

The Chemistry Of Transition Metal Carbides And Nitrides

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The Physics and Chemistry of Carbides, Nitrides and Borides
2D Metal Carbides and Nitrides (MXenes)
Materials Science of Carbides, Nitrides and Borides
Transition Metal Carbides and Nitrides
The Analysis of Refractory Borides, Carbides, Nitrides, and Silicides
MXenes
The Chemistry of Transition Metal Carbides and Nitrides
Contributions to the Data on Theoretical Metallurgy
Handbook of Refractory Carbides and Nitrides
Materials for Energy Storage
Preparation of Solid Catalysts
Ultra-High Temperature Materials II
Catalysis
Metallurgical Design of Flat Rolled Steels
Carbide, Nitride and Boride
Materials Synthesis and Processing
Energy Research Abstracts
Microstructure-Property Correlations for Hard, Superhard, and Ultrahard Materials
Steel Heat Treatment Handbook
Groups IV, V, and VI
Transition Metals and Compounds
S.T. Oyama R. Freer Babak Anasori Yury G. Gogotsi Louis E. Toth Owen H. Kriege Yury Gogotsi S.T. Oyama Kenneth Keith Kelley Hugh O. Pierson Niroj Kumar Sahu Gerhard Ertl Igor L. Shabalin G C Bond Vladimir B. Ginzburg A.W. Weimer Valentine Kanyanta George E. Totten T. F. Connolly

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this book arose from a symposium titled transition metal carbides and nitrides preparation properties and reactivity organized by jae sung lee masatoshi nagai and myself the symposium was part of the 1995 congress of pacific rim chemical societies held in honolulu hawaii between december 17 22 1995 the meeting was the first major conference to exclusively address the theme

of metal carbides and nitrides and brought together many of the major researchers in the field over 50 scientists and engineers reported their latest findings in five sessions of presentations and discussions the book closely follows the topics covered in the conference theory of bonding structure and composition catalytic properties physical properties new methods of preparation spectroscopy and microscopy the book is unique in its coverage it provides a general introduction to the properties and nature of the materials but also covers their latest applications in a wide variety of fields it should thus be of interest to both experts and nonexperts in the fields of material science solid state chemistry physics ceramics engineering and catalysis the first chapter gives an overview and many of the chapters provide summaries of advanced topics all contributions were peer reviewed

carbides nitrides and borides are families of related refractory materials traditionally they have been employed in applications associated with engineering ceramics where either high temperature strength or stability is of primary importance in recent years there has been a growing awareness of the interesting electrical thermal and optical properties exhibited by these materials and the fact that many can be prepared as monolithic ceramics single crystals and thin films in practical terms carbides nitrides and borides offer the prospect of a new generation of semiconductor materials for example which can function at very high temperatures in severe environmental conditions however as yet we have only a limited understanding of the detailed physics and chemistry of the materials and how the preparation techniques influence the properties under the auspices of the nato science committee an advanced research workshop arw was held on the physics and chemistry of carbides nitrides and borides university of manchester 18-22 september 1989 in order to assess progress to date and identify the most promising themes and materials for future research an international group of 38 scientists considered developments in 5 main areas the preparation of powders monolithic ceramics single crystals and thin films phase transformations microstructure defect structure and mass transport materials stability theoretical studies electrical thermal and optical properties of bulk materials and thin films

this book describes the rapidly expanding field of two dimensional 2d transition metal carbides and nitrides mxenes it covers fundamental knowledge on synthesis structure and properties of these new materials and a description of their processing scale up and emerging applications the ways in which the quickly expanding family of mxenes can outperform other novel nanomaterials in a variety of applications spanning from energy storage and conversion to electronics from water science to transportation and in defense and medical applications are discussed in detail

a survey of current research on a wide range of carbide nitride and boride materials covering the general issues relevant to the development and characterisation of a variety of advanced materials topics include structure and electronic properties modeling processing high temperature chemistry oxidation and corrosion mechanical behaviour manufacturing and applications the

volume complements more specialised books on specific materials as well as more general texts on ceramics or hard materials presenting a survey of materials research as a key to technological development after decades of research the materials are being used in electronics wear resistant refractory and other applications but numerous new applications are possible roughly equal numbers of papers cover theoretical and experimental research in the general field of materials science of refractory materials audience researchers and graduate students in materials science and engineering

since their discovery in 2011 mxenes 2d carbides nitrides and carbonitrides of early transition metals have developed into one of the largest and most intensively studied families of 2d materials they offer unique properties and are being explored in a large variety of applications this book compiles the most important research from a pioneer of the field professor yury gogotsi and his interdisciplinary research team as well as numerous collaborators worldwide it reports on the discovery and rise of mxenes and describes their synthesis and processing properties and incorporation into polymer ceramic and metal matrices to produce composites it also discusses the potential of mxenes for use in energy storage optics electronics and sensing as well as biomedical environmental and electrocatalysis applications the book will appeal to anyone interested in nanomaterials and their synthesis properties and applications

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the main objective of this book is to 1 provide a complete review of the structures and properties of refractory carbides and nitrides 2 provide a thorough assessment of the technology processing and equipment and systems used in production and r d with emphasis on advanced designs and 3 identify and describe the applications particularly new and emerging areas

materials for energy storage offers a combinatorial understanding of materials science and

electrochemistry in electrochemical energy storage devices with a holistic overview of the status research gaps and future opportunities rooted in a profound understanding of contemporary energy utilization aligned with the sustainable development goals this book delves deep into the several device chemistries impact of nanomaterials and critical factors related to the device performance it discusses electrode electrolyte interaction device fabrication and commercial aspects this book will offer value to the graduate and postgraduate students researchers and industry professionals related to materials science and energy technology

solid catalysts play a fundamental role in all areas between basic research and industrial applications this book offers a large amount of information about the preparation of solid catalysts all types of solid catalysts and all important aspects of their preparation are discussed the highly topical contributions are written by leading experts in disciplines ranging from solid state interface and solution chemistry to industrial engineering the straightforward presentation of the material and the comprehensive coverage make this book an essential and indispensable tool for every scientist and engineer working with solid catalysts

this exhaustive work in three volumes and over 1300 pages provides a thorough treatment of ultra high temperature materials with melting points over 2500 c the first volume focuses on carbon and refractory metals whilst the second and third are dedicated solely to refractory compounds and the third to refractory alloys and composites respectively topics included are physical crystallographic thermodynamic thermo physical electrical optical physico mechanical nuclear and chemical solid state diffusion interaction with chemical elements and compounds interaction with gases vapours and aqueous solutions properties of the individual physico chemical phases of carbon graphite graphene refractory metals w re os ta mo nb ir and compounds oxides nitrides carbides borides silicides with melting points in this range it will be of interest to researchers engineers postgraduate graduate and undergraduate students alike the reader is provided with the full qualitative and quantitative assessment for the materials which could be applied in various engineering devices and environmental conditions at ultra high temperatures on the basis of the latest updates in the field of physics chemistry materials science and engineering

there is an increasing challenge for chemical industry and research institutions to find cost efficient and environmentally sound methods of converting natural resources into fuels chemicals and energy catalysts are essential to these processes and the catalysis specialist periodical report series serves to highlight major developments in this area this series provides systematic and detailed reviews of topics of interest to scientists and engineers in the catalysis field the coverage includes all major areas of heterogeneous and homogeneous catalysis and also specific applications of catalysis such as nox control kinetics and experimental techniques such as microcalorimetry each chapter is compiled by recognised experts within their specialist fields and provides a summary of the current literature this series will be of interest to all those in academia

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this book outlines the basic principles of metallurgical design of flat rolled steels to obtain flat steel products with required metallurgical and mechanical properties these principles establish the requirements for steel chemical composition and the process parameters including steelmaking reheating hot rolling annealing and cold rolling metallurgical design of flat rolled steels reviews the current theories and experimental works conducted in this area and gives a comparative analysis of the obtained results in application to a large variety of steels produced around the world this guide presents essential material in a fashion that permits rapid application to practical problems while providing the structure and understanding necessary for long term growth it first explains how the components fit and work together to make a successful experimental design then analyzes each component in detail presenting the various approaches in the form of menus of different strategies and options then the text illustrates equations developed by various researchers and compares them in both table and graphic forms written in a clear and concise manner the material is presented using a modular or building block approach so readers get to see how the entire structure fits together and learn the essential techniques and terminology necessary to develop more complex designs and analyses

carbide nitride and boride materials synthesis and processing is a major reference text addressing methods for the synthesis of non oxides each chapter has been written by an expert practising in the subject area affiliated with industry academia or government research thus providing a broad perspective of information for the reader the subject matter ranges from materials properties and applications to methods of synthesis including pre and post synthesis processing although most of the text is concerned with the synthesis of powders chapters are included for other materials such as whiskers platelets fibres and coatings carbide nitride and boride materials synthesis and processing is a comprehensive overview of the subject and is suitable for practitioners in the industry as well as those looking for an introduction to the field it will be of interest to chemical mechanical and ceramic engineers materials scientists and chemists in both university and industrial environments working on or with refractory carbides nitrides and borides

this book discusses microstructure property correlations and explores key microstructure features and how they affect the properties of a material the authors discuss the effect of

manufacturing and processing routes on microstructure and properties they identify appropriate microstructure and mechanical characterization techniques essential for developing accurate microstructure property relationships the techniques include high resolution imaging methods and properties measurements such as hardness strength elastic modulus and fracture toughness current and future trends in hard and superhard material design are revealed by the authors including nanostructured materials biomimicry and novel manufacturing technologies

this comprehensive resource provides practical modern approaches to steel heat treatment topics such as sources of residual stress and distortion hardenability prediction modeling effects of steel alloy chemistry on heat treatment quenching carburizing nitriding vacuum heat treatment metallography and process equipment containing recent data and developments from international experts the steel treatment handbook discusses the principles of heat treatment quenchants quenching systems and quenching technology strain gauge procedures x ray diffraction and other residual stress measurement methods carburizing and carbonitriding powder metallurgy technology metallography and physical property determination ecological regulations and safety standards and more well illustrated with nearly 1000 tables equations figures and photographs the steel heat treatment handbook is an excellent reference for materials manufacturing heat treatment maintenance mechanical industrial process and quality control design and research engineers department or corporate metallurgists and upper level undergraduate and graduate students in these disciplines

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