Chalcogenide From 3d To 2d And Beyond Woodhead Publ

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MAURICE CURTIS

Functional Glasses and Glass-Ceramics

Springer
Chalcogenide: From 3D to 2D and Beyond reviews graphene-like 2D chalcogenide systems that include topological insulators, interesting thermoelectric structures, and structures that exhibit a host of spin phenomena that are unique to 2D and lower-dimensional geometries. The book describes state-of-the-art materials in growth and fabrication, magnetic, electronic and optical characterization, as well as the experimental and theoretical aspects of this family of materials. Bulk chalcogenides, chalcogenide films, their heterostructures and low-dimensional chalcogenide-based quantum structures are discussed. Particular attention is paid to findings that are relevant to the continued search for new physical phenomena and new functionalities. Finally, the book covers the enormous opportunities that have emerged as it has become possible to achieve lower-dimensional chalcogenide structures by epitaxial techniques. Provides readers with foundational information on the materials growth, fabrication, magnetic, electronic and optical characterization of chalcogenide materials Discusses not only bulk chalcogenides and chalcogenide thin films, but also two-dimensional chalcogenide materials systems Reviews the most important applications in optoelectronics, photovoltaics and thermoelectrics

Applications of Chalcogenides: S, Se, and Te Springer
From everyday applications to the rise of

automation, devices have become ubiquitous. Specific materials are employed in specific devices because of their particular properties, including electrical, thermal, magnetic, mechanical, ferroelectric, and piezoelectric. Materials for Devices discusses materials selection for optimal application and highlights current materials developments in gas sensors, optical devices, mechanoelectrical devices, and medical and biological devices. Explains how to select the right material for the right device Includes 2D materials, thin films, smart piezoelectric films, and more Presents details on organic solar cells Describes thin films in sensors, actuators, and LEDs Covers thin films and elastic polymers in biomedical devices Discusses growth and characterization of intrinsic magnetic topological insulators This work is aimed at researchers, technologists, and advanced students in materials and electrical engineering and related fields who are interested in developing sensors or devices.

Chalcogenide Glasses Springer Science & Business Media

Lead Chalcogenides remain one of the basic materials of modern infrared optoelectronics. This volume presents the properties of lead chalcogenides, including the basic physical features, the bulk and epitaxial growth technique, and the 2-D physics of lead chalcogenide-based structures. In addition, the theoretical appraoches for band structure and impurity state calculations are reviewed.

Solution Processing of Inorganic Materials Woodhead Publishing
In a field as diverse as Chemical Modelling it can be difficult to keep up with the literature, or discover the latest applications of computational and theoretical chemistry. Specialist Periodical Reports present comprehensive and critical reviews of the recent literature, providing the reader with informed opinion and latest detailed information in their field. The latest volume of Chemical Modelling presents a diverse range of authors invited by the volume editors. Topics include Quantum Chemistry of Large Systems, Theoretical Studies of Special Relativity in Atoms and Molecules, MOFs: From Theory Towards Applications, and Multi-Scale Modelling. Other chapters look at Catalysis, Descriptive DFT, Phase Transitions. An essential resource for experienced researchers and those just entering the field of chemical modelling, this latest Specialist Periodical Report is an essential resource for any research group active in the field or chemical sciences library.
Handbook of Chalcogen Chemistry Royal Society of Chemistry
Van der Waals Ferroelectrics A comprehensive guide to a unique class of compounds with a variety of applications Since the discovery of graphene, there has been intensive interest in two-dimensional materials with similar electronic and industrial applications. The limitations on the usefulness of graphene itself, however, have powered the search for other

materials with similar properties. One such class of materials, the phosphorous chalcogenides, has proven a particularly fruitful avenue for research, due to the favorable band gap and ferroelectric properties of these materials. Van der Waals Ferroelectrics provides, for the first time, a detailed overview of this highly relevant and sought-after class of materials, also known as transition metal chalcogenophosphates (TMCPs). Focusing on physical properties, the book explores the complex physics underlying these compounds as well as the unique characteristics that have driven their ever-increasing importance to the materials science community. Van der Waals Ferroelectrics readers will also find: Both computational and experimental perspectives on TCMP compounds In-depth discussion of the properties essential to the design and construction of devices like sensors, actuators, memory chips, and capacitors The first detailed review of the functional properties of TCMP compounds, such as ferrielectricity, electrostriction, and ionic conductivity Van der Waals Ferroelectrics is a useful reference for materials scientists, inorganic chemists, solid state chemists, solid state physicists, electrical engineers, and libraries supporting these professions.

Separations of Water Pollutants with Nanotechnology Elsevier

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-asemblies, 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
Photonic Crystals BoD – Books on Demand
Offering perspective on both the scientific and engineering aspects of 2D semiconductors, Ultrathin Two-Dimensional Semiconductors for Novel Electronic Applications discusses how to successfully engineer 2D materials for practical applications. It also covers several novel topics regarding 2D semiconductors which have not yet been discussed in any other publications. Features: Provides comprehensive information and data about wafer-scale deposition of 2D semiconductors, ranging from scientific discussions up to the planning of experiments and reliability testing of the fabricated samples Precisely discusses wafer-scale ALD and CVD of 2D semiconductors and investigates various aspects of deposition techniques Covers the new group of 2D materials synthesized from surface oxide of liquid metals and also explains the device fabrication and post-treatment of these 2D nanostructures Addresses a wide range of scientific and practical applications of 2D semiconductors and electronic and optoelectronic devices based on these nanostructures Offers novel coverage of 2D heterostructures and

heterointerfaces and provides practical information about fabrication and application of these heterostructures Introduces the latest advancement in fabrication of novel memristors, artificial synapses and sensorimotor devices based on 2D semiconductors This work offers practical information valuable for engineering applications that will appeal to researchers, academics, and scientists working with and interested in developing an array of semiconductor electronic devices.

Annual Review of Nano Research

Elsevier

Chemical structure and bonding. The scope of the series spans the entire Periodic Table and addresses structure and bonding issues associated with all of the elements. It also focuses attention on new and developing areas of modern structural and theoretical chemistry such as nanostructures, molecular electronics, designed molecular solids, surfaces, metal clusters and supramolecular structures. Physical and spectroscopic techniques used to determine, examine and model structures fall within the purview of Structure and Bonding to the extent that the focus is on the scientific results obtained and not on specialist information concerning the techniques themselves. Issues associated with the development of bonding models and generalizations that illuminate the reactivity pathways and rates of chemical processes are also relevant. The individual volumes in the series are thematic. The goal of each volume is to give the reader, whether at a university

or in industry, a comprehensive overview of an area where new insights are emerging that are of interest to a larger scientific audience.

Annual Review of Nano Research

Royal Society of Chemistry

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

2D Monoelemental Materials (Xenes) and Related Technologies

John Wiley & Sons

Low-Dimensional Halide Perovskites: Structure, Properties and Applications

provides an in-depth look at halide perovskite materials and their applications. Chapters cover history, fundamentals, physiochemical and optoelectronic properties, synthesis and characterization of traditional and Pb-free halide perovskites. The book concludes with sections describing the different applications of halide perovskites for solar cells, light-emitting diodes and photo detectors, as well as the challenges faced in the industrialization of halide perovskite-based devices and forward-thinking prospects for further deployment. Discusses the applications of halide perovskites according to their dimensionality Includes a look at current challenges for the commercialization of halide perovskites, while also previewing some possible solutions Presents alternative environmentally-friendly materials that can used to replace the current toxic materials-based halide perovskites

Electrochemistry of Metal Chalcogenides John Wiley & Sons

1.1 Introduction VIA group elements in the periodic table are known as chalcogens. Chalcogens are sometimes known as oxygen family. Oxygen (O), Sulphur (S), Selenium (Se) and Tellurium (Te) are the elements of chalcogens. The chalcogen term was first introduced by Wilhelm Bilts group around 1930 at the University of Honover, where it was proposed by a Scientist Werner Fischer [1]. Chalcogen is a Greek word which means ‘ore forming’. Chalcogen elements react with almost all elements

in the periodic table to form stable compounds, which occurs in the earth crust and these are the ores of particular elements. So they are named as ‘ore formers’. Oxide, sulphite, selenide and telluride are insoluble in water. A Chalcogenide is the chemical compound consisting of at least one chalcogen ion and at least one more electropositive element. Chalcogenide term is more commonly reserved for sulfides, selenides, tellurides and not for oxides,

Iron-Based Superconducting Thin Films

CRC Press

The second volume of the book concerns the characterization approach of photonic crystals, photonic crystal lasers, photonic crystal waveguides and plasmonics including the introduction of innovative systems and materials.

Photonic crystal materials promises to enable all-optical computer circuits and could also be used to make ultra low-power light sources. Researchers have studied lasers from microscopic cavities in photonic crystals that act as reflectors to intensify the collisions between photons and atoms that lead to lazing, but these lasers have been optically-pumped, meaning they are driven by other lasers. Moreover, the physical principles behind the phenomenon of slow light in photonic crystal waveguides, as well as their practical limitations, are discussed. This includes the nature of slow light propagation, its bandwidth limitation, coupling of modes and particular kind terminating photonic crystals with metal surfaces allowing to propagate in surface plasmon-polariton

waves. The goal of the second volume is to provide an overview about the listed issues.

Chemical Modelling Volume 11 Springer

This book provides a modern introduction to the growth, characterization, and physics of iron-based superconducting thin films. Iron pnictide and iron chalcogenide compounds have become intensively studied key materials in condensed matter physics due to their potential for high temperature superconductivity. With maximum critical temperatures of around 60 K, the new superconductors rank first after the celebrated cuprates, and the latest announcements on ultrathin films promise even more. Thin film synthesis of these superconductors began in 2008 immediately after their discovery, and this growing research area has seen remarkable progress up to the present day, especially with regard to the iron chalcogenides FeSe and FeSe1-xTex, the iron pnictide BaFe2-xCoxAs2 and iron-oxyarsenides. This essential volume provides comprehensive, state-of-the-art coverage of iron-based superconducting thin films in topical chapters with detailed information on thin film synthesis and growth, analytical film characterization, interfaces, and various aspects on physics and materials properties. Current efforts towards technological applications and functional films are outlined and discussed. The development and latest results for monolayer FeSe films are also presented. This book serves as a key

reference for students, lecturers, industry engineers, and academic researchers who would like to gain an overview of this complex and growing research area.

Electron Spectroscopies Applied to Low-Dimensional Structures Walter de Gruyter GmbH & Co KG

Volume 61 of Reviews in Mineralogy and Geochemistry presents an up-to-date review of sulfide mineralogy and geochemistry. The crystal structures, electrical and magnetic properties, spectroscopic studies, chemical bonding, thermochemistry, phase relations, solution chemistry, surface structure and chemistry, hydrothermal precipitation processes, sulfur isotope geochemistry and geobiology of metal sulfides are reviewed. Where it is appropriate for comparison, there is brief discussion of the selenide or telluride analogs of the metal sulfides. When discussing crystal structures and structural relationships, the sulfosalt minerals as well as the sulfides are considered in some detail.

Chalcogenide-Based Nanomaterials as Photocatalysts John Wiley & Sons

The first book to paint a complete picture of the challenges of processing functional nanomaterials for printed electronics devices, and additive manufacturing fabrication processes. Following an introduction to printed electronics, the book focuses on various functional nanomaterials available, including conducting, semi-conducting, dielectric, polymeric, ceramic and tailored nanomaterials. Subsequent sections cover the preparation and

characterization of such materials along with their formulation and preparation as inkjet inks, as well as a selection of applications. These include printed interconnects, passive and active modules, as well as such high-tech devices as solar cells, transparent electrodes, displays, touch screens, sensors, RFID tags and 3D objects. The book concludes with a look at the future for printed nanomaterials. For all those working in the field of printed electronics, from entrants to specialized researchers, in a number of disciplines ranging from chemistry and materials science to engineering and manufacturing, in both academia and industry.

Focus on Surface Science Research Routledge

Provides an overview of the developments on the chemistry of the chalcogen group elements (S, Se and Te). Organised into two parts, this book deals systematically with the chemistry of chalcogens in relation to other group elements in the periodic table, and also includes an overview of metal-chalcogenides and metal-polychalcogenides.

Handbook of Advanced Electronic and Photonic Materials and Devices: Chalcogenide glasses and sol-gel materials Springer Science & Business Media

This book introduces readers to a wide range of applications for elements in Group 16 of the periodic table, such as, optical fibers for communication and sensing, X-ray imaging, electrochemical

sensors, data storage devices, biomedical applications, photovoltaics and IR detectors, the rationale for these uses, the future scope of their applications, and expected improvements to existing technologies. Following an introductory section, the book is broadly divided into three parts—dealing with Sulfur, Selenium, and Tellurium. The sections cover the basic structure of the elements and their compounds in bulk and nanostructured forms; properties that make these useful for various applications, followed by applications and commercial products. As the global technology revolution necessitates the search for new materials and more efficient devices in the electronics and semiconductor industry, Applications of Chalcogenides: S, Se, and Te is an ideal book for a wide range of readers in industry, government and academic research facilities looking beyond silicon for materials used in the electronic and optoelectronic industry as well as biomedical applications.

Lead Chalcogenides CRC Press

Chalcogenide-Based Nanomaterials as Photocatalysts deals with the different types of chalcogenide-based photocatalytic reactions, covering the fundamental concepts of photocatalytic reactions involving chalcogenides for a range of energy and environmental applications. Sections focus on nanostructure control, synthesis methods, activity enhancement strategies, environmental applications, and perspectives of chalcogenide-based nanomaterials. The book offers

guidelines for designing new chalcogenide-based nanoscale photocatalysts at low cost and high efficiency for efficient utilization of solar energy in the areas of energy production and environment remediation. Provides information on the development of novel chalcogenide-based nanomaterials Outlines the fundamentals of chalcogenides-based photocatalysis Includes techniques for heterogeneous catalysis based on chalcogenide-based nanomaterials

Nanomaterials for 2D and 3D Printing

John Wiley & Sons

The author provides a unified account of the electrochemical material science of metal chalcogenide (MCh) compounds and alloys with regard to their synthesis, processing and applications. Starting with the chemical fundamentals of the chalcogens and their major compounds, the initial part of the book includes a systematic description of the MCh solids on the basis of the Periodic Table in terms of their structures and key properties. This is followed by a general discussion on the electrochemistry of chalcogen species, and the principles underlying the electrochemical formation of inorganic compounds/alloys. The core of the book offers an insight into available experimental results and inferences regarding the electrochemical preparation and microstructural control of conventional and novel MCh structures. It also aims to survey their photoelectrochemistry, both from a material-oriented point of view and as

connected to specific processes such as photocatalysis and solar energy conversion. Finally, the book illustrates the relevance of MCh materials to various applications of electrochemical interest such as (electro)catalysis in fuel cells, energy storage with intercalation electrodes, and ion sensing.

Synthesis and Stereochemical Investigation of the Redox-active Iron-chalcogenide Nitrosyl Clusters

CRC Press

Semiconductor nanocrystals and metal nanoparticles are the building blocks of the next generation of electronic, optoelectronic, and photonic devices. Covering this rapidly developing and interdisciplinary field, the book examines in detail the physical properties and device applications of semiconductor nanocrystals and metal nanoparticles. It begins with a review of the synthesis and characterization of various semiconductor nanocrystals and metal nanoparticles and goes on to discuss in detail their optical, light emission, and electrical properties. It then illustrates some exciting applications of nanoelectronic devices (memristors and single-electron devices) and optoelectronic devices (UV detectors, quantum dot lasers, and solar cells), as well as other applications (gas sensors and metallic nanopastes for power electronics packaging). Focuses on a new class of materials that exhibit fascinating physical properties and have many exciting device applications. Presents an overview of synthesis strategies and characterization

techniques for various semiconductor nanocrystal and metal nanoparticles. Examines in detail the optical/optoelectronic properties, light emission properties, and electrical properties of semiconductor nanocrystals and metal nanoparticles. Reviews applications in nanoelectronic devices, optoelectronic devices, and photonic devices.