Semi-Insulating III-V Materials

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Semi-Insulating III–V Materials REES,2012-12-06 The study of deep levels in semiconductors has seen considerable growth in recent years Many new techniques have become available for investigating both the electronic properties of deep levels and the chemical nature of the defects from which they arise This increasing interest has been stimulated by the importance of the subject to device technology in particular those microwave and opto electronic devices made from GaAs InP and their alloys While previous conferences have covered specialist areas of deep level technology the meeting described here was arranged to draw together workers from these separate fields of study The following papers reflect the breadth of interests represented at the conference For the sake of uniformity we have chosen the English alternative where an American expression has been used We have also sought to improve grammar sometimes without the approval of the author in the interests of rapid publication The Editor wishes to thank the referees for their ready advice at all stages Paul Jay who helped with many of the editorial duties and Muriel Howes and Lorraine Jones for rapid and accurate typing **III-V Semiconductor Materials and Devices** R.J. Malik,2012-12-02 The main emphasis of this volume is on III V semiconductor epitaxial and bulk crystal growth techniques Chapters are also included on material characterization and ion implantation In order to put these growth techniques into perspective a thorough review of the physics and technology of III V devices is presented This is the first book of its kind to discuss the theory of the various crystal growth techniques in relation to their advantages and limitations for use in III V semiconductor devices **Semiconductors and Semimetals** ,1983-11-16 Semiconductors and Semimetals **Semi-insulating III-V Materials** ,1993 **GaAs High-Speed Devices** C. Y. Chang,Francis Kai,1994-10-28 The performance of high speed semiconductor devices the genius driving digital computers advanced electronic systems for digital signal processing telecommunication systems and optoelectronics is inextricably linked to the unique physical and electrical properties of gallium arsenide Once viewed as a novel alternative to silicon gallium arsenide has swiftly moved into the forefront of the leading high tech industries as an irreplaceable material in component fabrication GaAs High Speed Devices provides a comprehensive state of the science look at the phenomenally expansive range of engineering devices gallium arsenide has made possible as well as the fabrication methods operating principles device models novel device designs and the material properties and physics of GaAs that are so keenly integral to their success In a clear five part format the book systematically examines each of these aspects of GaAs device technology forming the first authoritative study to consider so many important aspects at once and in such detail Beginning with chapter 2 of part one the book discusses such basic subjects as gallium arsenide materials and crystal properties electron energy band structures hole and electron transport crystal growth of GaAs from the melt and defect density analysis Part two describes the fabrication process of gallium arsenide devices and integrated circuits shedding light in chapter 3 on epitaxial growth processes molecular beam epitaxy and metal organic chemical vapor deposition techniques Chapter 4 provides an

introduction to wafer cleaning techniques and environment control wet etching methods and chemicals and dry etching systems including reactive ion etching focused ion beam and laser assisted methods Chapter 5 provides a clear overview of photolithography and nonoptical lithography techniques that include electron beam x ray and ion beam lithography systems The advances in fabrication techniques described in previous chapters necessitate an examination of low dimension device physics which is carried on in detail in chapter 6 of part three Part four includes a discussion of innovative device design and operating principles which deepens and elaborates the ideas introduced in chapter 1 Key areas such as metal semiconductor contact systems Schottky Barrier and ohmic contact formation and reliability studies are examined in chapter 7 A detailed discussion of metal semiconductor field effect transistors the fabrication technology and models and parameter extraction for device analyses occurs in chapter 8 The fifth part of the book progresses to an up to date discussion of heterostructure field effect HEMT in chapter 9 potential effect HBT in chapter 10 and quantum effect devices chapters 11 and 12 all of which are certain to have a major impact on high speed integrated circuits and optoelectronic integrated circuit OEIC applications Every facet of GaAs device technology is placed firmly in a historical context allowing readers to see instantly the significant developmental changes that have shaped it Featuring a look at devices still under development and device structures not yet found in the literature GaAs High Speed Devices also provides a valuable glimpse into the newest innovations at the center of the latest GaAs technology An essential text for electrical engineers materials scientists physicists and students GaAs High Speed Devices offers the first comprehensive and up to date look at these formidable 21st century tools The unique physical and electrical properties of gallium arsenide has revolutionized the hardware essential to digital computers advanced electronic systems for digital signal processing telecommunication systems and optoelectronics GaAs High Speed Devices provides the first fully comprehensive look at the enormous range of engineering devices gallium arsenide has made possible as well as the backbone of the technology ication methods operating principles and the materials properties and physics of GaAs device models and novel device designs Featuring a clear six part format the book covers GaAs materials and crystal properties Fabrication processes of GaAs devices and integrated circuits Electron beam x ray and ion beam lithography systems Metal semiconductor contact systems Heterostructure field effect potential effect and quantum effect devices GaAs Microwave Monolithic Integrated Circuits and Digital Integrated Circuits In addition this comprehensive volume places every facet of the technology in an historical context and gives readers an unusual glimpse at devices still under development and device structures not yet found in the literature **Chemistry of the Semiconductor Industry** S.J. Moss,A. Ledwith,1989-02-28 This book covers the chemistry of the major processes involved in the manufacture of integrated circuits The authors describe all the major processes in use together with some interesting processes which are currently being developed and hold future promise Each chapter covers the current state of knowledge of the underlying chemistry of a particular process and identifies areas of uncertainty requiring further research *Deep Centers in Semiconductors*

Sokrates T. Pantelides,2024-12-20 Examines several key semiconductor deep centers all carefully chosen to illustrate a variety of essential concepts A deep center is a lattice defect or impurity that causes very localized bound states and energies deep in the band gap For each deep center chosen a scientist instrumental in its development discusses the theoretical and experimental techniques used to understand that center The second edition contains four new sections treating recent developments including a chapter on hydrogen in crystalline semiconductors **Atomic Diffusion in III-V Semiconductors** Brian Tuck,2021-05-30 III V semiconductors of which gallium arsenide is the best known have been important for some years and appear set to become much more so in the future They have principally contributed to two technologies microwave devices and optoelectronics Recent advances in the production of thin layers have made possible a whole new range of devices based on multi quantum wells The heat treatments used in the manufacture of semiconductor devices means that some diffusion must take place A good understanding of diffusion processes is therefore essential to maintain control over the technology Atomic Diffusion in III V Semiconductors presents a lucid account of the experimental work that has been carried out on diffusion in III Vs and explores the advanced models that explain the results A review of the III V group of semiconductors outlines the special properties that make them so attractive for some types of devices Discussion of the basic elements of diffusion in semiconductors provides the theory necessary to understand the subject in depth and the book gives hints on how to assess the published data Chapters on diffusion of shallow donors shallow acceptors transition elements and very fast diffusing elements provide a critical review of published works The book also presents the neglected subject of self diffusion including a section on superlattices Atomic Diffusion in III V Semiconductors will be of interest to research workers in semiconductor science and technology and to postgraduate students in physics electronics and materials science **Compound Semiconductor Bulk Materials and Characterizations** Osamu Oda,2007 This book is concerned with compound semiconductor bulk materials and has been written for students researchers and engineers in material science and device fabrication It offers them the elementary and intermediate knowledge of compound semiconductor bulk materials necessary for entering this field In the first part the book describes the physical properties crystal growth technologies principles of crystal growth various defects in crystals characterization techniques and applications In the second and the third parts the book reviews various compound semiconductor materials including important industrial materials and the results of recent research *Acta Physica Polonica* ,1991 *Future Trends in Microelectronics* S. Luryi,Jimmy Xu,Alex Zaslavsky,2012-12-06 Silicon technology has developed along virtually one single line reducing the minimal size of lithographic features But has this taken us to the point of diminishing returns Are we now at a turning point in the logical evolution of microelectronics Some believe that the semiconductor microelectronics industry has matured the research game is over comparisons with the steel industry are being made Others believe that qualitative progress in hardware technology will come roaring back based on innovative research This debate spirited as it is

is reflected in the pages of Future Trends in Microelectronics where such questions are discussed What kind of research does the silicon industry need to continue its expansion What is the technical limit to shrinking Si devices Is there any economic sense in pursuing this limit What are the most attractive applications of optoelectronic hybrid systems Are there any green pastures beyond the traditional semiconductor technologies Identifying the scenario for the future evolution of microelectronics will present a tremendous opportunity for constructive action today Physics and Chemistry of III-V Compound Semiconductor Interfaces Carl Wilmsen,2013-06-29 The application of the 111 V compound semiconductors to device fabrica tion has grown considerably in the last few years This process has been stimulated in part by the advancement in the understanding of the interface physics and chemistry of the III V s The literature on this subject is spread over the last 15 years and appears in many journals and conference proceedings Understanding this literature requires consider able effort by the seasoned researcher and even more for those starting out in the field or by engineers and scientists who wish to apply this knowledge to the fabrication of devices The purpose of this book is to bring together much of the fundamental and practical knowledge on the physics and chemistry of the 111 V compounds with metals and dielectrics The authors of this book have endeavored to provide concise overviews of these areas with many tahles ancI grarhs whic h c omr are and summarize the literature In this way the book serves as both an insightful treatise on III V interfaces and a handy reference to the literature The selection of authors was mandated by the desire to include both fundamental and practical approaches covering device and material aspects of the interfaces All of the authors are recognized experts on III V interfaces and each has worked for many years in his subject area This experience is projected in the breadth of understanding in each chapter

Semi-insulating III-V Materials David C. Look,John Sydney Blakemore,1984 Molecular Beam Epitaxy and Heterostructures L.L. Chang,K. Ploog,2012-12-06 The NATO Advanced Study Institute on Molecular Beam Epitaxy MBE and Heterostructures was held at the Ettore Majorana Center for Scientific Culture Erice Italy on March 7 19 1983 the second course of the International School of Solid State Device Re search This volume contains the lectures presented at the Institute Throughout the history of semiconductor development the coupling between processing techniques and device structures for both scientific investigations and technological applications has time and again been demonstrated Newly conceived ideas usually demand the ultimate in existing techniques which often leads to process innova tions The emergence of a process on the other hand invariably creates opportunities for device improvement and invention This intimate relationship between the two has most recently been witnessed in MBE and heterostructures the subject of this Institute This volume is divided into several sections Chapter 1 serves as an introduction by providing a perspective of the subject This is followed by two sections each containing four chapters Chapters 2 5 addressing the principles of the MBE process and Chapters 6 9 describ ing its use in the growth of a variety of semiconductors and heteros tructures The next two sections Chapters to II and Chapters 12 15 treat the theory and the electronic properties of the heterostructures respectively The

focus is on energy quantization of the two dimensional electron system Chapters 16 17 are devoted to device structures including both field effect transistors and lasers and detec tors **InP and Related Compounds** M O Manasreh,2000-08-08 InP is a key semiconductor for the production of optoelectronic and photonic devices Its related compounds such as InGaAsP alloy have been realized as very important materials for communication in the 1 3 and 1 55 micron spectral regions Furthermore the applications on InP and related compounds have extended to other areas that include laser d Nuclear Physics Applications on Materials Science E. Recknagel,J.C. Soares,2012-12-06 The last decade has seen a rapid development and growing importance in the application of nuclear physics methods to material sciences It is a general desire to understand modern material problems on a microscopic scale which due to their inherent microscopic nature made nuclear techniques highly suitable tools for basic and applied research in this field The Advanced Study Institute on Nuclear Physics Applications on Ma terials Science brought together scientists active in different but closely re lated fields to review and discuss selected topics of bulk properties of metals semiconductors and insulators as well as properties of surfaces interfaces and thin films Most of the excellent lectures and oral presentations of the School are collected in part I of the present volume while extended abstracts of scientific work presented as posters are added in part II The pleasant site of the ASI at Viana do Castelo and the northern province of Portugal Alto Minho provided the stimulating atmosphere for an in spiring School Many people contributed to the scientific and social success of the institute Thanks are especially due to the members of the local organizing committee N Ayres de Campos M Fernanda da Silva A Pedroso de Lima and my co director J Carvalho Soares His permanent involvement in preparing and realization of the ASI was essential for this memorable School Gallium Arsenide and Related Compounds ,1987 **Compound Semiconductor Devices** Kenneth A. Jackson,2008-11-21 Compound Semiconductor Devices provides a comprehensive insight into today s standard technologies covering the vast range of semiconductor products and their possible applications The materials covered runs from the basics of conventional semiconductor technology through standard power and opto semiconductors to highly complex memories and microcontrollers and the special devices and modules for smartcards automotive electronics consumer electronics and telecommunications Some chapters are devoted to the production of semiconductor components and their use in electronic systems as well as to quality management The book offers students and users a unique overview of technology architecture and areas of application of semiconductor products **Characterization and qualification of GaAs semi-insulating substrates** James D. Oliver,1981 Physics Briefs ,1984

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