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Amorphous Chalcogenide Semiconductors and Related Materials

Second Edition

 Springer

Amorphous Chalcogenide Semiconductors And Related Materials

Kazuo Morigaki, Sandor Kugler, Koichi Shimakawa



Amorphous Chalcogenide Semiconductors And Related Materials:

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 *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 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 glasses 2 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 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 **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

Chalcogenide Glasses J-L Adam,X. Zhang,2014-02-14 The unique properties and functionalities of chalcogenide glasses make them promising materials for photonic applications Chalcogenide glasses are transparent from the visible to the near infrared region and can be moulded into lenses or drawn into fibres They have useful commercial applications as components for lenses for infrared cameras and chalcogenide glass fibres and optical components are used in waveguides for use with lasers for optical switching chemical and temperature sensing and phase change memories Chalcogenide glasses comprehensively reviews the latest technological advances in this field and the industrial applications of the technology Part one outlines the preparation methods and properties of chalcogenide glasses including the thermal properties structure and optical properties before going on to discuss mean coordination and topological constraints in chalcogenide network glasses and the photo induced phenomena in chalcogenide glasses This section also covers the ionic conductivity and physical aging of chalcogenide glasses deposition techniques for chalcogenide thin films and transparent chalcogenide glass ceramics Part two explores the applications of chalcogenide glasses Topics discussed include rare earth doped chalcogenide glass for lasers and amplifiers the applications of chalcogenide glasses for infrared sensing microstructured optical fibres for infrared applications and chalcogenide glass waveguide devices for all optical signal processing This section also discusses the control of light on the nanoscale with chalcogenide thin films chalcogenide glass resists for lithography and chalcogenide for phase change optical and electrical memories The book concludes with an overview of chalcogenide glasses as electrolytes for batteries Chalcogenide glasses comprehensively reviews the latest technological advances and applications of chalcogenide glasses and is an essential text for academics materials scientists and electrical engineers working in the photonics and optoelectronics industry Outlines preparation methods and properties and explores applications of chalcogenide glasses Covers the ionic conductivity and physical aging of chalcogenide glasses deposition techniques for chalcogenide thin films and transparent chalcogenide glass ceramics Discusses the control of light on the nanoscale with chalcogenide thin films chalcogenide glass resists for lithography and chalcogenide for phase change optical and electrical memories

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 *Amorphous Semiconductors* Sándor Kugler, Koichi Shimakawa, 2015-02-12 This book explains how to use computer modelling to understand amorphous semiconductors for researchers in solid state physics and semiconductor engineering 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

Amorphous Semiconductors Kazuo Morigaki, Sandor Kugler, Koichi Shimakawa, 2016-12-29 Amorphous semiconductors are substances in the amorphous solid state that have the properties of a semiconductor and which are either covalent or tetrahedrally bonded amorphous semiconductors or chalcogenide glasses Developed from both a theoretical and experimental viewpoint Deals with amongst others preparation techniques structural optical and electronic properties and light induced phenomena Explores different types of amorphous semiconductors including amorphous silicon amorphous semiconducting oxides and chalcogenide glasses Applications include solar cells thin film transistors sensors optical memory devices and flat screen devices including televisions

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

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

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

The Physics and Applications of Amorphous

Semiconductors Arun Madan, M. P. Shaw, 2012-12-02 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 **Disordered Materials** Stadford R.

Ovshinsky, 2012-12-06 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 **Research on Amorphous Materials** STANFORD UNIV

CALIF CENTER FOR MATERIALS RESEARCH., 1973 Contents Materials perfection and sharp band edges in amorphous Ge and Si Studies of Te and As₂Se₃ Studies of the GeTe system Dependence of structure of amorphous germanium films on the angle of evaporation Studies of amorphous Si Structural studies in the Ge S Ge Se and Ge Te systems Threefold coordinated model structure of amorphous GeS GeSe and GeTe The structure of chalcogenide glasses Cu impurities in As₂Se₃ X ray absorption edge spectroscopy studies Photoconductivity in amorphous chalcogenides Fundamentals of Amorphous Semiconductors National Research Council (U.S.). Ad Hoc Committee on the Fundamentals of Amorphous

Semiconductors, 1972 World Scientific Reference Of Amorphous Materials, The: Structure, Properties, Modeling And Main Applications (In 3 Volumes) , 2020-12-28 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

Springer Handbook of Glass J. David Musgraves, Juejun Hu, Laurent Calvez, 2019-11-08 This handbook provides comprehensive treatment of the current state of glass science from the leading experts in the field Opening with an enlightening contribution on the history of glass the volume is then divided into eight parts The first part covers fundamental properties from the current understanding of the thermodynamics of the amorphous state kinetics and linear and nonlinear optical properties through colors photosensitivity and chemical durability The second part provides dedicated chapters on each individual glass type covering traditional systems like silicates and other oxide systems as well as novel hybrid amorphous materials and spin glasses The third part features detailed descriptions of modern characterization techniques for understanding this complex state of matter The fourth part covers modeling from first principles calculations through molecular dynamics simulations and statistical modeling The fifth part presents a range of laboratory and industrial glass processing methods The remaining parts cover a wide and representative range of applications areas from optics and photonics through environment energy architecture and sensing Written by the leading international experts in the field the Springer Handbook of Glass represents an invaluable resource for graduate students through academic and industry researchers working in photonics optoelectronics materials science energy architecture and more **United Nuclear Corporation V. Energy Conversion Devices, Inc**, 1982

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