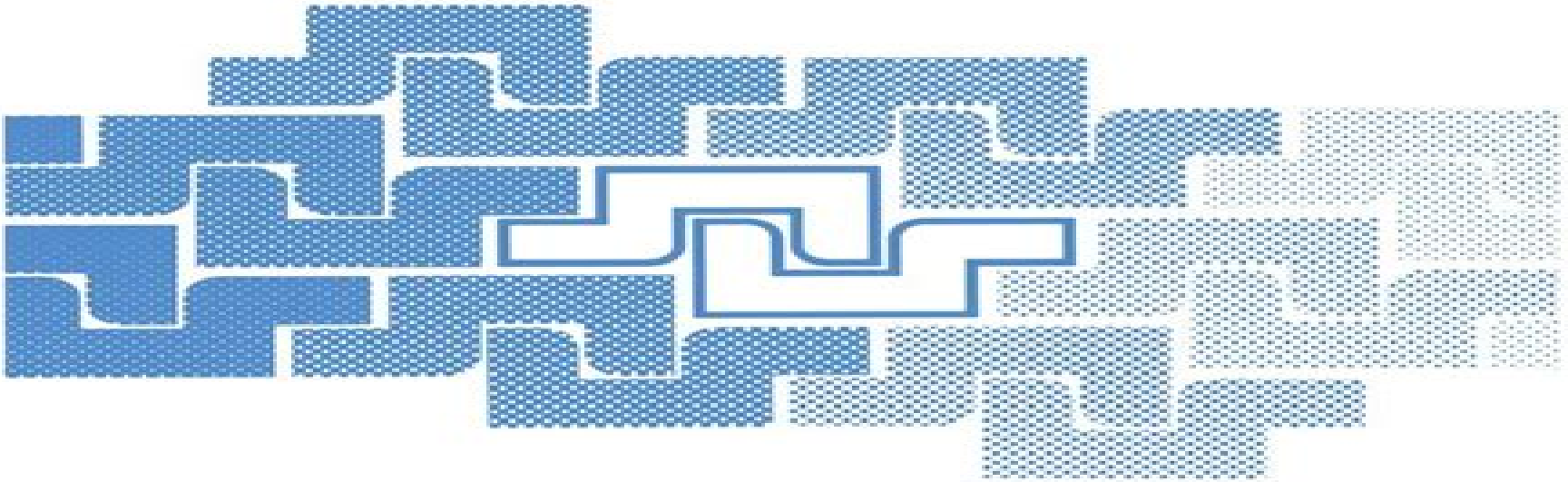

Point and Extended Defects in Semiconductors

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Point And Extended Defects In Semiconductors Nato Asi Series B Physics Vol

Emanuele Rimini

Point And Extended Defects In Semiconductors Nato Asi Series B Physics Vol :

Point and Extended Defects in Semiconductors Giorgio Benedek,2013-06-29 The systematic study of defects in semiconductors began in the early fifties FrQm that time on many questions about the defect structure and properties have been an swered but many others are still a matter of investigation and discussion Moreover during these years new problems arose in connection with the identification and char acterization of defects their role in determining transport and optical properties of semiconductor materials and devices as well as from the technology of the ever in creasing scale of integration This book presents to the reader a view into both basic concepts of defect physics and recent developments of high resolution experimental techniques The book does not aim at an exhaustive presentation of modern defect physics rather it gathers a number of topics which represent the present time research in this field The volume collects the contributions to the Advanced Research Workshop Point Extended and Surface Defects in Semiconductors held at the Ettore Majo rana Centre at Erice Italy from 2 to 7 November 1988 in the framework of the International School of Materials Science and Technology The workshop has brought together scientists from thirteen countries Most participants are currently working on defect problems in either silicon submicron technology or in quantum wells and superlattices where point defects dislocations interfaces and surfaces are closely packed together **Extended Defects in Semiconductors** D. B. Holt,B. G. Yacobi,2007-04-12 The elucidation of the effects of structurally extended defects on electronic properties of materials is especially important in view of the current advances in electronic device development that involve defect control and engineering at the nanometer level This book surveys the properties effects roles and characterization of extended defects in semiconductors The basic properties of extended defects dislocations stacking faults grain boundaries and precipitates are outlined and their effect on the electronic properties of semiconductors their role in semiconductor devices and techniques for their characterization are discussed These topics are among the central issues in the investigation and applications of semiconductors and in the operation of semiconductor devices The authors preface their treatment with an introduction to semiconductor materials and conclude with a chapter on point defect maldistributions This text is suitable for advanced undergraduate and graduate students in materials science and engineering and for those studying semiconductor physics Point and Extended Defects in Semiconductors Giorgio Benedek,1989 *Physical Chemistry of Semiconductor Materials and Processes* ,2015-08-17 The development of solid state devices began a little more than a century ago with the discovery of the electrical conductivity of ionic solids Today solid state technologies form the background of the society in which we live The aim of this book is threefold to present the background physical chemistry on which the technology of semiconductor devices is based secondly to describe specific issues such as the role of defects on the properties of solids and the crucial influence of surface properties and ultimately to look at the physics and chemistry of semiconductor growth processes both at the bulk and thin film level together with some issues relating to the properties of nano devices Divided into five chapters it covers

Thermodynamics of solids including phases and their properties and structural order Point defects in semiconductors Extended defects in semiconductors and their interactions with point defects and impurities Growth of semiconductor materials Physical chemistry of semiconductor materials processing With applications across all solid state technologies the book is useful for advanced students and researchers in materials science physics chemistry electrical and electronic engineering It is also useful for those in the semiconductor industry *Spectroscopy of Semiconductor Microstructures* Gerhard Fasol,Annalisa Fasolino,Paolo Lugli,2013-06-29 Proceedings of a NATO ARW held in Venice Italy May 9 13 1989

Physics of Highly-Ionized Atoms Richard Marrus,2012-12-06 The progress in the physics of highly ionized atoms since the last NATO sponsored ASI on this subject in 1982 has been enormous New accelerator facilities capable of extending the range of highly ionized ions to very high Z have come on line or are about to be completed We note particularly the GANIL accelerator in Caen France the Michigan State Superconducting Cyclotrons in East Lansing both of which are currently operating and the SIS Accelerator in Darmstadt FRG which is scheduled to accelerate beam in late 1989 Progress i low energy ion production has been equally dramatic The Lawrence Livermore Lab EBIT device has produced neon like gold and there has been continued improvement in ECR and EBIS sources The scientific developments in this field have kept pace with the technical developments New theoretical methods for evaluating relativistic and QED effects have made possible highly precise calcula tions of energy levels in one and two electron ions at high Z The calculations are based on the MCDF method and the variational method and will be subject to rigorous experimental tests On the experimental side precision x ray and UV measurements have probed the Lamb shift in the one and two electron ions up to Z 36 with increasing precision

Ion Implantation: Basics to Device Fabrication Emanuele Rimini,2013-11-27 Ion implantation offers one of the best examples of a topic that starting from the basic research level has reached the high technology level within the framework of microelectronics As the major or the unique procedure to selectively dope semiconductor materials for device fabrication ion implantation takes advantage of the tremendous development of microelectronics and it evolves in a multidisciplinary frame Physicists chemists materials sci entists processing device production device design and ion beam engineers are all involved in this subject The present monography deals with several aspects of ion implantation The first chapter covers basic information on the physics of devices together with a brief description of the main trends in the field The second chapter is devoted to ion im planters including also high energy apparatus and a description of wafer charging and contaminants Yield is a quite relevant is sue in the industrial surrounding and must be also discussed in the academic ambient The slowing down of ions is treated in the third chapter both analytically and by numerical simulation meth ods Channeling implants are described in some details in view of their relevance at the zero degree implants and of the available industrial parallel beam systems Damage and its annealing are the key processes in ion implantation Chapter four and five are dedicated to this extremely important subject **Evaluation of Advanced Semiconductor Materials by Electron Microscopy** David

Cherns,2012-12-06 The last few years have een rapid improvements in semiconductor growth techniques which have produced an expanding range of high quality heterostructures for new semiconductor devises As the dimensions of such structures approach the nanometer level it becomes increasingly important to characterise materials properties such as composition uniformity strain interface sharpness and roughness and the nature of defects as well as their influence on electrical and optical properties Much of this information is being obtained by electron microscopy and this is also an area of rapid progress There have been advances for thin film studies across a wide range of techniques including for example convergent beam electron diffraction X ray and electron energy loss microanalysis and high spatial resolution cathodoluminescence as well as by conventional and high resolution methods Important develop ments have also occurred in the study of surfaces and film growth phenomena by both microscopy and diffraction techniques With these developments in mind an application was made to the NATO Science Committee in late summer 1987 to fund an Advanced Research Work shop to review the electron microscopy of advanced semiconductors This was subsequently accepted for the 1988 programme and became the NATO Advanced Research Workshop on the Evaluation of Advanced Semiconductor Materials by Electron Microscopy The Workshop took place in the pleasant and intimate surroundings of Wills Hall Bristol UK during the week 11 17 September 1988 and was attended by fifty five participants from fourteen countries **Techniques and Concepts of High-Energy Physics V** Thomas Ferbel,2012-12-06 The fifth Advanced Study Institute ASI on Techniques and Concepts of High Energy Physics was held again at the Hotel on the Cay in the scenic harbor of Christiansted St Croix U S Virgin Islands The ASI brought together a total of 71 participants from 17 different countries It was another great success due to the dedication of the inspiring lecturers the exceptional study body and of course the beautiful setting The primary support for the meeting was again provided by the Scientific Affairs Division of NATO The ASI was cosponsored by the U S Department of Energy by Fermilab by the National Science Foundation and by the University of Rochester A special contribution from the Oliver S and Jennie R Donaldson Charitable Trust provided an important degree of flexibility as well as support for worthy students from developing nations As in the ca se of the previous ASI s the scientific program was designed for advanced graduate students and recent PhD recipients in experimental particle physics The present volume of lectures should complement the material published in the first four ASI s and prove to be of value to a wider audience of physicists

Defect Interaction and Clustering in Semiconductors Sergio Pizzini,2002 Modern semiconductor devices rely upon precise defect engineering On the one hand defects are the components needed to generate the electronic architecture of the device On the other hand they may if not carefully controlled induce failure of that device During the past fifty years the electrical and optical properties of defects their generation transport clustering and reactions between them have been investigated intensively Yet the development of semiconductor technology remains closely connected to the advances made in defect science and engineering Compared to metals defect control in silicon is significantly complicated by the open

structure of its lattice As a result reactions between defects even at room temperature have become a central issue in defect engineering **Nuclear Matter and Heavy Ion Collisions** Madeleine Soyeur,2012-12-06 The Winter School Nuclear Matter and Heavy Ion Collisions a NATO Research Workshop held at Les Houches in February 89 has been devoted to recent developments in nuclear matter theory and to the study of central heavy ion collisions in which quasi macroscopic nuclear systems can be formed at various temperatures and densities At in cident energies below 100 Me V per nucleon the kinematic conditions are favourable for producing transient hot nuclei with temperatures of the order of a few MeV At higher ener gies 100 MeV *Measures of Complexity and Chaos* Neal B. Abraham,Alfonso M. Albano,Anthony Passamante,Paul E. Rapp,2013-03-09 This volume serves as a general introduction to the state of the art of quantitatively characterizing chaotic and turbulent behavior It is the outgrowth of an international workshop on Quantitative Measures of Dynamical Complexity and Chaos held at Bryn Mawr College June 22 24 1989 The workshop was co sponsored by the Naval Air Development Center in Warminster PA and by the NATO Scientific Affairs Programme through its special program on Chaos and Complexity Meetings on this subject have occurred regularly since the NATO workshop held in June 1983 at Haverford College only two kilometers distant from the site of this latest in the series At that first meeting organized by J Gollub and H Swinney quantitative tests for nonlinear dynamics and chaotic behavior were debated and promoted 1 In the six years since the methods for dimension entropy and Lyapunov exponent calculations have been applied in many disciplines and the procedures have been refined Since then it has been necessary to demonstrate quantitatively that a signal is chaotic rather than it being acceptable to observe that it looks chaotic Other related meetings have included the Pecos River Ranch meeting in September 1985 of G Mayer Kress 2 and the reflective and forward looking gathering near Jerusalem organized by M Shapiro and I Procaccia in December 1986 3 This meeting was proof that interest in measuring chaotic and turbulent signals is widespread Reduced Thermal Processing for ULSI R.A. Levy,2012-12-06 As feature dimensions of integrated circuits shrink the associated geometrical constraints on junction depth impose severe restrictions on the thermal budget for processing such devices Furthermore due to the relatively low melting point of the first aluminum metallization level such restrictions extend to the fabrication of multilevel structures that are now essential in increasing packing density of interconnect lines The fabrication of ultra large scale integrated ULSI devices under thermal budget restrictions requires the reassessment of existing and the development of new microelectronic materials and processes This book addresses three broad but interrelated areas The first area focuses on the subject of rapid thermal processing RTP a technology that allows minimization of processing time while relaxing the constraints on high temperature Initially developed to limit dopant redistribution current applications of RTP are shown here to encompass annealing oxidation nitridation silicidation glass reflow and contact sintering In a second but complementary area advances in equipment design and performance of rapid thermal processing equipment are presented in conjunction with associated issues of temperature measurement and control

Defect mechanisms are assessed together with the resulting properties of rapidly deposited and processed films The concept of RTP integration for a full CMOS device process is also examined together with its impact on device characteristics

Diffusion and Defect Data ,2002 **Fifth European Conference on Power Electronics and Applications** Institution of Electrical Engineers. European Conference,1993 **Growth of Semiconductor Structures and High-Tc Thin Films on Semiconductors** A. Madhukar,1990 *Fifth European Conference on Power Electronics and Applications: Materials and devices* ,1993 **New Technical Books** New York Public Library,1990 *Subject Guide to Books in Print* ,1993 **Intrinsic Point Defects, Impurities, and Their Diffusion in Silicon** Peter Pichler,2012-12-06 Basically all properties of semiconductor devices are influenced by the distribution of point defects in their active areas This book contains the first comprehensive review of the properties of intrinsic point defects acceptor and donor impurities isovalent atoms chalcogens and halogens in silicon as well as of their complexes Special emphasis is placed on compiling the structures energetic properties identified electrical levels and spectroscopic signatures and the diffusion behavior from experimental and theoretical investigations In addition the book discusses the fundamental concepts of silicon and its defects the electron system diffusion thermodynamics and reaction kinetics which form the scientific basis needed for a thorough understanding of the text Therefore the book is able to provide an introduction to newcomers in this field up to a comprehensive reference for experts in process technology solid state physics and simulation of semiconductor processes

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