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Disordered Materials John Wiley & Sons

Optical Properties of Crystalline and Amorphous Semiconductors: Materials and Fundamental Principles presents an introduction to the fundamental optical properties of semiconductors. This book presents tutorial articles in the categories of materials and fundamental principles (Chapter 1), optical properties in the reststrahlen region (Chapter 2), those in the interband transition region (Chapters 3 and 4) and at or below the fundamental absorption edge (Chapter 5). Optical Properties of Crystalline and Amorphous Semiconductors: Materials and Fundamental Principles is presented in a form which could serve to teach the underlying concepts of semiconductor optical properties and their implementation. This book is an invaluable resource for device engineers, solid-state physicists, material scientists and students specializing in the fields of semiconductor physics and device engineering.

Optical Properties of Crystalline and Amorphous Semiconductors Springer Science & Business Media

Ein systematisches Lehrbuch der Theorie, Struktur und Eigenschaften amorpher Festkörper, gedacht für Anfänger auf diesem Gebiet. Illustriert werden diese Grundlagen durch zahlreiche Anwendungen, die beispielsweise ultratransparente optische Fasern in der Telekommunikation, amorphe Halbleiter in der Xerographie und organische Gläser in Architektur und Bauwesen zum Inhalt haben.

Amorphous Semiconductors 76 Springer

Twenty-four years ago, Hellmut Fritzsche came to our laboratory to evaluate our work in amorphous materials. He came many times, sometimes bringing his violin to play with our youngest son, to talk, to help, to discover, and to teach. The times with him were always exciting and rewarding. There was a camaraderie in the early years that has continued and a friendship that has deepened among Iris and me and Hellmut, Sybille and their children. The vision that Hellmut Fritzsche shared with me, the many important contributions he made, the science that he helped so firmly to establish, the courage he showed in the time of our adversity, and the potential that he recognized put all of us in the amorphous field, not only his close friends and collaborators, in his debt. He helped make a science out of intuition, and played an important role not only in the experimental field but also in the basic theoretical aspects. It has been an honor to work with Hellmut through the years.

Quantum Electron Theory of Amorphous Conductors John Wiley & Sons

This book provides introductory, comprehensive, and concise descriptions of amorphous chalcogenide semiconductors and related materials. It includes comparative portraits of the chalcogenide and related materials including amorphous hydrogenated Si, oxide and halide glasses, and organic polymers. It also describes effects of non-equilibrium disorder, in comparison with those in crystalline semiconductors.

Polycrystalline and Spatially Non-homogenous Amorphous Semiconductors Springer Science & Business Media

Currently this is the book providing a thorough introduction and a unified theoretical basis for the interpretation of equilibrium transport processes in amorphous hydrogenated tetrahedrally coordinated semiconductors - a topic of great interest to physicists and material scientists (first devices for practical applications are already being manufactured). Most of the relevant literature is reviewed with particular emphasis on the approach developed by the authors. It explains most of the experimental data and allows the extraction of information about microscopic transport processes and parameters from equilibrium transport data. This work treats electronic transport in the mentioned type of semiconductors and in particular in a-Si:H and a-Ge:H. From elementary concepts the theory is developed towards higher degrees of completeness and sophistication.

Further refinements for coping with the complexity of real systems are given. The comparison of theory with experiment is an important part of the book.

Amorphous Chalcogenide Semiconductors and Related Materials Springer

A review summarising the current state of research in the field, bridging the gaps in the existing literature. All the chapters are written by world leaders in research and development and guide readers through the details of photo-induced metastability and the results of the latest experiments and simulations not found in standard monographs on this topic. A useful reference not only for graduates but also for scientific and industrial researchers. With a foreword of Kazunobu Tanaka

Amorphous Semiconductors for Microelectronics World Scientific

Amorphous chalcogenide semiconductors have commercial value and have many uses such as image formation, including x-rays, and high-definition TV pick up tubes. They have widespread application in the microelectronics industry and amorphous metallic alloys also have useful magnetic properties. This book focuses on their imaging applications and related properties. It examines the two groups of amorphous semiconductors that are of most commercial interest: the chalcogenide glasses the tetrahedrally bonded amorphous solids such as amorphous silicon, germanium and related alloys Both of these groups may be conveniently prepared in the form of thin/thick films which is of considerable importance in applications where large-area coverage of flat or curved surfaces of rigid or flexible materials is desirable such as in photovoltaic arrays, X-Ray sensors, display screens and photocopier drums. Provides information on the amorphous semiconductors that are of most commercial interest Presents the history of the commercial applications, the latest developments and future possibilities

Physics of Amorphous Semiconductor Devices Gardners Books

The book is devoted to theoretical investigations of interrelations in between morphology, single-electron spectrum, and optical properties of polycrystalline and spatially non-homogeneous amorphous semiconductors.

Amorphous and Liquid Semiconductors Springer Science & Business Media

Landmark contributions to science and mechanisms for the origin of the phenomena, and technology are rarely recognized at the time of reached important conclusions about the physical publication. Few people, even in technical areas, nature of the materials at equilibrium and their recognized the importance of developments such as electronic nonequilibrium properties. Many of these the transistor, the laser, or electrophotography ideas were condensed into a publication for Physical until well after their successful demonstration. Review Letters, paper 1 in this collection. This So-called experts, in fact, tend to resist new paper immediately attracted attention to the field, inventions, a natural instinct based on a combina and directly lead to the initiation of large research tion of fear of obsolescent expertise and jealousy efforts at both industrial laboratories and univer- arising from lack of active participation in the ties throughout the world. Inevitably, there was discovery. the usual amount of controversy, with many experts Denigration of new ideas is a relatively simultaneously taking positions (2) and (3) above. safe modus operandi, since the vast majority It has now been well over 20 years since eventually are abandoned well short of commerciality. the original publication date, and an objective view However, a successful device can be identified by can be taken in hindsight.

Electronic Transport in Hydrogenated Amorphous Semiconductors National Academies

Although amorphous semiconductors have been studied for over four decades, many of their properties are not fully understood. This book discusses not only the most common spectroscopic techniques but also describes their advantages and disadvantages. Provides information on the most used spectroscopic techniques Discusses the advantages and disadvantages of each technique

Fundamentals of Amorphous Semiconductors Springer Science & Business Media

The Institute for Amorphous Studies was founded in 1982 as the international center for the

investigation of amorphous materials. It has since played an important role in promoting the understanding of disordered matter in general. An Institute lecture series on "Fundamentals of Amorphous Materials and Devices" was held during 1982-83 with distinguished speakers from universities and industry. These events were free and open to the public, and were attended by many representatives of the scientific community. The lectures themselves were highly successful inasmuch as they provided not only formal instruction but also an opportunity for vigorous and stimulating debate. That last element could not be captured within the pages of a book but the lectures concentrated on the latest advances in the field which is why their essential contents are here reproduced in collective form. Together they constitute an interdisciplinary status report of the field. The speakers brought many different viewpoints and a variety of background experiences to bear on the problems involved but though language and conventions vary the essential unity of the concerns is very clear as indeed are the ultimate benefits of the many-sided approach.

Fundamental Physics of Amorphous Semiconductors Cambridge University Press

"Amorphous solids (including glassy and non-crystalline solids) are ubiquitous since the vast majority of solids naturally occurring in our world are amorphous. Although the field is diverse and complex, this three-volume set covers the vast majority of the important concepts needed to understand these materials and their principal practical applications. One volume discusses the most important subset of amorphous insulators, namely oxide glasses; the other two volumes discuss the most important subsets of amorphous semiconductors, namely tetrahedrally coordinated amorphous semiconductors and amorphous and glassy chalcogenides. Together these three volumes provide a comprehensive set of theoretical concepts and practical information needed to become conversant in the field of amorphous materials. They are suitable for advanced graduate students, postdoctoral research associates, and researchers wishing to change fields or sub-fields. The topics covered in these three volumes include (1) concepts for understanding the structures of amorphous materials, (2) techniques to characterize the structural, electronic, and optical properties of amorphous materials, (3) the roles of defects in affecting the electronic and optical properties of amorphous materials, and (4) the concepts for understanding practical devices and other applications of amorphous materials. Applications discussed in these volumes include transistors, solar cells, displays, bolometers, fibers, non-volatile memories, vidicons, photoresists, and optical disks"--Publisher's website.

Technology and Applications of Amorphous Silicon Springer Science & Business Media

Solid state physics after solving so successfully many fundamental problems in perfect or slightly imperfect crystals, tried in recent years to attack problems associated with large disorder with the aim to understand the consequences of the lack of the long-range order. Semiconductors are much more changed by disorder than metals or insulators, and appear to be the most suitable materials for fundamental work. Considerable exploratory work on amorphous and liquid semiconductors was done by the Leningrad School since the early fifties. In recent years, much research in several countries was directed to deepen the understanding of the structural, electronic, optical, vibrational, magnetic and other properties of these materials and to possibly approach the present level of understanding of crystalline semiconductors. This effort was stimulated not only by purely scientific interest but also by the possibility of new applications from which memory devices in the general sense are perhaps the most challenging. The research met with serious difficulties which are absent in crystals.

Electronic Transport in Hydrogenated Amorphous Semiconductors Springer

This comprehensive, detailed treatise on the physics and applications of the new emerging technology of amorphous semiconductors focuses on specific device research problems such as the optimization of device performance. The first part of the book presents hydrogenated amorphous silicon type alloys, whose applications include inexpensive solar cells, thin film transistors, image scanners, electrophotography, optical recording and gas sensors. The second part of the book discusses amorphous chalcogenides, whose applications include electrophotography, switching, and memory elements. This book will serve as an excellent reference source for solid state scientists and engineers, and as a useful self-contained introduction to the field for graduate students.

Tetrahedrally-Bonded Amorphous Semiconductors Artech House Materials Science

Understanding the structural unit of crystalline solids is vital in determining their optical and electronic properties. However, the disordered nature of amorphous semiconductors, where no long-range order is retained, makes it difficult to determine their structure using traditional methods. This book shows how computer modelling can be used to overcome the difficulties that arise in the atomic scale identification of amorphous semiconductors. The book explains how to generate a random structure using computer modelling, providing readers with the techniques to construct realistic material structures. It shows how the optical and electronic properties are related to random structures. Readers will be able to understand the characteristic features of disordered semiconductors. The structural and electronic modifications by photon irradiation are also discussed in detail. This book is ideal for both physicists and engineers working in solid state physics, semiconductor engineering and electrical engineering.

Optical Constants of Crystalline and Amorphous Semiconductors Elsevier

The Kyoto Summer Institute 1980 (KSI '80), devoted to "Fundamental Physics of Amorphous Semiconductors", was held at Research Institute for Fundamental Physics (RIFP), Kyoto University, from 8-11 September, 1980. The KSI '80 was the successor of the preceding Institutes which were

held in July 1978 on "Particle Physics and Accelerator Projects" and in September 1979 on "Physics of Low-Dimensional Systems". The KSI '80 was attended by 200 participants, of which 36 were from abroad: Canada, France, Korea, Poland, U.K., U.S.A, U.S.S.R., and the Federal Republic of Germany. The KSI '80 was organized by RIFP and directed by the Amorphous Semiconductor group in Japan. A few years ago, we started to organize an international meeting on amorphous semiconductors as a satellite meeting of the International Conference on "Physics of Semiconductors" held on September 1-5, 1980 in Kyoto. We later decided to hold the meeting in the form of the Kyoto Summer Institute. The Kyoto Summer Institute is aimed to be something between a school and a conference. Accordingly, the object of the KSI '80 was to provide a series of invited lectures and informal seminars on fundamental physics of amorphous semiconductors. No contributed paper was accepted, but seminars were open.

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The World Scientific Reference Of Amorphous Materials Springer

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NONCRYSTALLINE SEMICONDUCTORS Elsevier

Amorphous materials differ significantly from their crystalline counterparts in several ways that create unique issues in their use. This book explores these issues and their implications, and provides a full treatment of both experimental and theoretical studies in the field. Advances in Amorphous Semiconductors covers a wide range of studies on hydrogenated amorphous silicon, amorphous chalcogenides, and some oxide glasses. It reviews structural properties, properties associated with the charge carrier-phonon interaction, defects, electronic transport, photoconductivity, and some applications of amorphous semiconductors. The book explains a number of recent advances in semiconductor research, including some of the editors' own findings. It addresses some of the problems associated with the validity of the effective mass approximation, whether K is a good quantum number, and the concepts of phonons and excitons. It also discusses recent progress made in understanding light-induced degradations in amorphous semiconductors, which is seen as the most limiting problem in device applications. The book presents a comprehensive review of both experimental and theoretical studies on amorphous semiconductors, which will be useful to students, researchers, and instructors in the field of amorphous solids.

Fundamental Physics of Amorphous Semiconductors Springer Science & Business Media

The electron theory of solids has attracted great attention in recent years, mainly because of the numerous practical applications of semiconductors. However, all the reviews and monographs on this subject deal only with crystalline conductors. At present, mainly in the Soviet Union, experimental and theoretical investigations have been extended to liquid and solid amorphous conductors, and in particular to such semiconductors. However, all the work published so far in this field is in the form of separate papers scattered throughout various journals, and there has as yet been no Soviet or foreign review of the theoretical work on amorphous semiconductors, in spite of the increasing interest in them. The investigation of liquid and amorphous semiconductors is of great practical importance, first, because all the solid semiconductors are usually prepared from the liquid phase and it is important to know the electrical and other properties of this phase; secondly, amorphous semiconductors are beginning to be used in industry, for example, amorphous Sb₂S₃ films in vidicon tubes. In some cases, especially in optical instruments, amorphous semiconductors have advantages compared with crystals. Theoretical studies of amorphous semiconductors should help in these practical applications. The present monograph is the first attempt to present systematically the quantum electron theory of amorphous conductors. The most interesting in the author's view-theoretical papers on this subject, published in journals are reviewed and critically compared.

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