and the applications of transistors in the present and future eras. The book is intended to provide information on the latest technology development of CMOS to researchers, physicists as well as engineers working in the field of semiconductor transistor manufacturing and design.

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