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Junqiao Wu · Jinbo Cao
Wei-Qiang Han · Anderson Janotti
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Functional Metal Oxide Nanostructures

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Jean-Pierre Jolivet

Functional Metal Oxide Nanostructures Springer Series In Materials Science:

Functional Metal Oxide Nanostructures Junqiao Wu,Jinbo Cao,Wei-Qiang Han,Anderson Janotti,Ho-Cheol Kim,2011-03-04 Metal oxides and particularly their nanostructures have emerged as animportant class of materials with a rich spectrum of properties and greatpotential for device applications In this book contributions from leadingexperts emphasize basic physical properties synthesis and processing and thelatest applications in such areas as energy catalysis and data storage Functional Metal Oxide Nanostructuresis an essential reference for any materials scientist or engineer with aninterest in metal oxides and particularly in recent progress in defectphysics strain effects solution based synthesis ionic conduction and theirapplications **Advances in Neuromorphic Hardware Exploiting Emerging Nanoscale Devices** Manan Suri,2017-01-21 This book covers all major aspects of cutting edge research in the field of neuromorphic hardware engineering involving emerging nanoscale devices Special emphasis is given to leading works in hybrid low power CMOS Nanodevice design The book offers readers a bidirectional top down and bottom up perspective on designing efficient bio inspired hardware At the nanodevice level it focuses on various flavors of emerging resistive memory RRAM technology At the algorithm level it addresses optimized implementations of supervised and stochastic learning paradigms such as spike time dependent plasticity STDP long term potentiation LTP long term depression LTD extreme learning machines ELM and early adoptions of restricted Boltzmann machines RBM to name a few The contributions discuss system level power energy parasitic trade offs and complex real world applications The book is suited for both advanced researchers and students interested in the field **Metal Oxide Nanostructures Chemistry** Jean-Pierre Jolivet,2019-01-16 This much anticipated new edition of Jolivet s work builds on the edition published in 2000 It is entirely updated restructured and increased in content The book focuses on the formation by techniques of green chemistry of oxide nanoparticles having a technological interest Jolivet introduces the most recent concepts and modelings such as dynamics of particle growth ordered aggregation ionic and electronic interfacial transfers A general view of the metal hydroxides oxy hydroxides and oxides through the periodic table is given highlighting the influence of the synthesis conditions on crystalline structure size and morphology of nanoparticles The formation of aluminum iron titanium manganese and zirconium oxides are specifically studied These nanomaterials have a special interest in many technological fields such as ceramic powders catalysis and photocatalysis colored pigments polymers cosmetics and also in some biological or environmental phenomena Metal Oxide Nanoparticles Oliver Diwald,Thomas Berger,2021-09-10 Ein umfassendes Referenzwerk f r Chemiker und Industriefachleute zum Thema Nanopartikel Nanopartikel aus Metalloxid sind ein wesentlicher Bestandteil zahlreicher nat rlicher und technologischer Prozesse von der Mineralumwandlung bis zur Elektronik Dar ber hinaus kommen Metalloxid Nanopartikel in Pulverform im Maschinenbau in der Elektronik und der Energietechnik zum Einsatz Das Werk Metal Oxide Nanoparticles Formation Functional Properties and Interfaces stellt die wichtigsten Synthese und Formulierungsans tze bei der Nutzung

von Metalloxid Nanopartikeln als Funktionsmaterialien vor Es werden die blichen Verarbeitungswege erkl rt und die physikalischen und chemischen Eigenschaften der Partikel mithilfe von umfassenden und erg nzenden Charakterisierungsmethoden bewertet Dieses Werk kann als Einf hrung in die Formulierung von Nanopartikeln ihre Grenzfl chenchemie und ihre funktionellen Eigenschaften im Nanobereich genutzt werden Dar ber hinaus dient es zum vertiefenden Verst ndnis denn das Buch enth lt detaillierte Angaben zu fortschrittlichen Methoden bei der physikalischen chemischen Oberfl chen und Grenzfl chencharakterisierung von Metalloxid Nanopartikeln in Pulvern und Dispersionen Erl uterung der Anwendung von Metalloxid Nanopartikeln und der wirtschaftlichen Auswirkungen Betrachtung der Partikelsynthese einschlie lich der Grunds tze ausgew hlter Bottom up Strategien Untersuchung der Formulierung von Nanopartikeln mit einer Auswahl von Verarbeitungs und Anwendungswegen Diskussion der Bedeutung von Partikeloberfl chen und grenzfl chen f r Strukturbildung Stabilit t und funktionelle Materialeigenschaften Betrachtung der Charakterisierung von Metalloxid Nanopartikeln auf verschiedenen L ngenskalen In diesem Buch finden Forscher im akademischen Bereich Chemiker in der Industrie und Doktoranden wichtige Erkenntnisse ber die Synthese Eigenschaften und Anwendungen von Metalloxid Nanopartikeln **Handbook of Nanofibers and Nanocomposites** Mohd Yusuf,Aminoddin Haji,2023-07-27 Textiles with functional properties such as antimicrobial finishes drug delivery ultraviolet resistance electrical conductivity superhydrophilicity superhydrophobicity self cleaning EMI shielding flame retardance can be developed with the help of nanotechnology Nanomaterials can be added to the textile materials at different stages of the production process including spinning finishing and coating Nanofibers are textile fibers that show enhanced properties due to larger surface area compared with ordinary textile fibers They have diameters less than 1000 nm and can hold nanoparticles drugs extracts essential oils etc in their polymeric matrix They actually encapsulate these compounds and are able to control their release by delivering them only at the targeted sites Recently nanofibers and textile nanocomposites have attracted great interest in the industry and research and electrospinning is the most famous among the several methods that have been developed for the fabrication of nanofibers This book is a collection of the reviews on the recent advances in the fields of nanofibers nanocomposites and their applications in textiles as well as related fields **Low Power Semiconductor Devices and Processes for Emerging Applications in Communications, Computing, and Sensing** Sumeet Walia,2018-08-06 The book addresses the need to investigate new approaches to lower energy requirement in multiple application areas and serves as a guide into emerging circuit technologies It explores revolutionary device concepts sensors and associated circuits and architectures that will greatly extend the practical engineering limits of energy efficient computation The book responds to the need to develop disruptive new system architectures and semiconductor processes aimed at achieving the highest level of computational energy efficiency for general purpose computing systems Discusses unique technologies and material only available in specialized journal and conferences Covers emerging materials and device structures such as ultra low power

technologies nanoelectronics and microsystem manufacturing Explores semiconductor processing and manufacturing device design and performance Contains practical applications in the engineering field as well as graduate studies Written by international experts from both academia and industry **Encyclopedia of Interfacial Chemistry** ,2018-03-29 Encyclopedia of Interfacial Chemistry Surface Science and Electrochemistry Seven Volume Set summarizes current fundamental knowledge of interfacial chemistry bringing readers the latest developments in the field As the chemical and physical properties and processes at solid and liquid interfaces are the scientific basis of so many technologies which enhance our lives and create new opportunities its important to highlight how these technologies enable the design and optimization of functional materials for heterogeneous and electro catalysts in food production pollution control energy conversion and storage medical applications requiring biocompatibility drug delivery and more This book provides an interdisciplinary view that lies at the intersection of these fields Presents fundamental knowledge of interfacial chemistry surface science and electrochemistry and provides cutting edge research from academics and practitioners across various fields and global regions **Metal Oxide Nanocomposite Thin Films for Optoelectronic Device Applications** Rayees Ahmad Zargar,2023-10-10 METAL OXIDE NANOCOMPOSITE THIN FILMS FOR OPTOELECTRONIC DEVICE APPLICATIONS The book provides insight into the fundamental aspects latest research synthesis route development preparation and future applications of metal oxide nanocomposite thin films The fabrication of thin film based materials is important to the future production of safe efficient and affordable energy as the devices convert sunlight into electricity Thin film devices allow excellent interface engineering for high performance printable solar cells as their structures are highly reliable and stand alone systems can provide the required megawatts They have been used as power sources in solar home systems remote buildings water pumping megawatt scale power plants satellites communications and space vehicles Metal Oxide Nanocomposite Thin Films for Optoelectronic Device Applications covers the basics of advanced nanometal oxide based materials their synthesis characterization and applications and all the updated information on optoelectronics Topics discussed include the implications of metal oxide thin films which are critical for device fabrications It provides updated information on the economic aspect and toxicity with great focus paid to display applications and covers some core areas of nanotechnology which are particularly concerned with optoelectronics and the available technologies The book concludes with insights into the role of nanotechnology and the physics behind photovoltaics Audience The book will be an important volume for electronics and electrical engineers nanotechnologists materials scientists inorganic chemists in academic research and those in industries exploring the applications of nanoparticles in semiconductors power electronics and more

Functional Metal-oxide Nanostructures Materials Research Society. Meeting. Symposium V,2009

Nano-Engineering at Functional Interfaces for Multidisciplinary Applications Sai Sathish Ramamurthy,Seemesh Bhaskar,Narendra Reddy,2024-10-18 Nano Engineering at Functional Interfaces for Multi disciplinary Applications

Electrochemistry Photoplasmonics Antimicrobials and Anticancer Applications provides a comprehensive overview of the fundamentals and latest advances of nano engineering strategies for the design development and fabrication of novel nanostructures for different applications in the fields of photoplasmonics and electrochemistry as well as antibacterial and anticancer research areas The book begins with an introduction to the fundamentals and characteristics of nanostructured interfaces and their associated technologies including an overview of their potential applications in different fields The following chapters present a thorough discussion of the synthesis processing and characterization methods of nanomaterials with unique functionalities suitable for energy harvesting food and textile applications electrocatalysis biomedical applications and more It then concludes outlining research future directions and potential industrial applications Presents the advantages and impact of nano engineering in technological advances with up to date discussions on their applications Covers research directions and potential future applications of nano engineering in industry Includes case studies that illustrate important processes **Comprehensive Inorganic Chemistry II** ,2013-07-23 Comprehensive Inorganic Chemistry II Nine Volume Set reviews and examines topics of relevance to today s inorganic chemists Covering more interdisciplinary and high impact areas Comprehensive Inorganic Chemistry II includes biological inorganic chemistry solid state chemistry materials chemistry and nanoscience The work is designed to follow on with a different viewpoint and format from our 1973 work Comprehensive Inorganic Chemistry edited by Bailar Emel us Nyholm and Trotman Dickenson which has received over 2 000 citations The new work will also complement other recent Elsevier works in this area Comprehensive Coordination Chemistry and Comprehensive Organometallic Chemistry to form a trio of works covering the whole of modern inorganic chemistry Chapters are designed to provide a valuable long standing scientific resource for both advanced students new to an area and researchers who need further background or answers to a particular problem on the elements their compounds or applications Chapters are written by teams of leading experts under the guidance of the Volume Editors and the Editors in Chief The articles are written at a level that allows undergraduate students to understand the material while providing active researchers with a ready reference resource for information in the field The chapters will not provide basic data on the elements which is available from many sources and the original work but instead concentrate on applications of the elements and their compounds Provides a comprehensive review which serves to put many advances in perspective and allows the reader to make connections to related fields such as biological inorganic chemistry materials chemistry solid state chemistry and nanoscience Inorganic chemistry is rapidly developing which brings about the need for a reference resource such as this that summarise recent developments and simultaneously provide background information Forms the new definitive source for researchers interested in elements and their applications completely replacing the highly cited first edition which published in 1973 Functional Nanomaterials Sabu Thomas,Nirav Joshi,Vijay K. Tomer,2020-06-12 This book provides a comprehensive overview of the current state of art in oxide nanostructures carbon nanostructures and 2D

materials fabrication It covers mimicking of sensing mechanisms and applications in gas sensors It focuses on gas sensors based on functional nanostructured materials especially related to issues of sensitivity selectivity and temperature dependency for sensors It covers synthesis properties and current gas sensing tools and discusses the necessity for miniaturized sensors This book will be of use to senior undergraduate and graduate students professionals and researchers in the field of solid state physics materials science surface science and chemical engineering *Flexible Devices Based on Metal Oxides* Daniela Nunes,Ana Pimentel,Pedro Barquinha,M.J. Mendes,J. Coelho,Elvira Fortunato,Rodrigo Martins,Henrique Vazão de Almeida,2024-11-29 Flexible devices based on metal oxides Achievements and prospects focuses on the integration of flexibility in electronic circuitry sensing applications energy conversion and storage and environmental remediation Flexibility in these applications offers great potential especially in the areas of wearable sensors solar cells transistors electronic skin and human body monitoring The book investigates flexible and wearable devices based on metal oxide nanostructures or thin films that are capable of bending rolling compression and folding all while maintaining their performance Metal oxide nanomaterials display exceptional properties that include mechanical stress tolerance high optical transparency high carrier mobilities wide band gap high dielectric constant and superconductivity amongst others In some cases they are also earth abundant environmentally benign cost effective chemically stable and compatible with low cost wet chemical synthesis routes The focus of the book is on wearables manufactured using sustainable manufacturing methods and integrated into substrates that are flexible inexpensive recyclable abundant and lightweight including polymer textile cellulose and cork substrates Provides a comprehensive guide to flexibility in next generation devices and applications Emphasizes green technologies and sustainability in production including substrates Considers current and future problems for the continued development of flexible devices and applications **Thin Films** Dongfang Yang,Katherine Gibson,2023-03-29 A thin film is a layer of material ranging from fractions of a nanometer to several micrometers in thickness Thin films have been employed in many applications to provide surfaces that possess specific optical electronic chemical mechanical and thermal properties Through ten chapters consisting of original research studies and literature reviews written by experts from the international scientific community this book covers the deposition and application of thin films **Novel Nanostructured Materials for Electrochemical Bio-sensing Applications** Jamballi G. Manjunatha,2023-11-21 Novel Nanostructured Materials for Electrochemical Bio sensing Applications presents a detailed overview into the fabrication of electrochemical bio sensing devices The book addresses the challenges and opportunities relating to sustainable and biocompatible sensors from food water and wearable applications to the various nanostructured biocompatible materials required for sensor fabrication In addition it explores the connection between nanomaterials and sensors and takes into consideration different and novel approaches such as toxic materials monitoring and health issues correlated with the use of nanomaterials Users will find exciting insight into innovations in nanostructured electrochemical

biosensing By providing its audience with fundamentals limitations challenges future perspectives and practical sustainability this book will serve as a reference source researchers and engineers within analytical chemistry and electrochemistry Showcases the latest progress in new nanostructured materials bio sensing types and applications Provides a comparative vision of electrochemical bio sensing with other biosensors Discusses the economics commercialization toxicity and life line aspects of electrochemical biosensors *Materials and Components of Biosensors in Healthcare* Md Saquib Hasnain,Amit Kumar Nayak,Tejraj M. Aminabhavi,2025-01-27 Materials and Components of Biosensors in Healthcare Volume Two provides comprehensive coverage and a detailed examination of the various materials and components used in the development of biosensors The book begins with an introduction and then discusses the biochemical inorganic and biopolymeric components used in biosensor assembly It goes on to detail a range of materials such as nanoparticles biological cellular structures electrochemical and electromagnetic materials and how they are used in biosensors Combined with Fundamentals of Biosensors in Healthcare Volume One and Applications of Biosensors in Healthcare Volume Three this trio provides holistic reference sources suitable for researchers graduate students postgraduates and industry professionals involved in biosensing biosensors and biomedical applications Reviews a range of materials and components used in biosensors and biosensing Discusses current research potential challenges and future prospects for the synthesis of biosensing materials Contributed to by global leaders and experts in the field from academia research and industry **Nanotechnology and Functional Materials for Engineers** Yaser Dahman,2017-01-13 Nanotechnology and Functional Materials for Engineers focuses on key essentials and examples across the spectrum of nanomaterials as applied by engineers including nanosensors smart nanomaterials nanopolymers and nanotubes Chapters cover their synthesis and characteristics production methods and applications with specific sections exploring nanoelectronics and electro optic nanotechnology nanostructures and nanodevices This book is a valuable resource for interdisciplinary researchers who want to learn more about how nanomaterials are used in different types of engineering including electrical chemical and biomedical Offers in depth information on a variety of nanomaterials and how they are used for different engineering applications Provides an overview of current research and suggests how this will impact future applications Explores how the unique properties of different nanomaterials make them particularly suitable for specific applications *Oxide Thin Films and Nanostructures* Falko P. Netzer,Claudine Noguera,2021-02-25 Nanostructured oxide materials ultra thin films nanoparticles and other nanometer scale objects play prominent roles in many aspects of our every day life in nature and in technological applications among which is the all oxide electronics of tomorrow Due to their reduced dimensions and dimensionality they strongly interact with their environment gaseous atmosphere water or support Their novel physical and chemical properties are the subject of this book from both a fundamental and an applied perspective Oxide Thin Films and Nanostructures reviews and illustrates the various methodologies for their growth fabrication experimental and theoretical characterization The role of key parameters

such as film thickness nanoparticle size and support interactions in driving their fundamental properties is underlined At the ultimate thickness limit two dimensional oxide materials are generated whose functionalities and potential applications are described The emerging field of cation mixing is mentioned which opens new avenues for engineering many oxide properties as witnessed by natural oxide nanomaterials such as clay minerals which beyond their role at the Earth s surface are now widely used in a whole range of human activities Oxide nanomaterials are involved in many interdisciplinary fields of advanced nanotechnologies Catalysis photocatalysis solar energy materials fuel cells corrosion protection and biotechnological applications are amongst the areas where they are making an impact The book outlines prototypical examples A cautious glimpse into future developments of scientific activity is finally ventured to round off the presentation

Epitaxial Growth of Complex Metal Oxides Gertjan Koster,Mark Huijben,Guus Rijnders,2022-04-22 Epitaxial Growth of Complex Metal Oxides Second Edition reviews techniques and recent developments in the fabrication quality of complex metal oxides which are facilitating advances in electronic magnetic and optical applications Sections review the key techniques involved in the epitaxial growth of complex metal oxides and explore the effects of strain and stoichiometry on crystal structure and related properties in thin film oxides Finally the book concludes by discussing selected examples of important applications of complex metal oxide thin films including optoelectronics batteries spintronics and neuromorphic applications This new edition has been fully updated with brand new chapters on topics such as atomic layer deposition interfaces STEM EELs and the epitaxial growth of multiferroics ferroelectrics and nanocomposites Examines the techniques used in epitaxial thin film growth for complex oxides including atomic layer deposition sputtering techniques molecular beam epitaxy and chemical solution deposition techniques Reviews materials design strategies and materials property analysis methods including the impacts of defects strain interfaces and stoichiometry Describes key applications of epitaxially grown metal oxides including optoelectronics batteries spintronics and neuromorphic applications **Emerging Applications of Nanoparticles and Architectural Nanostructures** Abdel Salam Hamdy Makhlouf,Ahmed Barhoum,2018-03-22 Emerging Applications of Nanoparticles and Architecture Nanostructures Current Prospects and Future Trends discusses the most important current applications of nanoparticles and architecture nanostructures in a comprehensive detailed manner The book covers major applications of nanoparticles and architecture nanostructures taking into account their unusual shapes and high surface areas In particular coverage is given to applications in aerospace automotive batteries sensors smart textile design energy conversion color imaging printing computer chips medical implants pharmacy cosmetics and more In addition the book discusses the future of research in these areas This is a valuable reference for both materials scientists chemical and mechanical engineers working both in R D and academia who want to learn more on how nanoparticles and nanomaterials are commercially applied Provides an in depth look at the properties of nanoparticles and architecture nanostructures in terms of their applicability for industrial uses Analyzes the most recent advances and industrial

applications of different types of nanoparticles and architecture nanostructures taking into account their unusual structures and compositions Identifies novel nanometric particles and architectures that are of particular value for applications and the techniques required to use them effectively

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