

Thermo Mechanical Processing Of Metallic Materials

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Explore the critical field of thermo-mechanical processing for metallic materials, a cornerstone of modern materials science. This essential resource, part of the prestigious Pergamon Materials Series, details the advanced techniques and principles used to engineer superior mechanical properties and microstructures in metals through precise thermal and mechanical treatments.

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Thermo-Mechanical Processing of Metallic Materials

Thermo-Mechanical Processing of Metallic Materials describes the science and technology behind modern thermo-mechanical processing (TMP), including detailed descriptions of successful examples of its application in the industry. This graduate-level introductory resource aims to fill the gap between two scientific approaches and illustrate their successful linkage by the use of suitable modern case studies. The book is divided into three key sections focusing on the basics of metallic materials processing. The first section covers the microstructural science base of the subject, including the microstructure determined mechanical properties of metals. The second section deals with the current mechanical technology of plastic forming of metals. The concluding section demonstrates the interaction of the first two disciplines in a series of case studies of successful current TMP processing and looks ahead to possible new developments in the field. This text is designed for use by graduate students coming into the field, for a graduate course textbook, and for Materials and Mechanical Engineers working in this area in the industry. * Covers both physical metallurgy and metals processing * Links basic science to real everyday applications * Written by four internationally-known experts in the field

Biomaterials

Replacement of a failing hip joint or other defective organs in the human body by artificial 'spare parts' has significantly improved our quality of life. These spare parts have to meet a wide spectrum of mechanical, chemical and design requirements. In this book, the properties and selection of materials for such 'spare parts' are deduced from case studies at the start of each chapter. Hard tissue replacements (joints, long bones, dental), soft tissue (heart valves) and tissue engineering are included. The chapters also detail the three generic classes of materials: alloys (including shape memory alloys), ceramics & glasses and polymers. Separate chapters are devoted to the toxicity of implants, the metals zirconium(-zirconium oxide), tantalum, niobium and metallic glasses, soluble metals and Rapid

Prototyping techniques for the fabrication of custom made prostheses. The book concludes by a chapter on water as water is always 'there' and conditions the interaction between body and implant. Water is the very matrix of life on earth. A peculiarity of the book is its 'perspective view', meaning that the authors looked behind the present biomaterials' décor and included historical backgrounds (real and mythological), future developments, and the relation to nature (plants and geology).

Recent Advances in Materials, Mechanical and Civil Engineering

This volume was collected by results of the International Conference on Recent Advances in Materials, Mechanical and Civil Engineering (ICRAMMCE-2017, 1-2nd June, 2017, Hyderabad, India) and presents readers with the results of recent researches and achievements in the fields of the structural materials, technologies of materials processing, building materials and technologies in the construction, applied mechanics and practice of design in the mechanical engineering. We hope that this collection will be useful for many specialists from area of mechanical engineering and construction.

Modeling and Simulation Techniques in Structural Engineering

The development of new and effective analytical and numerical models is essential to understanding the performance of a variety of structures. As computational methods continue to advance, so too do their applications in structural performance modeling and analysis. Modeling and Simulation Techniques in Structural Engineering presents emerging research on computational techniques and applications within the field of structural engineering. This timely publication features practical applications as well as new research insights and is ideally designed for use by engineers, IT professionals, researchers, and graduate-level students.

Materials Processing and Texture

This volume contains papers presented at The 15th International Conference on the Texture of Materials from June 1-5th, 2008 in Pittsburgh, PA. Chapters include: Friction Stir Welding and Processing Texture and Anisotropy in Steels Effects of Magnetic Fields Hexagonal Metals Texture in Materials Design View information on Applications of Texture Analysis: Ceramic Transactions, Volume 201.

Intermetallic Chemistry

Intermetallic science is closely related to physics, chemistry, metallurgy, materials science & technology, and engineering. This book emphasizes the chemical aspects of this science, and therefore the mutual reactivity of metals and the characteristics of intermetallic compounds. Topics included are:

- Phase diagrams of alloy systems. Many intermetallic systems form several compounds, generally not obeying common simple stoichiometric rules, which are often homogeneous in a certain range of compositions. The stability and extension of these phases are conveniently presented through phase diagrams.
- Selected aspects of intermetallics structural chemistry, with emphasis on the solid state. The general structural characteristics of intermetallic phases are considered, with attention to nomenclature and to alternative and complementary methods of presenting crystal-chemical data. A brief account is given of derivative and degenerate structures, modular aspects of crystal structures, and of a few special groups of alloys such as quasicrystals and amorphous alloys. A number of selected structural prototypes with typical features, their possible grouping in structural "families and their distribution among different types of alloys are provided.
- Intermetallic reactivity trends in the Periodic Table. Attention is given to a few selected elemental parameters such as electron configuration and valence electron number and to their changes along the Table, which act as reference factors of the intermetallic behaviour. As an example, the relationships are considered between crystal structure and the number of valence electrons per atom (or per formula) in various classes of compounds or solid solution phases.
- Alloying behaviour systematics of intermetallic systems with a description of the intermetallic reactivity of each element, or group of elements, in the order of their position in the Periodic Table. For each pair of metallic elements, their capability to form intermediate phases is summarised by maps and schemes.
- A description of small scale preparation methods of intermetallics. A number of interesting and significant peculiarities are, e.g., those related to their high melting points, insolubility in common solvents, etc.
- Systematic treatment of alloying behaviour
- Wide overview of intermetallic chemistry
- Illustrated, with many examples

Underneath the Bragg Peaks

This book focuses on the structural determination of crystalline solids with extensive disorder. Well-established methods exist for characterizing the structure of fully crystalline solids or fully disordered materials such as liquids and glasses, but there is a dearth of techniques for the cases in-between, crystalline solids with internal atomic and nanometer scale disorder. Egami and Billinge discuss how to fill the gap using modern tools of structural characterization. This problem is encountered in the structural characterization of a surprisingly wide range of complex materials of interest to modern technology and is becoming increasingly important. Takeshi Egami received the 2003 Eugene Bertram Warren Diffraction Physics Award for the work described in the book. The authors received 2010 J. D. Hanawalt Award from the International Union of Crystallography largely based on the success of this book. Introduces a unique method to study the atomic structure of nanomaterials Lays out the basic theory and methods of this important emerging technique The first edition is considered the seminal text on the subject

Phase Transformations

The terms phase transitions and phase transformations are often used in an interchangeable manner in the metallurgical literature. In Phase Transformations, transformations driven by pressure changes, radiation and deformation and those occurring in nanoscale multilayers are brought to the fore. Order-disorder transformations, many of which constitute very good examples of continuous transformations, are dealt with in a comprehensive manner. Almost all types of phase transformations and reactions that are commonly encountered in inorganic materials are covered and the underlying thermodynamic, kinetic and crystallographic aspects elucidated. Shows readers the advancements in the field - due to enhanced computing power and superior experimental capability Drawing upon the background and the research experience of the authors, bringing together a wealth of experience Written essentially from a physical metallurgists view point

Applications of Texture Analysis

This volume contains papers presented at The 15th International Conference on the Texture of Materials from June 1-5th, 2008 in Pittsburgh, PA. Chapters include: Thin Films Texture at Non-Ambient Conditions Novel Texture Measurement Techniques Including 3D Complex Oxides Interface Textures Recrystallization Texture Biomaterials Texture Effects on Damage Accumulation Digital Microstructures View information on Materials Processing and Texture: Ceramic Transactions, Volume 200.

Self-diffusion and Impurity Diffusion in Pure Metals

Diffusion in metals is an important phenomenon, which has many applications, for example in all kinds of steel and aluminum production, and in alloy formation (technical applications e.g. in superconductivity and semiconductor science). In this book the data on diffusion in metals are shown, both in graphs and in equations. Reliable data on diffusion in metals are required by researchers who try to make sense of results from all kinds of metallurgical experiments, and they are equally needed by theorists and computer modelers. The previous compilation dates from 1990, and measurements relying on the electron microprobe and the recent Rutherford backscattering technique were hardly taken into account there. This reference book, containing all results on self-diffusion and impurity diffusion in pure metals with an indication of their reliability, will be useful to everyone in this field for the theory, fundamental research and industrial applications covered. • Up-to-date and complete (including EPMA and RBS investigations) • Indication of reliability of the measurements • Reassessment of many early results • Data can easily be extracted from Tables and Graphs

Gamma Titanium Aluminide Alloys

The first book entirely dedicated to the topic emphasizes the relation between basic research and actual processing technologies. As such, it covers complex microstructures down to the nanometer scale, structure/property relationships and potential applications in key industries. From the contents: * Constitution * Thermophysical Constants * Phase Transformations and Microstructures * Deformation Behaviour * Strengthening Mechanisms * Creep * Fracture Behaviour * Fatigue * Oxidation Resistance and Related Issues * Alloy Design * Ingot Production and Component Casting * Powder Metallurgy * Wrought Processing * Joining * Surface Hardening * Applications and Component Assessment

TMS 2014 143rd Annual Meeting & Exhibition, Annual Meeting Supplemental Proceedings

These papers present advancements in all aspects of high temperature electrochemistry, from the fundamental to the empirical and from the theoretical to the applied. Topics involving the application of electrochemistry to the nuclear fuel cycle, chemical sensors, energy storage, materials synthesis, refractory metals and their alloys, and alkali and alkaline earth metals are included. Also included are papers that discuss various technical, economic, and environmental issues associated with plant operations and industrial practices.

Nucleation in Condensed Matter

In *Nucleation in Condensed Matter*, key theoretical models for nucleation are developed and experimental data are used to discuss their range of validity. A central aim of this book is to enable the reader, when faced with a phenomenon in which nucleation appears to play a role, to determine whether nucleation is indeed important and to develop a quantitative and predictive description of the nucleation behavior. The third section of the book examines nucleation processes in practical situations, ranging from solid state precipitation to nucleation in biological systems to nucleation in food and drink. *Nucleation in Condensed Matter* is a key reference for an advanced materials course in phase transformations. It is also an essential reference for researchers in the field. Unified treatment of key theories, experimental evaluations and case studies Complete derivation of key models Detailed discussion of experimental measurements Examples of nucleation in diverse systems

Engineering Materials 2

Provides a thorough explanation of the basic properties of materials; of how these can be controlled by processing; of how materials are formed, joined and finished; and of the chain of reasoning that leads to a successful choice of material for a particular application. The materials covered are grouped into four classes: metals, ceramics, polymers and composites. Each class is studied in turn, identifying the families of materials in the class, the microstructural features, the processes or treatments used to obtain a particular structure and their design applications. The text is supplemented by practical case studies and example problems with answers, and a valuable programmed learning course on phase diagrams.

Engineering Applications of Nanotechnology

This book focuses on the use of nanotechnology in several fields of engineering. Among others, the reader will find valuable information as to how nanotechnology can aid in extending the life of component materials exposed to corrosive atmospheres, in thermal fluid energy conversion processes, anti-reflection coatings on photovoltaic cells to yield enhanced output from solar cells, in connection with friction and wear reduction in automobiles, and buoyancy suppression in free convective heat transfer. Moreover, this unique resource presents the latest research on nanoscale transport phenomena and concludes with a look at likely future trends.

Material and Process Design for Lightweight Structures

The use of lightweight structures across several industries has become inevitable in today's world given the ever-rising demand for improved fuel economy and resource efficiency. In the automotive industry, composites, reinforced plastics, and lightweight materials, such as aluminum and magnesium are being adopted by many OEMs at increasing rates to reduce vehicle mass and develop efficient new lightweight designs. Automotive weight reduction with high-strength steel is also witnessing major ongoing efforts to design novel damage-controlled forming processes for a new generation of efficient, lightweight steel components. Although great progress has been made over the past decades in understanding the thermomechanical behavior of these materials, their extensive use as lightweight solutions is still limited due to numerous challenges that play a key role in cost competitiveness. Hence, significant research efforts are still required to fully understand the anisotropic material behavior, failure mechanisms, and, most importantly, the interplay between industrial processing, microstructure development, and the resulting properties. This Special Issue reprint book features concise reports on the current status in the field. The topics discussed herein include areas of manufacturing and processing technologies of materials for lightweight applications, innovative microstructure and process design concepts, and advanced characterization techniques combined with modeling of material's behavior.

Light Metals: Advances in Research and Application: 2011 Edition

Light Metals: Advances in Research and Application: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Light Metals. The editors have built Light Metals: Advances in Research and Application: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Light Metals in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Light Metals: Advances in Research and Application: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

Principles of Laser Materials Processing

Principles of Laser Materials Processing Authoritative resource providing state-of-the-art coverage in the field of laser materials processing, supported with supplementary learning materials Principles of Laser Materials Processing goes over the most recent advancements and applications in laser materials processing, with the second edition providing a welcome update to the successful first edition through updated content on the important fields within laser materials processing. The text includes solved example problems and problem sets suitable for the readers' further understanding of the technology explained. Split into three parts, the text first introduces basic concepts of lasers, including the characteristics of lasers and the design of their components, to aid readers in their initial understanding of the technology. The text then reviews the engineering concepts that are needed to analyze the different processes. Finally, it delves into the background of laser materials and provides a state-of-the-art compilation of material in the major application areas, such as laser cutting and drilling, welding, surface modification, and forming, among many others. It also presents information on laser safety to prepare the reader for working in the industry sector and provide practicing engineers the updates needed to work safely and effectively. In Principles of Laser Materials Processing, readers can expect to find specific information on: Laser generation principles, including basic atomic structure, atomic transitions, population distribution, absorption, and spontaneous emission Optical resonators, including standing waves in a rectangular cavity, planar resonators, beam modes, line selection, confocal resonators, and concentric resonators Laser pumping, including optical pumping, arc/flash lamp pumping, energy distribution in the active medium, and electrical pumping Broadening mechanisms, including line-shape functions, homogeneous broadening such as natural and collision, and inhomogeneous broadening Principles of Laser Materials Processing is highly suitable for senior undergraduate and graduate students studying laser processing, and non-traditional manufacturing processes; it is also aimed at researchers to provide additional information to be used in research projects that are to be undertaken within the technology field.

Oxide Scale Behavior in High Temperature Metal Processing

The result of a fruitful, on-going collaboration between academia and industry, this book reviews recent advances in research on oxide scale behavior in high-temperature forming processes. Presenting novel, previously neglected approaches, the authors emphasize the pivotal role of reproducible experiments to elucidate the oxide scale properties and develop quantitative models with predictive accuracy. Each chapter consists of a detailed, systematic examination of different aspects of oxide scale formation with immediate impact for researchers and developers in industry. The clear and stringent style of presentation makes this monograph both coherent and easily readable.

Thermomechanical fatigue behavior of materials

"Constrained Deformation of Materials: Devices, Heterogeneous Structures and Thermo-Mechanical Modeling" is an in-depth look at the mechanical analyses and modeling of advanced small-scale structures and heterogeneous material systems. Mechanical deformations in thin films and miniaturized materials, commonly found in microelectronic devices and packages, MEMS, nanostructures and composite and multi-phase materials, are heavily influenced by the external or internal physical confinement. A continuum mechanics-based approach is used, together with discussions on micro-mechanisms, to treat the subject in a systematic manner under the unified theme. Readers will find valuable information on the proper application of thermo-mechanics in numerical modeling as well as in the interpretation and prediction of physical material behavior, along with many case studies.

Additionally, particular attention is paid to practical engineering relevance. Thus real-life reliability issues are discussed in detail to serve the needs of researchers and engineers alike.

Constrained Deformation of Materials

The rise of rapid and uncontrolled industrialization, its alarming levels of hazardous waste produced, and their negative contribution to the international environmental epidemic of global warming — in addition to the decrease in room to dispose of these wastes safely — have put the pressure for many engineers, researchers, and key decision-makers to find the answers to the constant tussle between progress and sustainability — and quickly. *Environmental Geotechnology* revisits existing concepts of geotechnical engineering critically, and brings them up to date with new knowledge and current affairs so as to better address and serve today's needs of the professionals. It points out the role and importance of the parameters and mechanisms that govern the interaction of contaminants with geomaterials (soil and rock mass), and also discusses their degradation in the long-run, and the consequences that follow. The book starts from an engineering philosophy that incorporates the influence of environmental effects (both manmade and natural) on geotechnical engineering practices. Its contents are based on geotechnical and environmental engineering studies pertaining to waste management, such as: the safe handling, transportation and disposal of waste, the estimation of waste leakage into the subsurface, its consequences, methods of containment, and the development of schemes to remediate contaminated land. It also proposes innovative strategies for waste management through the utilization of wastes based on a comprehensive characterization. Modelling techniques such as accelerated physical modelling using geotechnical centrifuge, finite-element or difference-based numerical modelling and physico-chemico-mineralogical modelling are discussed in this book to enable the study of the complex (and otherwise slow) process of contaminant-geomaterial interaction. [Related Link\(s\)](#)

Environmental Geotechnology: Meeting Challenges Through Needs-based Instrumentation

This reference describes advanced computer modeling and simulation procedures to predict material properties and component design including mechanical properties, microstructural evolution, and materials behavior and performance. The book illustrates the most effective modeling and simulation technologies relating to surface-engineered compounds, fastener design, quenching and tempering during heat treatment, and residual stresses and distortion during forging, casting, and heat treatment. Written by internationally recognized experts in the field, it enables researchers to enhance engineering processes and reduce production costs in materials and component development.

Modeling and Simulation for Material Selection and Mechanical Design

Comprehensive Materials Processing, Thirteen Volume Set provides students and professionals with a one-stop resource consolidating and enhancing the literature of the materials processing and manufacturing universe. It provides authoritative analysis of all processes, technologies, and techniques for converting industrial materials from a raw state into finished parts or products. Assisting scientists and engineers in the selection, design, and use of materials, whether in the lab or in industry, it matches the adaptive complexity of emergent materials and processing technologies. Extensive traditional article-level academic discussion of core theories and applications is supplemented by applied case studies and advanced multimedia features. Coverage encompasses the general categories of solidification, powder, deposition, and deformation processing, and includes discussion on plant and tool design, analysis and characterization of processing techniques, high-temperatures studies, and the influence of process scale on component characteristics and behavior. Authored and reviewed by world-class academic and industrial specialists in each subject field. Practical tools such as integrated case studies, user-defined process schemata, and multimedia modeling and functionality. Maximizes research efficiency by collating the most important and established information in one place with integrated applets linking to relevant outside sources.

Comprehensive Materials Processing

A one-stop desk reference, for engineers involved in the use of engineered materials across engineering and electronics, this book will not gather dust on the shelf. It brings together the essential professional reference content from leading international contributors in the field. Material ranges from basic to advanced topics, including materials and process selection and explanations of properties of metals, ceramics, plastics and composites. A hard-working desk reference, providing all the essential

material needed by engineers on a day-to-day basis Fundamentals, key techniques, engineering best practice and rules-of-thumb together in one quick-reference sourcebook Definitive content by the leading authors in the field, including Michael Ashby, Robert Messler, Rajiv Asthana and R.J. Crawford

Engineering Materials and Processes e-Mega Reference

A snapshot of the central ideas used to control fracture properties of engineered structural metallic materials, *Advanced Structural Materials: Properties, Design Optimization, and Applications* illustrates the critical role that advanced structural metallic materials play in aerospace, biomedical, automotive, sporting goods, and other indust

Advanced Structural Materials

Offering one of the field's most thorough treatments of material design principles, including a concise overview of fastener design, the *Handbook of Mechanical Alloy Design* provides an extensive overview of the effects of alloy compositional design on expected mechanical properties. This reference highlights the design elements that must be considered in risk-based metallurgical design and covers alloy design for a broad range of materials, including the increasingly important powder metal and metal matrix alloys. It discusses the design issues associated with carbon, alloy, and tool steels, microalloyed steels, and more. The *Handbook of Mechanical Alloy Design* is a must-have reference.

Handbook of Mechanical Alloy Design

PRICM-8 features the most prominent and largest-scale interactions in advanced materials and processing in the Pacific Rim region. The conference is unique in its intrinsic nature and architecture which crosses many traditional discipline and cultural boundaries. This is a comprehensive collection of papers from the 15 symposia presented at this event.

Proceedings of the 8th Pacific Rim International Conference on Advanced Materials and Processing (PRICM-8)

The second section describes the various techniques used in the petroleum industry to protect metallic materials, to detect and to monitor corrosion, in a manner readily accessible to non-specialist readers.

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Corrosion and Degradation of Metallic Materials

Im Zuge der vorliegenden Arbeit wurde der Einfluss von Prozessparametern und prozessspezifischen Charakteristika auf die Mikrostruktur und das mechanische Verhalten von über das selektive Laserschmelzen hergestellten Strukturen untersucht. Aufgrund der mit diesem Verfahren verbundenen hohen Designfreiheit galt es insbesondere, das Trag- und Verformungsverhalten sowie die Schädigungsentwicklung von Strukturen unterschiedlich komplizierter Geometrie zu charakterisieren, wobei metallische Materialien deutlich unterschiedlicher Festigkeit und Duktilität betrachtet wurden. Unter Verwendung der digitalen Bildkorrelation wurden tiefgehende Einblicke in die Verformungsmechanismen und Beanspruchungsverteilungen auf makroskopischer und lokaler Ebene gewonnen. Die Auswirkungen mikrostruktureller Ausprägungen in Abhängigkeit der Geometrie wurden dabei einbezogen.

Selektives Laserschmelzen metallischer Materialien

This book comprises select proceedings of the International Conference on Emerging Trends in Mechanical Engineering (ICETME 2018). The book covers various topics of mechanical engineering like computational fluid dynamics, heat transfer, machine dynamics, tribology, and composite materials. In addition, relevant studies in the allied fields of manufacturing, industrial and production engineering are also covered. The applications of latest tools and techniques in the context of mechanical engineering problems are discussed in this book. The contents of this book will be useful for students, researchers as well as industry professionals.

Materials Forum

Of interest to researchers and practitioners in materials science, especially in the aerospace industry, 16 papers from a symposium in Atlanta, Georgia, November 1988 discuss the analysis, modeling, and behavior of both continuous and discontinuous ceramic and metal matrix composites, and methods of

Applied mechanics reviews

An update of the definitive annual reference source in the field of aluminum production and related light metals technologies, a great mix of materials science and practical, applied technology surrounding aluminum, bauxite, aluminum reduction, rolling, casting, and production.

Emerging Trends in Mechanical Engineering

ENGINEERING PHYSICS OF HIGH-TEMPERATURE MATERIALS Discover a comprehensive exploration of high temperature materials written by leading materials scientists In *Engineering Physics of High-Temperature Materials: Metals, Ice, Rocks, and Ceramics* distinguished researchers and authors Nirmal K. Sinha and Shoma Sinha deliver a rigorous and wide-ranging discussion of the behavior of different materials at high temperatures. The book discusses a variety of physical phenomena, from plate tectonics and polar sea ice to ice-age and intraglacial depression and the postglacial rebound of Earth's crust, stress relaxation at high temperatures, and microstructure and crack-enhanced Elasto Delayed Elastic Viscous (EDEV) models. At a very high level, *Engineering Physics of High-Temperature Materials (EPHTM)* takes a multidisciplinary view of the behavior of materials at temperatures close to their melting point. The volume particularly focuses on a powerful model called the Elasto-De-layed-Elastic-Viscous (EDEV) model that can be used to study a variety of inorganic materials ranging from snow and ice, metals, including complex gas-turbine engine materials, as well as natural rocks and earth formations (tectonic processes). It demonstrates how knowledge gained in one field of study can have a strong impact on other fields. *Engineering Physics of High-Temperature Materials* will be of interest to a broad range of specialists, including earth scientists, volcanologists, cryospheric and interdisciplinary climate scientists, and solid-earth geophysicists. The book demonstrates that apparently dissimilar polycrystalline materials, including metals, alloys, ice, rocks, ceramics, and glassy materials, all behave in a surprisingly similar way at high temperatures. This similarity makes the information contained in the book valuable to all manner of physical scientists. Readers will also benefit from the inclusion of: A thorough introduction to the importance of a unified model of high temperature material behavior, including high temperature deformation and the strength of materials An exploration of the nature of crystalline substances for engineering applications, including basic materials classification, solid state materials, and general physical principles Discussions of forensic physical materialogy and test techniques and test systems Examinations of creep fundamentals, including rheology and rheological terminology, and phenomenological creep failure models Perfect for materials scientists, metallurgists, and glaciologists, *Engineering Physics of High-Temperature Materials: Metals, Ice, Rocks, and Ceramics* will also earn a place in the libraries of specialists in the nuclear, chemical, and aerospace industries with an interest in the physics and engineering of high-temperature materials.

Thermal and Mechanical Behavior of Metal Matrix and Ceramic Matrix Composites

'Metal-Matrix Composites' are being used or considered for use in a variety of applications in the automotive, aerospace and sporting goods industries. This book contains sixteen chapters, all written by leading experts in the field, which focus on the processing, microstructure and characterization, mechanics and micromechanics of deformation, mechanics and micromechanics of damage and fracture, and practical applications of a wide variety of metal composites. A particularly noteworthy feature of this authoritative volume is its collection of state-of-the-art reviews of the relationships among processing, microstructural evolution, micromechanics of deformation and overall mechanical response.

Light Metals 2012

It has been already well established that the nanostructured materials (materials with a grain size of 100nm or less) is the future materials. Nanostructured materials possess properties superior to those of conventional, coarse grained materials. Hence designing potentially cost efficient and environmentally friendly products with better performance is a possibility. Among others, nanostructured materials exhibit increased strength, hardness and ductility and provide an opportunity for superplastic forming. When all the procedures in use for the production of nanostructured materials are examined, only

severe plastic deformation (SPD) processes exhibit a potential for producing relatively large samples suitable for industrial applications. In this monograph, the state-of-the-art on severe plastic deformation methods is presented in one volume. The monograph is organised into eight chapters, each of which contains papers on different aspect of severe plastic deformation methods prepared by the experts in this field. The topics covered in the monograph are structure formation, phase transformation, superplasticity, mechanical properties of nanostructured materials, electronic and magnetic properties of nanostructured materials, deformation analysis, novel SPD methods, commercialisation of ECAE method.

Engineering Physics of High-Temperature Materials

Metals Forum