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"As soon as she heard me enter, Elvia awoke from a light sleep that had overcome her as she anxiously waited: 'How did it go?' Excited, I exclaimed: 'It works!' We embraced, almost overwhelmed with feelings of euphoria and happiness, aware that something epochal had happened. On that cold January night of 1971, the world's first microprocessor was born!" The creation of the microprocessor launched the digital age. The key technology allowing unprecedented integration, and the design of the world's first microprocessor, the Intel 4004, were the achievement of Federico Faggin. Shrinking an entire computer onto a tiny and inexpensive piece of silicon would come to define our daily lives, imbuing myriad devices and everyday objects with computational intelligence. In Silicon, internationally recognized inventor and entrepreneur Federico Faggin chronicles his "four lives" his formative years in war-torn Northern Italy; his pioneering work in American microelectronics; his successful career as a high-tech entrepreneur; and his more recent explorations into the mysteries of consciousness. In this heartfelt memoir, Faggin paints vivid anecdotes, steps readers through society-changing technological breakthroughs, and shares personal insights, as each of his lives propels the next. A strong effort is has been devoted to the investigation of defects and diffusion phenomena in silicon. This effort is not only driven by the stringent technological requirements for the processing of integrated circuits of increased complexity and miniaturization, but also by the lack of fundamental understanding of many of the critical parameters and mechanisms involved. Experimental and theoretical investigations are needed to identify the properties of the defects, the mechanisms of impurity diffusion and the strength of impurity-defect, defect-defect, and impurity-impurity interactions. This book provides a unique and interdisciplinary forum for the discussion of experimental, theoretical and applied aspects of defects and diffusion phenomena in silicon. Topics include: defect properties and diffusion phenomena in silicon; experimental and theoretical assessments of defect properties; transient-enhanced diffusion and dopant clustering; damage evolution and extended defects and gettering procedures. Like the Greeks who sailed with Jason in search of the Golden Fleece, the new Argonauts--foreign-born, technically skilled entrepreneurs who travel back and forth between Silicon Valley and their home countries--seek their fortune in distant lands by launching companies far from established centers of skill and technology. Their story illuminates profound transformations in the global economy. Economic geographer AnnaLee Saxenian has followed this transformation, exploring one of its great paradoxes: how the "brain drain" has become "brain circulation," a powerful economic force for development of formerly peripheral regions. The new Argonauts--armed with Silicon Valley experience and relationships and the ability to operate in two countries simultaneously--quickly identify market opportunities, locate foreign partners, and manage cross-border business operations. The New Argonauts extends Saxenian's pioneering research into the dynamics of competition in Silicon Valley. The book brings a fresh perspective to the way that technology entrepreneurs build regional advantage in order to compete in global markets. Scholars, policymakers, and business leaders will benefit from Saxenian's firsthand research into the investors and entrepreneurs who return home to start new companies while remaining tied to powerful economic and professional communities in the United States. For Americans accustomed to unchallenged economic domination, the fast-growing capabilities of China and India may seem threatening. But as Saxenian convincingly displays in this pathbreaking book, the Argonauts have made America richer, not poorer. Nuclear spins are highly coherent quantum objects that were featured in early ideas and demonstrations of quantum information processing. In silicon, the high-fidelity coherent control of a single phosphorus

(31-P) nuclear spin I=1/2 has demonstrated record-breaking coherence times, entanglement, and weak measurements. In this thesis, we demonstrate the coherent quantum control of a single antimony (123-Sb) donor atom, whose higher nuclear spin I = 7/2 corresponds to eight nuclear spin states. However, rather than conventional nuclear magnetic resonance (NMR), we employ nuclear electric resonance (NER) to drive nuclear spin transitions using localized electric fields produced within a silicon nanoelectronic device. This method exploits an idea first proposed in 1961 but never realized experimentally with a single nucleus, nor in a non-polar crystal such as silicon. We then present a realistic proposal to construct a chaotic driven top from the nuclear spin of 123-Sb. Signatures of chaos are expected to arise for experimentally realizable parameters of the system, allowing the study of the relation between quantum decoherence and classical chaos, and the observation of dynamical tunneling. These results show that high-spin quadrupolar nuclei could be deployed as chaotic models, strain sensors, hybrid spin-mechanical quantum systems, and quantum-computing elements using all-electrical controls. An archaeologist explores the material culture of Silicon Valley. This book introduces to non-experts several important processes of impurity doping in silicon and goes on to discuss the methods of determination of the concentration of dopants in silicon. The conventional method used is the discussion process, but, since it has been sufficiently covered in many texts, this work describes the double-diffusion method. This book provides a review of research on single-electron devices and circuits in silicon. It considers the design, fabrication, and characterization of single-electron transistors, single-electron memory devices, few-electron transfer devices such as electron pumps and turnstiles, and single-electron logic devices. In all cases, a review of various device designs is provided, and in many cases, the devices developed during the author's own research work are used as detailed examples. An introduction to the physics of the single-electron charging effects is also provided. Neuromorphic Systems Engineering: Neural Networks in Silicon emphasizes three important aspects of this exciting new research field. The term neuromorphic expresses relations to computational models found in biological neural systems, which are used as inspiration for building large electronic systems in silicon. By adequate engineering, these silicon systems are made useful to mankind. Neuromorphic Systems Engineering: Neural Networks in Silicon provides the reader with a snapshot of neuromorphic engineering today. It is organized into five parts viewing state-of-the-art developments within neuromorphic engineering from different perspectives. Neuromorphic Systems Engineering: Neural Networks in Silicon provides the first collection of neuromorphic systems descriptions with firm foundations in silicon. Topics presented include: large scale analog systems in silicon neuromorphic silicon auditory (ear) and vision (eye) systems in silicon learning and adaptation in silicon merging biology and technology micropower analog circuit design analog memory analog interchipcommunication on digital buses £/LIST£ Neuromorphic Systems Engineering: Neural Networks in Silicon serves as an excellent resource for scientists, researchers and engineers in this emerging field, and may also be used as a text for advanced courses on the subject. An award-winning documentary photographer presents a striking visual history of the Silicon Valley technology boom that reflects key moments in the careers of Steve Jobs, Bill Gates and other leading innovators. This work presents a comprehensive theory describing atomic diffusion in silicon crystals under strong nonequilibrium conditions caused by ion implantation and interaction with the surface or other interfaces. A set of generalized equations that describe diffusion of impurity atoms and point defects are presented in a form suitable for solving numerically. Based on this theory, partial diffusion models are constructed, and the simulation of many doping processes used in microelectronics is carried out.Coupled Diffusion of Impurity Atoms and Point Defects in Silicon Crystals is a useful text for researchers, engineers, and advanced students in semiconductor physics, microelectronics, and nanoelectronics. It helps readers acquire a deep understanding of the physics of diffusion and demonstrates the practical application of the theoretical ideas formulated to find cheaper solutions in the course of manufacturing semiconductor devices and integrated microcircuits. Advances in Silicon Dioxide Research and Application / 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Silicon Dioxide. The editors have built Advances in Silicon Dioxide Research and Application / 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Silicon Dioxide in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Advances in Silicon Dioxide Research and Application / 2012 Edition has been produced by the world’s leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/. This volume reviews the latest understanding of the behavior and roles of oxygen in silicon, which will carry the field into the ULSI era from the experimental and theoretical points of view. The fourteen chapters, written by recognized authorities representing industrial and academic institutions, cover thoroughly the oxygen related phenomena from the crystal growth to device fabrication processes, as well as indispensable diagnostic techniques for oxygen. Comprehensive study of the behavior of oxygen in silicon Discusses silicon crystals for VLSI and ULSI applications Thorough coverage from crystal growth to device fabrication Edited by technical experts in the field Written by recognized authorities from industrial and academic institutions Useful to graduate students, scientists in other disciplines, and active participants in the arena of silicon-based microelectronics research 297 original line drawings Metal Impurities in Silicon-Device Fabrication treats the transition-metal impurities generated during the fabrication of silicon samples and devices. The different mechanisms responsible for contamination are discussed, and a survey is given of their impact on device performance. The specific properties of the main and rare impurities in silicon are examined, as well as the detection methods and requirements in modern technology. Finally, impurity gettering is studied along with modern techniques to determine the gettering efficiency. In all of these subjects, reliable and up-to-date data are presented. This monograph provides a thorough review of the results of recent scientific investigations, as well as the relevant data and properties of the various metal impurities in silicon. The new edition includes important recent data and a number of new tables. Hydrogen plays an important role in silicon technology, having a profound effect on a wide range of properties. Thus, the study of hydrogen in semiconductors has received much attention from an interdisciplinary assortment of researchers. This sixteen-chapter volume provides a comprehensive review of the field, including a discussion of hydrogenation methods, the use of hydrogen to passivate defects, the use of hydrogen to neutralize deep levels, shallow acceptors and shallow donors in silicon, vibrational spectroscopy, and hydrogen-induced defects in silicon. In addition to this detailed coverage of hydrogen in silicon, chapters are provided that discuss hydrogen-related phenomena in germanium and the neutralization of defects and dopants in III*b1V semiconductors. Provides the most in-depth coverage of hydrogen in silicon available in a single source**Includes an extensive chapter on the neutralization of defects in III*b1V semiconductors**Combines both experimental and theoretical studies to form a comprehensive reference It was fOlllld as long ago as 1954 that heating oxygen rich silicon to around 450°C produced electrical active defects - the so called thermal donors. The inference was that the donors were created by some defect produced by the aggregation of oxygen. Since then, there has been an enor mous amount of work carried out to elucidate the detailed mechanism by which they, and other defects, are generated. This task has been made all the more relevant as silicon is one of the most important technological ma terials in everyday use and oxygen is its most common impurity. However, even after forty years, the details of the processes by which the donors and other defects are generated are still obscure. The difficulty of the problem is made more apparent when it is realised that there is only one oxygen atom in about ten thousand silicon atoms and so it is difficult to devise experiments to 'see' what happens during the early stages of oxygen precipitation when complexes of two, three or four 0xygen atoms are formed. However, new important new findings have emerged from experiments such as the careful monitoring of the changes in the infra red lattice absorption spectra over long durations, the observation of the growth of new bands which are correlated with electronic infra-red data, and high resolution ENDOR studies. In addition, progress has been made in

the improved control of samples containing oxygen, carbon, nitrogen and hydrogen. This work examines the relationship between the rapid technological and economic growth characteristic of high-technology districts and their distinct labour market institutions. The author suggests that while these institutions are unorthodox, they play essential roles in high growth. This book provides a unique review of various aspects of metallic contamination in Si and Ge-based semiconductors. It discusses all of the important metals including their origin during crystal and/or device manufacturing, their fundamental properties, their characterization techniques and their impact on electrical devices' performance. Several control and possible gettering approaches are addressed. The book offers a valuable reference guide for all researchers and engineers studying advanced and state-of-the-art micro- and nano-electronic semiconductor devices and circuits. Adopting an interdisciplinary approach, it combines perspectives from e.g. material science, defect engineering, device processing, defect and device characterization, and device physics and engineering. NATIONAL BESTSELLER • The gripping story of Elizabeth Holmes and Theranos—one of the biggest corporate frauds in history—a tale of ambition and hubris set amid the bold promises of Silicon Valley, rigorously reported by the prize-winning journalist. With a new Afterword covering her trial and sentencing, bringing the story to a close. "Chilling … Reads like a thriller … Carreyrou tells [the Theranos story] virtually to perfection." —The New York Times Book Review In 2014, Theranos founder and CEO Elizabeth Holmes was widely seen as the next Steve Jobs: a brilliant Stanford dropout whose startup "unicorn" promised to revolutionize the medical industry with its breakthrough device, which performed the whole range of laboratory tests from a single drop of blood. Backed by investors such as Larry Ellison and Tim Draper, Theranos sold shares in a fundraising round that valued the company at more than $9 billion, putting Holmes's worth at an estimated $4.5 billion. There was just one problem: The technology didn't work. Erroneous results put patients in danger, leading to misdiagnoses and unnecessary treatments. All the while, Holmes and her partner, Sunny Balwani, worked to silence anyone who voiced misgivings—from journalists to their own employees. One of the leading causes of automobile accidents is the slow reaction of the driver while responding to a hazardous situation. State-of-the-art wireless electronics can automate several driving functions, leading to significant reduction in human error and improvement in vehicle safety. With continuous transistor scaling, silicon fabrication technology now has the potential to substantially reduce the cost of automotive radar sensors. This book bridges an existing gap between information available on dependable system/architecture design and circuit design. It provides the background of the field and detailed description of recent research and development of silicon-based radar sensors. System-level requirements and circuit topologies for radar transceivers are described in detail. Holistic approaches towards designing radar sensors are validated with several examples of highly-integrated radar ICs in silicon technologies. Circuit techniques to design millimeter-wave circuits in silicon technologies are discussed in depth. Scientific Essay from the year 2017 in the subject Materials Science, grade: A, University of California, Santa Barbara, language: English, abstract: Dislocations in Silicon have been a subject to intense studies in the last several decades. It is not only an interesting subject by itself, but is also important for understanding generic dislocation behaviors in a wider class of materials. In the 1970s, researchers had concluded that glide sets can move more easily than shuffle sets via experiments and theoretical calculations. It became widely accepted then that plastic deformation occurs by the motion of partial dislocations in the glide planes of diamond or zinc blende structures. TEM images confirmed this solidarity by showing the motion of dislocations under stress. In 1998, some researchers working on InP found that at very low temperatures (77 K) and high hydrostatic pressure, non-dissociated dislocations move in shuffle planes. It was also subsequently shown that a shuffle-set dislocation has a lower Peierls stress than glide-set partial dislocation. Other calculations debunked older models such as the Peierls-Nabarro model and showed that shuffle set-dislocations always move faster than glide sets. It has since broiled into a highly debated issue with a number of papers supporting either side. This paper attempts to give an overview of most of the seminal papers written on this topic and some newer work. This volume is devoted to the consideration of the use use of surface, thin film and interface characterization tools in support of silicon-based semiconductor processing. The approach taken is to consider each of the types of films used in silicon devices individually in its own chapter and to discuss typical problems seen throughout that films' history, including characterization tools which are most effectively used to clarifying and solving those problems. This volume reviews recent developments in the materials science of silicon. The topics discussed range from the fundamental characterization of the physical properties to the assessment of materials for device applications, and include: crystal growth; process-induced defects; topography; hydrogenation of silicon; impurities; and complexes and interactions between impurities. In view of its key position within the conference scope, several papers examine process induced defects: defects due to ion implantation, silicidation and dry etching, with emphasis being placed on the device aspects. Special attention is also paid to recent developments in characterization techniques on epitaxially grown silicon, and silicon-on-insulators. The book contains clearly written thumbnail sketches of 31 people who were of paramount importance in the conception and creation of the computer industry This book describes techniques that can reduce mechanical-stress-induced inaccuracy and long-term instability in chips. The authors also show that the piezojunction effect can be applied for new types of mechanical-sensor structures. Thermo-mechanical stress is induced when packaged chips cool down to the temperature of application. Learn the latest advances in SiC (Silicon Carbide) technology from the leading experts in the field with this new cutting-edge resource. The book is your single source for in-depth information on both SiC device fabrication and system-level applications. This comprehensive reference begins with an examination of how SiC is grown and how defects in SiC growth can affect working devices. Key issues in selective doping of SiC via ion implantation are covered with special focus on implant conditions and electrical activation of implants. SiC applications discussed include chemical sensors, motor-control components, high-temperature gas sensors, and high-temperature electronics. By cutting through the arcane data and jargon surrounding the hype on SiC, this book gives an honest assessment of today's SiC technology and shows you how SiC can be adopted in developing tomorrow's applications. Take an intimate peek into the Silicon Valley social scene. San Francisco Bay Area residents share true stories about dating, relationships and sex in the tech capital of the world.Here's a small sample:"There are so many intelligent, creative 'engineer' types who apply the same type of inventiveness to sex. There are amazing men sitting behind computers thinking about sex all day—hot and ready to go!" Yasmine, 32"Each phone call had me peeling off my clothes little by little. I would be in my underwear by the time the phone call ended and I wouldn't sleep all night." Faith, 33"We just couldn't wait any longer and ran into some Chinese dive bar in the Tenderloin. We went downstairs and screwed our brains out 'til the bar owner came and almost knocked the door down." Lucky, 32"My friend suggested I go out and have a fling, so I thought I'd give it a shot. But where would I find someone to fling me?" Nicole, 30"My boss's daughter was always walking around in tight skirts and low cut blouses. We ended up going down on each other, leaning right up against the copy equipment!" Stephanie, 24 Silicon technology is evolving rapidly, particularly in board-to-board or chip-to chip applications. Increasingly, the electronic parts of silicon technology will carry out the data processing, while the photonic parts take care of the data communication. For the first time, this book describes the merging of photonics and electronics in silicon and other group IV elements. It presents the challenges, the limitations, and the upcoming possibilities of these developments. The book describes the evolution of CMOS integrated electronics, status and development, and the fundamentals of silicon photonics, including the reasons for its rapid expansion, its possibilities and limitations. It discusses the applications of these technologies for such applications as memory, digital logic operations, light sources, including drive electronics, optical modulators, detectors, and post detector circuitry. It will appeal to engineers in the fields of both electronics and photonics who need to learn more about the basics of the other field and the prospects for the integration of the two. Combines the topics of photonics and electronics in silicon and other group IV elements Describes the evolution of CMOS integrated electronics, status and development, and the fundamentals of silicon photonics Future Directions in Silicon Photonics, Volume 101 in the Semiconductors and Semimetals series, highlights new advances in the field, with this updated volume presenting the latest

developments as discussed by esteemed leaders in the field silicon photonics. Provides the authority and expertise of leading contributors from an international board of authors Represents the latest release in the Semiconductors and Semimetals series Includes the latest information on Silicon Photonics This book contains the first comprehensive review of intrinsic point defects, impurities and their complexes in silicon. Besides compiling the structures, energetic properties, identified electrical levels and spectroscopic signatures, and the diffusion behaviour from investigations, it gives a comprehensive introduction into the relevant fundamental concepts. The fundamental properties of deep luminescence centres in Si associated with transition metals such as Cu, Ag, Au, and Pt have been a focus of interest for decades, both as markers for these deleterious contaminants, and also in the quest for efficient Si-based light emission. This dissertation presents the results of ultra-high resolution photoluminescence studies of these centres in specially prepared, highly enriched 28-Si samples. The greatly improved spectral resolution due to this enrichment led to the discovery of isotopic fingerprints. These fingerprints have revealed that the detailed constituents of all of the centres previously studied had been identified incorrectly. They also revealed the existence of several different families of impurity complexes containing either four or five atoms chosen from Li, Cu, Ag, Au, and Pt. These centres' constituents have been determined, together with no-phonon transition energies, no-phonon isotope shifts, local vibrational mode energies, and the isotope shifts of the local vibrational mode energies. The data presented here for these centres should prove useful for the currently sought theoretical explanations of their formation, stability, and properties. "Drawing on their extensive counseling practice, psychologists Mel and Pat Krantzler, who have helped hundreds of managers, CEOs, engineers, and human resource specialists of high-tech companies cope with dreams turned to nightmares, expose the shadowy side of Silicon Valley, the mind-set it exported to other areas of the country, and the awesome personal costs of "success." Down and Out in Silicon Valley presents a side of high-tech, dot-com culture never explored by the media. The authors reveal the haunting truths that Silicon Valley and its techno-cloned communities throughout the country have one of the highest divorce rates in the world, more children who are psychologically disturbed than in less-affluent areas, no affordable housing even for those earning $50,000 a year, eighty-hour work weeks, and widespread alcohol and drug use."--BOOK JACKET. Since its inception in 1966, the series of numbered volumes known as Semiconductors and Semimetals has distinguished itself through the careful selection of well-known authors, editors, and contributors.The"Willardson and Beer"Series, as it is widely known, has succeeded in publishing numerous landmark volumes and chapters. Not only did many of these volumes make an impact at the time of their publication, but they continue to be well-cited years after their original release. Recently, Professor Eicke R. Weber of the University of California at Berkeley joined as a co-editor of the series. Professor Weber, a well-known expert in the field of semiconductor materials, will further contribute to continuing the series' tradition of publishing timely, highly relevant, and long-impacting volumes. Some of the recent volumes, such as Hydrogen in Semiconductors, Imperfections in III/V Materials, Epitaxial Microstructures, High-Speed Heterostructure Devices,Oxygen in Silicon, and others promise indeed that this tradition will be maintained and even expanded.Reflecting the truly interdisciplinary nature of the field that the series covers, the volumes in Semiconductors and Semimetals have been and will continue to be of great interest to physicists, chemists, materials scientists, and device engineers in modern industry.