

Keiji Tanaka
Koichi Shimakawa

Amorphous Chalcogenide Semiconductors and Related Materials

Second Edition

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Amorphous Chalcogenide Semiconductors And Related Materials:

Amorphous Chalcogenide Semiconductors and Related Materials Keiji Tanaka,Koichi Shimakawa,2011-05-24

Amorphous Chalcogenide Semiconductors and Glasses describes developments in the science and technology of this class of materials This book offers an up to date treatment of chalcogenide glasses and amorphous semiconductors from basic principles to applications while providing the reader with the necessary theoretical background to understanding the material properties technology of this class of materials This book offers an up to date treatment of chalcogenide glasses and amorphous semiconductors from basic principles to applications while providing the reader with the necessary theoretical background to understanding the material properties Chalcogenides form a special class of materials which have one or more of the elements from the chalcogen group Group VI in the Periodic Table S Se or Te as a constituent the chalcogen is mixed with other elements to form various new compounds and alloys Chalcogenides are noncrystalline solids because their structure is amorphous or glassy Such structures have totally different properties than crystalline solids Chalcogenide glasses have a number of very interesting and useful properties which have been already exploited in the commercialization of new devices

Amorphous Chalcogenide Semiconductors and Related Materials Keiji Tanaka,Koichi

Shimakawa,2021-07-01 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

Amorphous Chalcogenides Victor I. Mikla,Victor V.

Mikla,2011-09-23 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 1 the chalcogenide glasses2 the tetrahedrally bonded amorphous solids such as amorphous silicon germanium and related alloysBoth 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

Chalcogenides Alexander V. Kolobov,Junji Tominaga,2012-08-22 A state of the art

description of metastability observed in chalcogenide alloys is presented with the accent on the underlying physics A comparison is made between sulphur selenium based chalcogenide glasses where numerous photo induced phenomena take place entirely within the amorphous phase and tellurides where a reversible crystal to amorphous phase change

transformation is a major effect Applications of metastability in devices optical memories and nonvolatile electronic phase change random access memories among others are discussed including the latest trends Background material essential for understanding current research in the field is also provided Proceedings of the Sixth International Symposium on Dielectric Materials and Applications (ISyDMA'6) Ashok Vaseashta, Mohammed Essaid Achour, Mustapha Mabrouki, Didier Fasquelle, Amina Tachafine, 2022-09-25 This book addresses to the materials scientists physicists chemists biologists and electrical engineers engaged in fundamental and applied research or technical investigations on such materials The goal of the International Symposium on Dielectric Materials and Applications conference series is to provide an innovative platform for key researchers scientists from all over the world to exchange ideas and to hold wide ranging discussions on recent developments in dielectric materials and their new and emerging applications The aim of ISyDMA meeting is to provide an international forum for the discussion of current research on high k dielectric electrical insulation dielectric phenomena and topics related to emerging applications Springer Handbook of Electronic and Photonic Materials Safa Kasap, Peter Capper, 2017-10-04 The second updated edition of this essential reference book provides a wealth of detail on a wide range of electronic and photonic materials starting from fundamentals and building up to advanced topics and applications Its extensive coverage with clear illustrations and applications carefully selected chapter sequencing and logical flow makes it very different from other electronic materials handbooks It has been written by professionals in the field and instructors who teach the subject at a university or in corporate laboratories The Springer Handbook of Electronic and Photonic Materials second edition includes practical applications used as examples details of experimental techniques useful tables that summarize equations and most importantly properties of various materials as well as an extensive glossary Along with significant updates to the content and the references the second edition includes a number of new chapters such as those covering novel materials and selected applications This handbook is a valuable resource for graduate students researchers and practicing professionals working in the area of electronic optoelectronic and photonic materials Optical Properties of Materials and Their Applications Jai Singh, 2020-01-07 Provides a semi quantitative approach to recent developments in the study of optical properties of condensed matter systems Featuring contributions by noted experts in the field of electronic and optoelectronic materials and photonics this book looks at the optical properties of materials as well as their physical processes and various classes Taking a semi quantitative approach to the subject it presents a summary of the basic concepts reviews recent developments in the study of optical properties of materials and offers many examples and applications Optical Properties of Materials and Their Applications 2nd Edition starts by identifying the processes that should be described in detail and follows with the relevant classes of materials In addition to featuring four new chapters on optoelectronic properties of organic semiconductors recent advances in electroluminescence perovskites and ellipsometry the book covers optical properties of disordered condensed matter and glasses concept of excitons photoluminescence

photoinduced changes and electroluminescence in noncrystalline semiconductors and photoinduced bond breaking and volume change in chalcogenide glasses Also included are chapters on nonlinear optical properties of photonic glasses kinetics of the persistent photoconductivity in crystalline III V semiconductors and transparent white OLEDs In addition readers will learn about excitonic processes in quantum wells optoelectronic properties and applications of quantum dots and more Covers all of the fundamentals and applications of optical properties of materials Includes theory experimental techniques and current and developing applications Includes four new chapters on optoelectronic properties of organic semiconductors recent advances in electroluminescence perovskites and ellipsometry Appropriate for materials scientists chemists physicists and electrical engineers involved in development of electronic materials Written by internationally respected professionals working in physics and electrical engineering departments and government laboratories Optical Properties of Materials and Their Applications 2nd Edition is an ideal book for senior undergraduate and postgraduate students and teaching and research professionals in the fields of physics chemistry chemical engineering materials science and materials engineering

Metastable States in Amorphous Chalcogenide Semiconductors Victor I. Mikla, Victor V. Mikla, 2009-12-24 This book presents experimental results on the structural and electronic metastable states in Se rich chalcogenides Coverage includes states in the mobility gap structural transformation photocrystallization and many potential related applications

Planar Waveguides and other Confined Geometries Gerd Marowsky, 2014-10-07 This book provides a comprehensive overview of the theoretical concepts and experimental applications of planar waveguides and other confined geometries such as optical fibres Covering a broad array of advanced topics it begins with a sophisticated discussion of planar waveguide theory and covers subjects including efficient production of planar waveguides materials selection nonlinear effects and applications including species analytics down to single molecule identification and thermo optical switching using planar waveguides Written by specialists in the techniques and applications covered this book will be a useful resource for advanced graduate students and researchers studying planar waveguides and optical fibers

Silicon Dioxide and the Luminescence of Related Materials Anatoly Trukhin, 2021-07-05 This book is devoted to the study of the properties of materials that can be in a crystalline and glassy state Its central focus is the physics of solids whose structure is disordered since the existing theories of solids are based on crystal structures The approach adopted here is based on the comparison of data for crystals and glasses formed by the same atoms paying particular attention to the under explored glass forming crystals The book will be of interest to graduate students solid states researchers glass technologists and young scientists beginning research in the field of experimental physics

Chalcogenide Abhay Kumar Singh, Tien-Chien Jen, 2021-04-26 This is introductory book for researchers scientists and students in the area of organic and inorganic composite materials This book has addressed timely the innovative topic chalcogenide multiwalled carbon nanotubes and chalcogenide bilayer graphene composite materials under a glassy regime This book will give a clear idea on the concepts of

the newly established composite materials area by providing interpretations of inside physio chemical mechanism The remarkable landmark innovations related to this newly introduced research field are included in this book Additionally the possible futuristic applications in the area of nanoelectronics optoelectronics biomedical etc are also addressed Advances in Condensed-Matter and Materials Physics Jagannathan Thirumalai, Sergey Ivanovich Pokutnyi, 2020-05-06 This book Condensed Matter and Material Physics incorporates the work of multiple authors to enhance the theoretical as well as experimental knowledge of materials The investigation of crystalline solids is a growing need in the electronics industry Micro and nano transistors require an in depth understanding of semiconductors of different groups Amorphous materials on the other hand as non equilibrium materials are widely applied in sensors and other medical and industrial applications Superconducting magnets composite materials lasers and many more applications are integral parts of our daily lives Superfluids liquid crystals and polymers are undergoing active research throughout the world Hence profound information on the nature and application of various materials is in demand This book bestows on the reader a deep knowledge of physics behind the concepts perspectives characteristic properties and prospects The book was constructed using 10 contributions from experts in diversified fields of condensed matter and material physics and its technology from over 15 research institutes across the globe **Optoelectronic Materials** Yuan Ming Huang, 2010-11-11 Selected peer reviewed papers from the 2010 International Conference on Optical Electronic and Electrical Materials August 1 4 Kunming China OEEM 2010

Handbook of Advanced Electronic and Photonic Materials and Devices: Chalcogenide glasses and sol-gel materials Hari Singh Nalwa, 2001 Electronic and photonic materials discussed in this handbook are the key elements of continued scientific and technological advances in the 21st century The electronic and photonic materials comprising this handbook include semiconductors superconductors ferroelectrics liquid crystals conducting polymers organic and superconductors conductors nonlinear optical and optoelectronic materials electrochromic materials laser materials photoconductors photovoltaic and electroluminescent materials dielectric materials nanostructured materials supramolecular and self assemblies silicon and glasses photosynthetic and respiratory proteins etc etc Some of these materials have already been used and will be the most important components of the semiconductor and photonic industries computers internet information processing and storage telecommunications satellite communications integrated circuits photocopiers solar cells batteries light emitting diodes liquid crystal displays magneto optic memories audio and video systems recordable compact discs video cameras X ray technology color imaging printing flat panel displays optical waveguides cable televisions computer chips molecular sized transistors and switches as well as other emerging cutting edge technologies Electronic and photonic materials are expected to grow to a trillion dollar industry in the new millennium and will be the most dominating forces in the emerging new technologies in the fields of science and engineering This handbook is a unique source of the in depth knowledge of synthesis processing fabrication spectroscopy physical properties and applications of electronic and

photonic materials covering everything for today's and developing future technologies This handbook consists of over one hundred state of the art review chapters written by more than 200 world leading experts from 25 different countries With more than 23 000 bibliographic citations and several thousands of figures tables photographs chemical structures and equations this handbook is an invaluable major reference source for scientists and students working in the field of materials science solid state physics chemistry electrical and optical engineering polymer science device engineering and computational engineering photophysics data storage and information technology and technocrats everyone who is involved in science and engineering of electronic and photonic materials

Key Features This is the first handbook ever published on electronic and photonic materials 10 volumes summarize the advances in electronic and photonic materials made over past the two decades This handbook is a unique source of the in depth knowledge of synthesis processing spectroscopy physical properties and applications of electronic and photonic materials Over 100 state of the art review chapters written by more than 200 leading experts from 25 different countries About 25 000 bibliographic citations and several thousand figures tables photographs chemical structures and equations Easy access to electronic and photonic materials from a single reference Each chapter is self contained with cross references Single reference having all inorganic organic and biological materials Witten in very clear and concise fashion for easy understanding of structure property relationships in electronic and photonic materials

Amorphous Semiconductors Sándor Kugler, Koichi Shimakawa, 2015-02-12 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

Overall Aspects of Non-Traditional Glasses: Synthesis, Properties and Applications Helena Cristina de Sousa Pereira Meneses e Vasconcelos, Maria Clara Gonçalves, 2016-05-01 The considerable proliferation of new glasses during the second half of the 20th century germanate vanadate bismuthate tellurite chalcogenide glasses etc brought about the use the plural form of the 4 generic glass denomination in order to be able to index each emerging glass family by its proper name as well as to classify them methodically Together with its great compositional versatility the peculiar characteristics of glass non crystalline structure with short range order continuous network with no intergranular boundaries isotropy easy to be formed into a plastic state inside a wide temperature range allow for a freedom of design and adaptability that few materials are able

to offer All these circumstances have contributed to the fact that in the last seventy years glass has acquired the multiple and varied appearance of its new families without losing neither its original image nor its soda lime silica traditional composition destined for the huge industrial manufacture of its conventional products

Physics and Applications of Non-Crystalline Semiconductors in Optoelectronics A. Andriesh, M. Bertolotti, 2012-12-06 The Workshop on Physics and Application of Non crystalline Semiconductors in Optoelectronics was held from 15 to 17 October 1996 in Chisinau republic of Moldova and was devoted to the problems of non crystalline semiconducting materials The reports covered two main topics theoretical basis of physics of non crystalline materials and experimental results In the framework of these major topics there were treated many subjects concerning the physics of non crystalline semiconductors and their specific application optical properties of non crystalline semiconductors doping of glassy semiconductors and photoinduced effects in chalcogenide glasses and their application for practical purposes methods for investigation of the structure in non crystalline semiconductors new glassy materials for IR transmittance and optoelectronics Reports and communications were presented on various aspects of the theory new physical principles studies of the atomic structure search and development of optoelectronics devices Special attention was paid to the actual subject of photoinduced transformations and its applications Experimental investigations covered a rather wide spectrum of materials and physical phenomena As a novel item it is worth to mention the study of nonlinear optical effects in amorphous semiconducting films The third order optical nonlinearities fast photoinduced optical absorption and refraction acousto optic effects recently discovered in non crystalline semiconductors could potentially be utilised for optical signal processing The important problems of photoinduced structural transformations and related phenomena which are very attractive and actual both from the scientific and practical points of view received much attention in discussions at the conference

Photoconductivity and Photoconductive Materials Safa O. Kasap, 2022-06-28 Dieses wichtige Referenzwerk behandelt die grundlegenden Konzepte der Photoleitfähigkeit und der photoleitenden Materialien Mit Photoconductivity and Photoconductive Materials präsentiert Professor Kasap eine maßgebliche Zusammenstellung der wesentlichen Grundsätze der Photoleitfähigkeit und stellt eine Auswahl aktueller photoleitfähiger Materialien vor Der erste Band des zweibändigen Werks beginnt mit einer Darstellung der grundlegenden Konzepte und Definitionen Es folgt eine Charakterisierung der verschiedenen Techniken auf Grundlage von stationärer transienter und modulierter Photoleitfähigkeit und der neuen Methode der Ladungsextraktion durch linear steigende Spannung CELIV Auch die Physik der Terahertz Photoleitfähigkeit sowie die Grundlagen der organischen Halbleiter LSOI werden behandelt Der zweite Band beginnt mit einem umfassenden Überblick über eine Vielzahl unterschiedlicher photoleitfähiger Materialien wobei der Schwerpunkt auf einige der wichtigsten Photoleiter gelegt wird darunter hydriertes amorphes Silizium Cadmium Quecksilber Tellurid verschiedene Röntgenphotoleiter Diamantfilme Metallhalogenidperowskite Nanodrähte und Quantenpunkte Auch die Anwendungen der photoleitenden Antenne werden erörtert Das Werk das zahlreiche Beiträge führender Autoren auf diesem

Fachgebiet enthält bietet den Leserinnen und Lesern außerdem eine gründliche Einführung in die Charakterisierung von Halbleitern mit Hilfe von Techniken der Photoleitfähigkeit insbesondere gleichmäßiger Beleuchtung und Phototrieger Gittertechniken Eine umfassende Darstellung organischer Photoleiter mitsamt Informationen zu Photoerzeugung Transport und Anwendungen im Druckbereich Praktische Erörterungen der transienten Lichtleitfähigkeit im Flugzeitverfahren inklusive Experimentiertechniken und Interpretationshinweisen Eine eingehende Betrachtung der transienten Photoleitfähigkeit organischer Halbleiterschichten und neuartiger Techniken der transienten Photoleitfähigkeit Photoconductivity and Photoconductive Materials ist nicht nur ein wichtiges Referenzwerk für Physiker in der Forschung Materialwissenschaftler und Elektroingenieure sondern auch ein unverzichtbares Nachschlagewerk für Doktoranden und Studierende höherer Semester die sich mit dem Bereich der optoelektronischen Materialien beschäftigen sowie für Forschende in der Industrie Ein umfassendes zweibändiges Werk mit Beiträgen führender Fachautoren herausgegeben von einem angesehenen Forscher auf dem Gebiet der Photoleitfähigkeit

Stanford R. Ovshinsky Brian B. Schwartz, 2008 This book highlights the achievements of the self taught inventor scientist manufacturer and entrepreneur Stanford R Ovshinsky This remarkable individual could without special training compete with the well funded establishments of learning and industry in the second half of the last century and leave us an incredible legacy of brilliant innovations with a lasting impact on our lives His achievements extend over amazingly diverse fields and have or are prone to create new industries of great societal value The phase change memories of commonly used rewritable CDs and DVDs as well as of new flash memories are his invention so are the Ni Metal hydride batteries which are the enabling batteries for electric and hybrid electric vehicles The future hydrogen economy will utilize his efficient and safe hydrogen storage alloys He has developed light and ultralight photovoltaic solar panels for converting sunlight into electricity and built the largest manufacturing facility for thin film flexible solar roofing materials A common theme of his inventions is the synthesis of new materials utilizing novel aspects of structural and compositional disorder The book explains for each of Ovshinsky's innovations the essence of his pioneering ideas and inventions These introductions are followed by a selection of Ovshinsky's seminal publications and for each subject category a list of his patents which reveal the inventive mind of this unusually creative person Ovshinsky's example of gaining a deep understanding of the science underlying his inventions his perseverance as well as his ability to attract and inspire talented collaborators will be a role model for entrepreneurs of this century

Science And Technology Of An American Genius, The: Stanford R Ovshinsky Brian Schwartz, Hellmut Fritzsche, 2008-10-09 This book highlights the achievements of the self taught inventor scientist manufacturer and entrepreneur Stanford R Ovshinsky This remarkable individual could without special training compete with the well funded establishments of learning and industry in the second half of the last century and leave us an incredible legacy of brilliant innovations with a lasting impact on our lives His achievements extend over amazingly diverse fields and have or are prone to create new industries of great societal value The phase change memories of

commonly used rewritable CDs and DVDs as well as of new flash memories are his invention so are the Ni Metal hydride batteries which are the enabling batteries for electric and hybrid electric vehicles The future hydrogen economy will utilize his efficient and safe hydrogen storage alloys He has developed light and ultralight photovoltaic solar panels for converting sunlight into electricity and built the largest manufacturing facility for thin film flexible solar roofing materials A common theme of his inventions is the synthesis of new materials utilizing novel aspects of structural and compositional disorder The book explains for each of Ovshinsky's innovations the essence of his pioneering ideas and inventions These introductions are followed by a selection of Ovshinsky's seminal publications and for each subject category a list of his patents which reveal the inventive mind of this unusually creative person Ovshinsky's example of gaining a deep understanding of the science underlying his inventions his perseverance as well as his ability to attract and inspire talented collaborators will be a role model for entrepreneurs of this century

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