

Handbook Of Refractory Carbides Nitrides Properties Characteristics Processing And Applications

The first comprehensive book to focus on ultra-high-temperature ceramic materials in more than 20 years Ultra-High Temperature Ceramics are a family of compounds that display an unusual combination of properties, including extremely high melting temperatures (>3000°C), high hardness, and good chemical stability and strength at high temperatures. Typical UHTC materials are the carbides, nitrides, and borides of transition metals, but the Group IV compounds (Ti, Zr, Hf) plus Ta are generally considered to be the main focus of research due to the superior melting temperatures and stable high-melting-temperature oxide that forms in situ. Rather than focusing on the latest scientific results, Ultra-High Temperature Ceramics: Materials for Extreme Environment Applications broadly and critically combines the historical aspects and the state-of-the-art on the processing, densification, properties, and performance of boride and carbide ceramics. In reviewing the historic studies and recent progress in the field, Ultra-High Temperature Ceramics: Materials for Extreme Environment Applications provides: Original reviews of research conducted in the 1960s and 70s Content on electronic structure, synthesis, powder processing, densification, property measurement, and characterization of boride and carbide ceramics. Emphasis on materials for hypersonic aerospace applications such as wing leading edges and propulsion components for vehicles traveling faster than Mach 5 Information on materials used in the extreme environments associated with high speed cutting tools and nuclear power generation Contributions are based on presentations by leading research groups at the conference "Ultra-High Temperature Ceramics: Materials for Extreme Environment Applications II" held May 13-19, 2012 in Hernstein, Austria. Bringing together disparate researchers from academia, government, and industry in a singular forum, the meeting cultivated didactic discussions and efforts between bench researchers, designers and engineers in assaying results in a broader context and moving the technology forward toward near- and long-term use. This book is useful for furnace manufacturers, aerospace manufacturers that may be pursuing hypersonic technology, researchers studying any aspect of boride and carbide ceramics, and practitioners of high-temperature structural ceramics.

The cold spray process produces dense, low oxide coatings which can be used in such diverse applications as corrosion control and metals repair. It has emerged as an important alternative to thermal spray coating techniques in certain areas. This pioneering book reviews both the fundamentals of the process and how it can best be applied in practice. The first part of the book discusses the development of the process together with its advantages and disadvantages in comparison with thermal spray coating techniques. Part two reviews key process parameters such as powders, nozzle design, particle temperature and velocity, and particle/substrate interaction. It also describes portable and stationary cold spray systems. The final part of the book discusses how the cold spray process can be applied in such areas as improved wear, corrosion protection, electromagnetic interference shielding and repair of damaged components. The cold spray materials deposition process is a standard reference on this important process and its industrial applications. Examines the fundamentals of the cold spraying process Assesses how the technique can best be applied in practice Describes portable and stationary cold spray systems

Refractory carbides and nitrides are useful materials with numerous industrial applications and a promising future, in addition to being materials of great interest to the scientific community. Although most of their applications are recent, the refractory carbides and nitrides have been known for over one hundred years. The industrial importance of the refractory carbides and nitrides is growing rapidly, not only in the traditional and well-established applications based on the strength and refractory nature of these materials such as cutting tools and abrasives, but also in new and promising.

January 26-31, 2003, Cocoa Beach, Florida

Refractory Carbides I (Ta, Hf, Nb and Zr Carbides)

Materials for Extreme Environment Applications

Oxide Free Nanomaterials for Energy Storage and Conversion Applications

Physics, Materials, and Devices

Disorder and Order in Strongly Nonstoichiometric Compounds

Turn to this new second edition for an understanding of the latest advances in the chemical vapor deposition (CVD) process. CVD technology has recently grown at a rapid rate, and the number and scope of its applications and their impact on the market have increased considerably. The market is now estimated to be at least double that of a mere seven years ago when the first edition of this book was published. The second edition is an update with a considerably expanded and revised scope. Plasma CVD and metallo-organic CVD are two major factors in this rapid growth. Readers will find the latest data on both processes in this volume. Likewise, the book explains the growing importance of CVD in production of semiconductor and related applications. This unique and practical book provides quick and easy access to data on the physical and chemical properties of all classes of materials. The second edition has been much expanded to include whole new families of materials while many of the existing families are broadened and refined with new material and up-to-date information. Particular emphasis is placed on the properties of common industrial materials in each class. Detailed appendices provide additional information, and careful indexing and a tabular format make the data quickly accessible. This book is an essential tool for any practitioner or academic working in materials or in engineering.

Advances in Medical and Surgical Engineering integrates the knowledge and experience of experts from academia and practicing surgeons working with patients. The cutting-edge progress in medical technology applications is making the traditional line between engineering and medical science ever thinner. This is an excellent resource for biomedical engineers working in industry and academia on developing medical technologies. It covers challenges in the application of technology in the clinic with views from an editorial team that is highly experienced in engineering, biomaterials, surgical practice, biomedical science and technology, and that has a proven track record of publishing applied biomedical science and technology. For medical practitioners, this book covers advances in technology in their domain. For students, this book identifies the opportunities of research based on the reviews of utilization of current technologies. The content in this book can also be of interest to policymakers, research funding agencies, and libraries, that are contributing to development of medical technologies. Covers circulatory support, aortic valve implantation and microvascular anastomosis Explores arthroplasty of both the knee and the

shoulder Includes tribology of materials, laser treatment and machining of biomaterial
Some Physical, Mechanical, and Thermodynamic Properties of Transition Metal Refractory Carbides
27th Annual Cocoa Beach Conference on Advanced Ceramics and Composites - A
Properties, Characteristics, Processing, and Applications
Concepts, Methodologies, Tools, and Applications
Particulate Composites
Materials Science of Carbides, Nitrides and Borides

Over the past few decades, devices and technologies have been significantly miniaturized from one generation to the next, providing far more potential in a much smaller package. The smallest of these recently developed tools are miniscule enough to be invisible to the naked eye. Nanotechnology: Concepts, Methodologies, Tools, and Applications describes some of the latest advances in microscopic technologies in fields as diverse as biochemistry, materials science, medicine, and electronics. Through its investigation of theories, applications, and new developments in the nanotechnology field, this impressive reference source will serve as a valuable tool for researchers, engineers, academics, and students alike.

This volume is part of the Ceramic Engineering and Science Proceeding (CESP) series. This series contains a collection of papers dealing with issues in both traditional ceramics (i.e., glass, whitewares, refractories, and porcelain enamel) and advanced ceramics. Topics covered in the area of advanced ceramic include bioceramics, nanomaterials, composites, solid oxide fuel cells, mechanical properties and structural design, advanced ceramic coatings, ceramic armor, porous ceramics, and more.

This book embraces the entire range of problems associated with phase equilibria in “tungsten – carbon” binary system and related ternary systems, nonstoichiometry, disorder and order in different tungsten carbides, electronic and crystal structure of these carbides. The main application of tungsten carbides is constituent in hardmetals for cutting tools. In the last 20 years, the most active efforts were made in synthesis and application of nanocrystalline tungsten carbide for the production of nanostructured hardmetals. The present book describes in detail different methods for production of nanocrystalline tungsten carbide. The peculiarities of sintering of Co hardmetals from nanocrystalline powders having different particle sizes are discussed. Materials scientists using tungsten carbide to create novel superhard and tough materials will find this book particularly useful.

Principles, Technology and Applications
Handbook Of High Temperature Compounds: Properties, Production, Applications
SNAP Technology Handbook: Refractory fuels and cladding
Technological Applications of Nanomaterials
Transition Metal Carbides, Nitrides and Oxides
A Bibliography

This book is open access under a CC BY 4.0 license. It relates to the III Annual Conference hosted by The Ministry of Education and Science of the Russian Federation in December 2016. This event has summarized, analyzed and discussed the interim results, academic outputs and scientific achievements of the Russian Federal Targeted Programme “Research and Development in Priority Areas of Development of the Russian Scientific and Technological Complex for 2014–2020.” It contains 75 selected papers from 6 areas considered priority by the Federal Targeted Programme: computer science, ecology & environment sciences; energy and energy efficiency; lifesciences; nanoscience & nanotechnology and transport & communications. The chapters report the results of the 3-years research projects supported by the Programme and finalized in 2016.

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.

Oxide Free Nanomaterials for Energy Storage and Conversion Applications covers in depth topics on non-oxide nanomaterials involving transition metal nitrides, carbides, selenides, phosphides, oxynitrides based electrodes, & other non-oxide groups. The current application of nanostructured nonoxides involves their major usage in energy storage and conversion devices variety of applications such as supercapacitor, batteries, dye-sensitized solar cells and hydrogen production applications. The current application of energy storage devices involves their usage of nanostructured non-oxide materials with improved energy and power densities. In this book readers will discover the major advancements in this field during the past decades. The various techniques used to prepare environmentally friendly nanostructured non-oxide materials, their structural and morphological characterization, their improved mechanical and material properties, and finally, current applications and future impacts of these materials are discussed. While planning and fabricating non-oxide materials, the readers must be concern over that they ought to be abundant, cost-efficient and environment-friendly for clean innovation and conceivably be of use in an expansive choice of utilization. The book gives detailed literature on the development of nanostructured non-oxides, their use as energy related devices and their present trend in the industry and market. This book also emphasis on the latest advancement

about application of these noble non-oxide based materials for photocatalytic water-splitting. Recent progress on various kinds of both photocatalytic and electrocatalytic nanomaterials is reviewed, and essential aspects which govern catalytic behaviours and the corresponding stability are discussed. The book will give an updated literature on the synthesis, potential applications and future of nanostructured non-oxides in energy related applications. This book is highly useful to researchers working in the field with diversified backgrounds are expected to making the chapter truly interdisciplinary in nature. The contents in the book will emphasize the recent advances in interdisciplinary research on processing, morphology, structure and properties of nanostructured non-materials and their applications in energy applications such as supercapacitors, batteries, solar cells, electrochemical water splitting and other energy applications. Thus, nanotechnology researchers, scientists and experts need to have update of the growing trends and applications in the field of science and technology. Further, the postgraduate students, scientists, researchers and technologists are need to buy this book. Offers a comprehensive coverage of the nanostructured non-oxide materials and their potential energy applications Examines the properties of nanostructured non-oxide materials that make them so adaptable Explores the mechanisms by which nanoparticles interact with each other, showing how these can be used for industrial applications Shows the how nanostructured non-oxide materials are used in a wide range of industry sectors, containing energy production and storage Nuclear Technology

NBS Special Publication

Critical Surveys of Data Sources, Ceramics

High-Efficiency Solar Cells

Materials Transactions, JIM.

Mechanical Alloying: Energy Storage, Protective Coatings, and Medical Applications, Third Edition is a detailed introduction to mechanical alloying that offers guidelines on the necessary equipment and facilities needed to carry out the process, also giving a fundamental background to the reactions taking place. El-Eskandarany, a leading authority on mechanical alloying, discusses the mechanism of powder consolidations using different powder compaction processes. A new chapter is included on utilization of the mechanically alloyed powders for thermal spraying. Fully updated to cover recent developments in the field, this second edition also introduces new and emerging applications for mechanical alloying, including the fabrication of carbon nanotubes, surface protective coating and hydrogen storage technology. El-Eskandarany discusses the latest research into these applications and provides engineers and scientists with the information they need to implement these developments. Guides readers through each step of the mechanical alloying process Includes tables and graphs that are used to explain the stages of the milling processes Presents a comprehensive update on the previous edition, including new chapters that cover emerging applications

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.

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Interactions of Sulfur with Nanostructured, Early Transition Metal Carbides and Nitrides

Handbook of Refractory Carbides and Nitrides

27th International Cocoa Beach Conference on Advanced Ceramics and Composites

Carbide and Nitride Catalysts for the Water Gas Shift Reaction

Materials Handbook

NIST Special Publication

Cutting edge high temperature materials include high temperaturesuperconductors, solid oxide fuel cells, thermoelectric materialsand ultrahigh temperature construction materials (including metals,cermets and ceramics) and have applications in key areas such asenergy, transportation and space technologies. This book introduces the concepts which underpin researchinto these critical materials including thermodynamics, kineticsand various physical, chemical and modelling techniques with a focus on practical “ how to ” methods and covers: Introduction to High Temperature Research Basic Design of High Temperature Furnaces Temperature Measurement Radiation Pyrometry Refractory Materials in the Laboratory Vacuum in Theory and Practice The Design of Vacuum Furnaces and Thermobalances With highly detailed instrument illustrations and an emphasis onthe control and measurement of the fundamental properties oftemperature, pressure and mass, High Temperature Experiments inChemistry and Materials Science provides a practical referenceon high temperature measurements, for researchers, advancedstudents and those working in academic or industriallaboratories. Introduction to High Temperature Research Basic Design of High Temperature Furnaces Temperature Measurement Radiation Pyrometry Refractory Materials in the Laboratory Vacuum in Theory and Practice The Design of Vacuum Furnaces and Thermobalances

In recent years, significant advances have been made in the development of chemistry and computer science integration into the fields of biomedical and chemical engineering, applying quantum principles to practical, macro-world science. Methodologies and Applications for Chemoinformatics and Chemical Engineering brings together innovative research, new concepts, and novel developments in the application of informatics tools for applied chemistry and computer science. This book is essential amongst chemists, engineers, and researchers in providing mutual communication between academics and industry professionals around the world.

This book is focused on composites involving powders as the starting materials. It provides relevant information for questions related to the selection of constituent phases, most economic fabrication routes, proper testing procedures, and product optimization. The field is

sufficiently advanced that predictive models guide many decisions. Applications are illustrated over a broad range of material and property combinations. This title includes: •Selection of phases with consideration of intersolubility & interface •Microstructure, especially the role of phase connectivity •Fabrication approaches, especially net-shape consolidation •Assessment of typical properties, testing techniques & industry standards •Design & trade-off decisions involved in optimization, including cost •Applications, both those that have matured and some emerging prospects. The reader may have little appreciation for how particulate composites are literally everywhere. Examples include new wear resistant consumer products(Apple watch), longer lasting automotive tires with reduced rolling resistance(Yokohama tires), and new diamond heat sinks for computers(Element Six substrates). Particulate composites also form critical components in applications such as magnets, dental fillings, brakes, darts, bio-implants, & cutting tools. Particulate composites are a multi-billion dollar industry, and can be a cost-effective solution ripe for innovation and continued rapid growth. For the engineer, the wide range of particulate composite formulation and property combinations offers the ability to design for a variety of application and provides ample opportunity for innovation. Particulate Composites: Fundamentals & Applications is ideal for use in a one-semester eng. course at the senior UG/graduate level, and is also suitable as a practical reference for materials scientists in academia and industry.

Tungsten Carbides

Energy Storage, Protective Coatings, and Medical Applications

High Temperature Experiments in Chemistry and Materials Science

Materials, Coatings, and Surface Treatments

Proceedings of the Scientific-Practical Conference "Research and Development - 2016"

Advances in Medical and Surgical Engineering

This book is a printed edition of the Special Issue "Titanium Alloys 2017" that was published in Metals

This exhaustive work in several volumes and over 2500 pages provides a thorough treatment of ultra-high temperature materials (with melting points around or over 2500 °C). The first volume focuses on carbon (graphene/graphite) and refractory metals (W, Re, Os, Ta, Mo, Nb and Ir), whilst the second and third are dedicated to refractory transition metal 4-5 groups carbides. Topics included are physical (structural, thermal, electro-magnetic, optical, mechanical, nuclear) and chemical (more than 3000 binary, ternary and multi-component systems, including those used for materials design, data on solid-state diffusion, wettability, interaction with various elements and compounds in solid and liquid states, gases and chemicals in aqueous solutions) properties of these materials. It will be of interest to researchers, engineers, postgraduate, graduate and undergraduate students alike. The readers/users are provided with the full qualitative and quantitative assessment, which is based on the latest updates in the field of fundamental physics and chemistry, nanotechnology, materials science, design and engineering.

Handbook of Refractory Carbides & Nitrides Properties, Characteristics, Processing and Apps. William Andrew

Characterization of the Basic Properties of Early Transition Metal Nitride Catalysts

Fundamentals and Applications

A Concise Desktop Reference

Mechanical Alloying

Properties, Characteristics, Processing and Apps.

Ultra-High Temperature Materials III

Deals with the influence of stoichiometry and order/disorder on materials properties. It summarizes the knowledge available in a comprehensive way.

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.

Materials in a nuclear environment are exposed to extreme conditions of radiation, temperature and/or corrosion, and in many cases the combination of these makes the material behavior very different from conventional materials. This is evident for the four major technological challenges the nuclear technology domain is facing currently: (i) long-term operation of existing Generation II nuclear power plants, (ii) the design of the next generation reactors (Generation IV), (iii) the construction of the ITER fusion reactor in Cadarache (France), (iv) and the intermediate and final disposal of nuclear waste. In order to address these challenges, engineers and designers need to know the properties of a wide variety of materials under these conditions and to understand the underlying processes affecting changes in their behavior, in order to assess their performance and to determine the limits of operation. Comprehensive Nuclear Materials 2e provides broad ranging, validated summaries of all the major topics in the field of

nuclear material research for fission as well as fusion reactor systems. Attention is given to the fundamental scientific aspects of nuclear materials: fuel and structural materials for fission reactors, waste materials, and materials for fusion reactors. The articles are written at a level that allows undergraduate students to understand the material, while providing active researchers with a ready reference resource of information. Most of the chapters from the first Edition have been revised and updated and a significant number of new topics are covered in completely new material. During the ten years between the two editions, the challenge for applications of nuclear materials has been significantly impacted by world events, public awareness, and technological innovation. Materials play a key role as enablers of new technologies, and we trust that this new edition of Comprehensive Nuclear Materials has captured the key recent developments. Critically reviews the major classes and functions of materials, supporting the selection, assessment, validation and engineering of materials in extreme nuclear environments Comprehensive resource for up-to-date and authoritative information which is not always available elsewhere, even in journals Provides an in-depth treatment of materials modeling and simulation, with a specific focus on nuclear issues Serves as an excellent entry point for students and researchers new to the field

Ultra-High Temperature Ceramics

Ultra-High Temperature Materials II

Comprehensive Nuclear Materials

Methodologies and Applications for Chemoinformatics and Chemical Engineering

Structure, Properties and Application in Hardmetals

Carbide, Nitride and Boride Materials Synthesis and Processing

As part of the effort to increase the contribution of solar cells (photovoltaics) to our energy mix, this book addresses three main areas: making existing technology cheaper, promoting advanced technologies based on new architectural designs, and developing new materials to serve as light absorbers. Leading scientists throughout the world create a fundamental platform for knowledge sharing that combines the physics, materials, and device architectures of high-efficiency solar cells. While providing a comprehensive introduction to the field, the book highlights directions for further research, and is intended to stimulate readers' interest in the development of novel materials and technologies for solar energy applications.

This book contains the most-used methods of powder preparation and manufacture of articles, data on the explosibility, flammability and toxicity of refractory-compound powders. Topics include the properties of borides, carbides, nitrides, silicides, sulphides, selenides, and tellurides.

Materials Transactions

Handbook of Tribology

Handbook of Chemical Vapor Deposition

Nanotechnology: Concepts, Methodologies, Tools, and Applications

Refractory Carbides II (Ti and V Carbides)

Handbook of Refractory Carbides & Nitrides