

Polycrystalline and Spatially Non-Homogeneous Amorphous Semiconductors and Insulators

Valeri Ligatchev

Polycrystalline Semiconductors

Hiroyoshi Naito



Polycrystalline Semiconductors:

Polycrystalline Semiconductors G. Harbeke, 2012-12-06 In terms of structure the field of semiconductors spans a wide range from the perfect order of single crystals to the non periodic disordered amorphous state The two extremes of this range attract a large amount of interest On one side glamorous novel phenomena are being found which can only occur in specially tailored ultra perfect periodic lattices On the other side the exotic and challenging nature of the amorphous state has triggered a surge of activity in recent years Polycrystalline semiconductors are in between They are among the work horses in the field useful in many applications a handy solution to many practical problems and still they have not received in the past the amount of research interest that they deserve It is the aim of the present book to improve this situation The book originated from the lectures and seminars presented at the course on Polycrystalline Semiconductors Physical Properties and Applications of the International School on Materials Science and Technology held at the Centre for Scientific Culture Ettore Majorana in Erice Italy July 1-15 1984

Polycrystalline Semiconductors Hans J. Möller, Horst P. Strunk, Jürgen H. Werner, 2012-12-06 This book summarizes the most recent aspects of polycrystalline semiconductors as presented at the conference Polycrystalline Semiconductors Grain Boundaries and Interfaces It contains 12 review articles on selected topics written by experts in their fields and 41 complementary contributed papers The structure chemistry and physics of grain boundaries and other interfaces are experimentally and theoretically studied Aspects of the technologically important polycrystalline silicon are discussed in detail Also covered are other polycrystalline semiconductors germanium and compound semiconductors that are currently of interest in fundamental research and in the technology of solar cells and thin film devices Anyone interested in polycrystalline semiconductors will be able to use this comprehensive collection to advantage It also suggests directions for new research and development

Polycrystalline Semiconductors VII Takashi Fuyuki, Toshiyuki Sameshima, Horst P. Strunk, J.H. Werner, 2003-06-10 Proceedings of the Seventh International Conference Nara September 10-13 2002

The Story of Semiconductors John W. Orton, 2008-12-11 The book provides an overview of the fascinating spectrum of semiconductor physics devices and applications presented from a historical perspective It covers the development of the subject from its inception in the early nineteenth century to the recent millennium Written in a lively informal style it emphasizes the interaction between pure scientific push and commercial pull on the one hand and between basic physics materials and devices on the other It also sets the various device developments in the context of systems requirements and explains how such developments met wide ranging consumer demands It is written so as to appeal to students at all levels in physics electrical engineering and materials science to teachers lecturers and professionals working in the field as well as to a non specialist scientific readership

Organic Semiconductors for Optoelectronics Hiroyoshi Naito, 2021-08-02 Comprehensive coverage of organic electronics including fundamental theory basic properties characterization methods device physics and future trends Organic semiconductor materials have vast commercial potential

for a wide range of applications from self emitting OLED displays and solid state lighting to plastic electronics and organic solar cells As research in organic optoelectronic devices continues to expand at an unprecedented rate organic semiconductors are being applied to flexible displays biosensors and other cost effective green devices in ways not possible with conventional inorganic semiconductors Organic Semiconductors for Optoelectronics is an up to date review of the both the fundamental theory and latest research and development advances in organic semiconductors Featuring contributions from an international team of experts this comprehensive volume covers basic properties of organic semiconductors characterization techniques device physics and future trends in organic device development Detailed chapters provide key information on the device physics of organic field effect transistors organic light emitting diodes organic solar cells organic photosensors and more This authoritative resource Provides a clear understanding of the optoelectronic properties of organic semiconductors and their influence to overall device performance Explains the theories behind relevant mechanisms in organic semiconducting materials and in organic devices Discusses current and future trends and challenges in the development of organic optoelectronic devices Reviews electronic properties device mechanisms and characterization techniques of organic semiconducting materials Covers theoretical concepts of optical properties of organic semiconductors including fluorescent phosphorescent and thermally assisted delayed fluorescent emitters An important new addition to the Wiley Series in Materials for Electronic Optoelectronic Applications Organic Semiconductors for Optoelectronics bridges the gap between advanced books and undergraduate textbooks on semiconductor physics and solid state physics It is essential reading for academic researchers graduate students and industry professionals involved in organic electronics materials science thin film devices and optoelectronics research and development

Thin Film Transistors: Polycrystalline silicon thin film transistors Yue Kuo, 2004 This is the first reference on amorphous silicon and polycrystalline silicon thin film transistors that gives a systematic global review of all major topics in the field These volumes include sections on basic materials and substrates properties fundamental device physics critical fabrication processes structures a Si H dielectric metallization catalytic CVD and existing and new applications The chapters are written by leading researchers who have extensive experience with reputed track records Thin Film Transistors provides practical information on preparing individual functional a Si H TFTs and poly Si TFTs as well as large area TFT arrays Also covered are basic theories on the a Si H TFT operations and unique material characteristics Readers are also exposed to a wide range of existing and new applications in industries

The Physics of Semiconductors Marius Grundmann, 2010-11-11

Semiconductor electronics is common place in every household Semiconductor devices have also enabled economically reasonable fiber based optical communication optical storage and high frequency amplification and have recently revolutionized photography display technology and lighting Along with these tremendous technological developments semiconductors have changed the way we work communicate entertain and think The technological progress of semiconductor materials and devices is evolving

continuously with a large worldwide effort in human and monetary capital. For students, semiconductors offer a rich, diverse and exciting field with a great tradition and a bright future. This book introduces students to semiconductor physics and semiconductor devices. It brings them to the point where they can specialize and enter supervised laboratory research. It is based on the two-semester semiconductor physics course taught at Universität Leipzig in its Master of Science physics curriculum. Since the book can be followed with little or no pre-existing knowledge in solid state physics and quantum mechanics, it is also suitable for undergraduate students. For the interested reader, some additional topics are included in the book that can be covered in subsequent more specialized courses. The material is selected to provide a balance between aspects of solid state and semiconductor physics, the concepts of various semiconductor devices and modern applications in electronics and photonics.

Polycrystalline Semiconductors III Horst P. Strunk, J.H. Werner, B. Fortin, O. Bonnaud, 1994-03-10. Physics and Technology Proceedings of the 3rd International Conference on Polycrystalline Semiconductors held in Saint Malo, France, September 1993.

Polycrystalline Semiconductors VI O. Bonnaud, 2001. This book comprises the contributions to the sixth conference on polycrystalline semiconductors, POLYSE. The conference covered many aspects of polycrystalline semiconductors but was more applications oriented than on previous occasions, thereby reflecting the rapid evolution of these technologies. POLYSE 2000 brought together research specialists from basic research as well as from research development engineering, all of whom are working on devices such as thin film transistors, microelectromechanical systems or sensors and actuators. In particular, ten internationally recognized scientists: J. Morante, S. P. Richon, M. Konagai, S. Wagner, R. Hagenbeck, D. A. Bonnell, G. Horowitz, T. Fuyuki, J. Kocka and V. Chu were invited to review their work on several interesting and promising aspects of the subject such as micro systems, solar cells, thin film transistors, organic polycrystalline devices and polycrystalline ceramics.

Elementary Semiconductor Device Physics Kazuya Masu, Shuhei Amakawa, 2024-10-31. This book by two leading experts on integrated circuit design adopts an untraditional approach to introducing semiconductor devices to beginners. The authors use circuit theory to provide a digestible explanation of energy band theory and understanding of energy band diagrams. After briefly summarizing the basics of semiconductors, the authors describe semiconductor devices from a circuit theoretic point of view, making the book especially suitable for circuit design students and engineers. Further to the emphasis on the circuit perspective, the book then uses circuit theory to introduce readers to the famously indigestible energy bands of crystalline solids. Additionally, the book explains how to read physics from energy band diagrams of semiconductor devices in great detail. The key to appreciating the real power of energy band diagrams is shown to lie in the understanding of the concept of the quasi-Fermi levels introduced in 1949 by William Shockley but remaining elusive to date and therefore often omitted from energy band diagrams. To rectify this, some of the energy band diagrams presented in this book, complete with quasi-Fermi levels, were drawn using a device simulator, a technology computer-aided design (TCAD) offering quantitative information about device physics. The book

could therefore also serve as a hands on course text in TCAD drawn band diagram reading Because no prior exposure to quantum mechanics is required and the book does not attempt to teach it this book is ideal for students in various disciplines who may or may not be specializing in semiconductor devices The numerous practical examples of reading TCAD based energy band diagrams are also invaluable to practicing semiconductor device engineers

Point and Extended Defects in Semiconductors Giorgio Benedek, 2013-06-29 The systematic study of defects in semiconductors began in the early fifties From that time on many questions about the defect structure and properties have been answered but many others are still a matter of investigation and discussion Moreover during these years new problems arose in connection with the identification and characterization of defects their role in determining transport and optical properties of semiconductor materials and devices as well as from the technology of the ever increasing 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 Majorana 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

Ion Implantation in Semiconductors Susumu Namba, 2012-12-06 The technique of ion implantation has become a very useful and stable technique in the field of semiconductor device fabrication This use of ion implantation is being adopted by industry Another important application is the fundamental study of the physical properties of materials The First Conference on Ion Implantation in Semiconductors was held at Thousand Oaks California in 1970 The second conference in this series was held at Garmisch Partenkirchen Germany in 1971 At the third conference which convened at Yorktown Heights New York in 1973 the emphasis was broadened to include metals and insulators as well as semiconductors This scope of the conference was still accepted at the fourth conference which was held at Osaka Japan in 1974 A huge number of papers had been submitted to this conference All papers which were presented at the Fourth International Conference on Ion Implantation in Semiconductors and Other Materials are included in this proceedings The success of this conference was due to technical presentations and discussions of 224 participants from 14 countries as well as to financial support from many companies in Japan On behalf of the committee I wish to thank the authors for their excellent papers and the sponsors for their financial support The International Committee responsible for advising this conference consisted of B L Crowder J A Davies G Dearnaley F H Eisen Ph Glotin T Itoh A U MacRae J W Mayer S Namba I Ruge and F L Vook

Rapid Thermal

Processing of Semiconductors Victor E. Borisenko, Peter J. Hesketh, 2013-11-22 Rapid thermal processing has contributed

to the development of single wafer cluster processing tools and other innovations in integrated circuit manufacturing environments Borisenko and Hesketh review theoretical and experimental progress in the field discussing a wide range of materials processes and conditions They thoroughly cover the work of international investigators in the field Materials Science in Microelectronics II Eugene Machlin, 2010-07-07 The subject matter of thin films which play a key role in microelectronics divides naturally into two headings the processing structure relationship and the structure properties relationship Part II of Materials Science in Microelectronics focuses on the latter of these relationships examining the effect of structure on the following Electrical properties Magnetic properties Optical properties Mechanical properties Mass transport properties Interface and junction properties Defects and properties Captures the importance of thin films to microelectronic development Examines the cause effect relationship of structure on thin film properties **Polycrystalline Semiconductors V** J.H. Werner, Horst P. Strunk, H.W. Schock, 1999-04-23 Bulk Materials Thin Films and Devices Proceedings of the Fifth International Conference on Polycrystalline Semiconductors V held in Schwabisch Gmünd Germany September 13-18 1998 *SERI Photovoltaic Advanced Research and Development Bibliography, 1982-1985*, 1986

China's Carbon-Energy Policy and Asia's Energy Transition Akihisa Mori, 2021-12-29 This book seeks to examine the impacts associated with China's carbon energy policy in Asia and how coupled with the Belt and Road Initiative these effects prompt foreign direct investments in coal power and exports of renewable energy technologies China shows a co evolution of carbon energy policy and energy transitions from coal to renewables Assessing how the policy intensifies pressures and motivations to Chinese companies chapters in this edited volume analyse how the policy has changed energy and CO₂ emissions in Asia through the lens of carbon leakage relocation and halos Contributors present in depth studies on China's investments and exports and also its impacts on Indonesia India Vietnam and Japan Using applied computable general equilibrium and scenario input output analyses chapters investigate if regional electricity connectivity reduces new coal power investments through efficiency gain Arguing that China is shifting from the world's factory to the leading innovator and Asia's demand centre it is ultimately demonstrated that China is likely to achieve climate targets whereas Asia to increase CO₂ emissions and economic reliance on China China's Carbon Energy Policy and Asia's Energy Transition will be of significant interest to students and scholars of energy environment and sustainability studies as well as Chinese studies and economics

Fundamentals of Solid-state Electronics Chih-Tang Sah, 1991 This is perhaps the most comprehensive undergraduate textbook on the fundamental aspects of solid state electronics It presents basic and state of the art topics on materials physics device physics and basic circuit building blocks not covered by existing textbooks on the subject Each topic is introduced with a historical background and motivations of device invention and circuit evolution Fundamental physics is rigorously discussed with minimum need of tedious algebra and advanced mathematics Another special feature is a systematic classification of fundamental mechanisms not found even in advanced texts It bridges the gap between solid state

device physics covered here with what students have learnt in their first two years of study Used very successfully in a one semester introductory core course for electrical and other engineering materials science and physics junior students the second part of each chapter is also used in an advanced undergraduate course on solid state devices The inclusion of previously unavailable analyses of the basic transistor digital circuit building blocks and cells makes this an excellent reference for engineers to look up fundamental concepts and data design formulae and latest devices such as the GeSi heterostructure bipolar transistors

Quantitative Recombination and Transport Properties in Silicon from Dynamic Luminescence Johannes Giesecke, 2014-06-03 Harmonically modulated luminescence combines the advantages of highly sensitive luminescence metrology with an immediate dynamic access to carrier lifetime in semiconductors at a minimum of required a priori information The present work covers theoretical conceptual and experimental advances of the harmonically modulated luminescence technique Theoretical constraints of dynamic carrier lifetime techniques are rigorously elaborated including the proof of their differential nature and their characteristics at nonuniform spatial distributions of recombination rate The pathway toward a unified reliable and versatile harmonically modulated carrier lifetime metrology is delineated covering the entire solar cell production chain from bare ingots to finished solar cells Accurate access to miscellaneous relevant recombination and transport properties via harmonically modulated luminescence is demonstrated and experimentally validated embracing injection dependent carrier lifetimes at extremely low injection conditions a spatially resolved carrier lifetime calibration of luminescence images and accurate approaches to both net dopant concentration and minority carrier mobility

Capacitance Spectroscopy of Semiconductors Jian V. Li, Giorgio Ferrari, 2018-07-06 Capacitance spectroscopy refers to techniques for characterizing the electrical properties of semiconductor materials junctions and interfaces all from the dependence of device capacitance on frequency time temperature and electric potential This book includes 15 chapters written by world recognized leading experts in the field academia national institutions and industry divided into four sections Physics Instrumentation Applications and Emerging Techniques The first section establishes the fundamental framework relating capacitance and its allied concepts of conductance admittance and impedance to the electrical and optical properties of semiconductors The second section reviews the electronic principles of capacitance measurements used by commercial products as well as custom apparatus The third section details the implementation in various scientific fields and industries such as photovoltaics and electronic and optoelectronic devices The last section presents the latest advances in capacitance based electrical characterization aimed at reaching nanometer scale resolution

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