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Shape Memory Alloys Shape Memory Alloys Modeling and Simulation of Microstructure Evolution in Solidifying Alloys Shape Memory Alloys Alliages À Mémoire de Forme Alloys and Intermetallic Compounds Additive Manufacturing of High-performance Metals and Alloys Shape-Memory Alloys Handbook Shape Memory Alloys Shape Memory Alloy Actuators Additive Manufacturing of High-performance Metals and Alloys - Modeling and Optimization Shape Memory Alloy Engineering Solidification Processing of Metallic Alloys Under External Fields Alloy Modeling & Design Shape Memory Alloys Modeling and Simulation of Microstructure Evolution in Solidifying Alloys Ferromagnetic Shape Memory Alloys II Innovative Lightweight and High-Strength Alloys Alloy Modeling & Design Pseudoelasticity of Shape Memory Alloys Applied Computational Materials Modeling Metallurgical Modeling for Aluminum Alloys Additive Manufacturing of Shape Memory Materials Computational Modeling and Simulation of Heat Treatment for Metal Alloy Modeling and Simulation for Material Selection and Mechanical Design Mechanical Behavior of

Advanced Materials Alloys: Microstructural Aspects, Characterization and Modeling Concepts Mechanical Behavior of Advanced Materials Phase-field Modeling of Multi-domain Evolution in Ferromagnetic Shape Memory Alloys and of Polycrystalline Thin Film Growth Modeling of Diffusion and Diffusion-controlled Phase Transformations in Alloys Science and Engineering of Casting Solidification Modeling the Lattice Parameters of Solid Solution Alloys High-Entropy Alloys Plastic Deformation Modeling of Magnesium Alloys Advances on Extrusion Technology and Simulation of Light Alloys Modeling of the Damage Mechanisms in AlMgSi Alloys Casting Aluminum Alloys Integrated Computational Materials Engineering (ICME) for Metals Semi-solid Processing of Alloys Simulation of Aluminum Shape Casting Processing

Shape Memory Alloys

2008-06-05

this book provides a working knowledge of the modeling and engineering applications of shape memory alloys smas beginning with a rigorous introduction to continuum mechanics and continuum thermodynamics as they relate to the development of sma modeling modern smas can recover from large amounts of bending and deformation and millions of repetitions within recoverable ranges smas are used in the medical industry to create stents in the dental industry to create dental and orthodontic archwires and in the aerospace industry to create fluid fittings the text presents a unified approach to the constitutive modeling of smas including modeling of magnetic and high temperature smas

Shape Memory Alloys

2008-07-02

this book explores the modeling and engineering applications of shape memory alloys smas beginning with a rigorous introduction to continuum mechanics and continuum thermodynamics as related to sma modeling the text presents a unified approach to the constitutive modeling of smas

Modeling and Simulation of Microstructure Evolution in Solidifying Alloys

2004

this proceedings is a collection of papers from over ten countries covering the latest research on processing modeling and industrial applications of shape memory alloys

Shape Memory Alloys

2003

this book focuses on the role of modeling in the design of alloys and intermetallic compounds it includes an introduction to the most important and most used modeling techniques such as calphad and ab initio methods as well as a section devoted to the latest developments in applications of alloys the book emphasizes the correlation between modeling and technological developments while discussing topics such as wettability of ultra high temperature ceramics by metals active brazing of diamonds to metals in cutting tools surface issues in medicine novel fe based superconductors metallic glasses high entropy alloys and thermoelectric materials

Alliages À Mémoire de Forme

1999

freedoms in material choice based on combinatorial design different directions of process optimization and computational tools are a significant advantage of additive manufacturing technology the combination of additive and information technologies enables rapid prototyping and rapid manufacturing models on the design stage thereby significantly accelerating the design cycle in mechanical engineering modern and high demand powder bed fusion and directed energy deposition methods allow obtaining functional complex shapes and functionally graded structures until now the experimental parametric analysis remains as the main method during am optimization therefore an additional goal of this book is to introduce readers to new modeling and material s optimization approaches in the rapidly changing world of additive manufacturing of high performance metals and alloys

Alloys and Intermetallic Compounds

2017-07-12

the aim of this book is to understand and describe the martensitic phase transformation and the process of martensite platelet reorientation these

two key elements enable the author to introduce the main features associated with the behavior of shape memory alloys smas i e the one way shape memory effect pseudo elasticity training and recovery attention is paid in particular to the thermodynamical frame for solid materials modeling at the macroscopic scale and its applications as well as to the particular use of such alloys the simplified calculations for the bending of bars and their torsion other chapters are devoted to key topics such as the use of the crystallographical theory of martensite for sma modeling phenomenological and statistical investigations of smas magneto thermo mechanical behavior of magnetic smas and the fracture mechanics of smas case studies are provided on the dimensioning of sma elements offering the reader an additional useful framework on the subject contents 1 some general points about smas 2 the world of shape memory alloys 3 martensitic transformation 4 thermodynamic framework for the modeling of solid materials 5 use of the ctm to model smas 6 phenomenological and statistical approaches for smas 7 macroscopic models with internal variables 8 design of sma elements case studies 9 behavior of magnetic smas 10 fracture mechanics of smas 11 general conclusion appendix 1 intrinsic properties of rotation matrices appendix 2 twinning equation demonstration appendix 3 calculation of the parameters a n and q from the twinning equation appendix 4 twinned austenite martensite equation about the authors christian lexcellent is emeritus professor at the École national supérieure de mécanique et des microtechniques de besançon

and a researcher in the department of applied mechanics at femto st in france he is a specialist in the mechanics of materials and phase transition and has taught in the subjects of mechanics of continuum media and shape memory alloys he is also a member of the international committee of esomat

Additive Manufacturing of High-performance Metals and Alloys

2018-07-11

this book provides a systematic approach to realizing niti shape memory alloy actuation and is aimed at science and engineering students who would like to develop a better understanding of the behaviors of smas and learn to design simulate control and fabricate these actuators in a systematic approach several innovative biomedical applications of smas are discussed these include orthopedic rehabilitation assistive cardiovascular and surgery devices and tools to this end unique actuation mechanisms are discussed these include antagonistic bi stable shape memory superelastic actuation shape memory spring actuation and multi axial tension torsion actuation these actuation mechanisms open new possibilities for creating adaptive structures and biomedical devices by using smas

Shape-Memory Alloys Handbook

2013-04-08

freedoms in material choice based on combinatorial design different directions of process optimization and computational tools are a significant advantage of additive manufacturing technology the combination of additive and information technologies enables rapid prototyping and rapid manufacturing models on the design stage thereby significantly accelerating the design cycle in mechanical engineering modern and high demand powder bed fusion and directed energy deposition methods allow obtaining functional complex shapes and functionally graded structures until now the experimental parametric analysis remains as the main method during am optimization therefore an additional goal of this book is to introduce readers to new modeling and material s optimization approaches in the rapidly changing world of additive manufacturing of high performance metals and alloys

Shape Memory Alloys

2000

shape memory alloy engineering for aerospace structural and biomedical applications second edition embraces new advancements in materials

systems and applications introduced since the first edition readers will gain an understanding of the intrinsic properties of smas and their characteristic state diagrams sections address modeling and design process aspects explore recent applications and discuss research activities aimed at making new devices for innovative implementations the book discusses both the potential of these fascinating materials their limitations in everyday life and tactics on how to overcome some limitations in order to achieve proper design of useful sma mechanisms provides a greatly expanded scope looking at new applications of sma devices and current research activities covers all aspects of sma technology from a global state of the art survey to the classification of existing materials basic material design material manufacture and from device engineering design to implementation within actual systems presents the material within a modular architecture over different topics from material conception to practical engineering realization

Shape Memory Alloy Actuators

2016-01-19

this book explores the application of external physical fields to the solidification processing of metallic alloys leading academics from around the world present comprehensive and critical reviews on state of the art research and discuss possible future directions major physical fields

including electromagnetic electric acoustic and thermal are considered in addition the most advanced synchrotron x ray based real time and in situ studies and numerical modeling methodologies are reviewed and discussed with a special emphasis on their applications to the solidification processes throughout all chapters are illustrated with both historical and very recent research cases including typical examples of in situ studies modeling and simulation this book contains essential knowledge and information suitable for a wide audience from undergraduate and postgraduate students to academics practicing researchers and engineers in materials metallurgy and manufacturing

Additive Manufacturing of High-performance Metals and Alloys - Modeling and Optimization

2018

this work brings together contributions from researchers in a variety of fields that have a common interest in applying the most recent developments in basic research to the design of new alloys the papers are from materials week 93 held in pittsburgh pennsylvania october 17 21 1993

Shape Memory Alloy Engineering

2021-01-13

the aim of modeling and simulation of microstructure evolution in solidifying alloys is to describe in a clear mathematical language the physics of the solidification structure evolution of cast alloys the concepts and methodologies presented here for the net shaped casting and the ingot remelt processes can be applied with some modifications to model other solidification processes such as welding and deposition processes another aim of the book is to provide simulation examples of the solidification structure modeling in some crucial commercial casting technologies as well as to provide practical techniques for controlling the structure formation during the solidification processes

Solidification Processing of Metallic Alloys Under External Fields

2018-10-09

volume is indexed by thomson reuters cpci s wos this work on ferromagnetic shape memory alloys contains selected peer reviewed papers such materials belong to the most exciting and fastest growing group of martensitic multifunctional materials the selected papers cover

the following topics of basic phenomena and theory structure and magnetic properties magnetomechanics and magnetocaloric effect thin films and composites modeling and simulations and processing and engineering this volume will be useful to anyone who is already working with novel advanced materials as well as to those seeking an accessible introduction to the relatively new field of fsmas the alloys put on outstanding performances as sensors and actuators and so are of enormous interest to scientists and engineers interested in smart materials of the nearly 100 papers 28 were selected and peer reviewed for publication here paralleling conference sessions they are presented in sections on basic phenomena and theory structure and magnetic properties magnetomechanics and magnetocaloric effect thin films and composites modeling and simulations and processing and engineering among the topics are the symmetry conforming theory of martensite aging magnetic metamagnetic shape memory alloys based on nickel and manganese recent developments in nickel manganese gallium foam research the fabrication and magnetic properties of cobalt nickel aluminum ferromagnetic shape memory alloy thin films the thermodynamic modeling of actuators and nano positioning

Alloy Modeling & Design

1994

innovative lightweight and high strength alloys multiscale integrated processing experimental and modeling techniques provides multiscale processing experimental and modeling techniques overviews and perspectives that highlight current roadblocks to optimal design of new alloys alongside solutions critical microstructural chemical and mechanical aspects are considered with techniques for significantly improving mechanical properties case studies applications and hands on techniques that can be put into immediate practice are included throughout sections cover processing techniques for various alloys including aluminum titanium martensitic austenitic and others additive manufacturing of alloys is also covered along with updates on mechanical quasi static chemically based and dynamic experimentation techniques and more the book concludes with a modeling section that features several chapters covering multiscale microstructural combinatorial computational and machine learning modeling techniques provides solutions for designing innovative and durable alloys demonstrates how to optimally combine alloys with other metallic and non metallic material systems for longer life cycles and better durability in extreme environments and loading conditions outlines a variety of experimentation characterization and modeling techniques that can be put into immediate practice

Shape Memory Alloys

1996

pseudoelasticity of shape memory alloys theory and experimental studies is devoted to the phenomenon of pseudoelasticity superelasticity exhibited by shape memory alloy materials it provides extensive introductory content on the state of the art in the field including sma materials development definition of shape memory effects and discussions on where shape memory behavior is found in various engineering application areas the book features a survey of modeling approaches targeted at reliable prediction of sma materials behavior on different scales of observation including atomistic microscopic mezoscopic and macroscopic researchers and graduate students will find detailed information on the modern methodologies used in the process of building constitutive models of advanced materials exhibiting complex behavior

Modeling and Simulation of Microstructure Evolution in Solidifying Alloys

2007-05-08

the scope of this book is to identify and emphasize the successful link between computational materials modeling as a simulation and design

tool and its synergistic application to experimental research and alloy development the book provides a more balanced perspective of the role that computational modeling can play in every day research and development efforts each chapter describes one or more particular computational tool and how they are best used

Ferromagnetic Shape Memory Alloys II

2010

the proceedings from the october 2003 pittsburgh conference include 28 papers on plasticity quench and solidification modeling and microstructure evolution researchers from north america and europe present recent work on computational micromechanical modeling fatigue crack growth methodologies mathematical pitfalls thermal and residual stress analysis the simulation of local microstructures and thermal growth elastic strain energy analysis computer modeling of phase transformations integral modeling and other modeling issues there is no index annotation 2004 book news inc portland or booknews com

Innovative Lightweight and High-Strength Alloys

2024-04-23

additive manufacturing of shape memory materials techniques

characterization modeling and applications outlines an array of techniques and applications for additive manufacturing am and the use of various shape memory materials covering corrosion properties material sensitivity to thermal magnetic and electrical effects as well as sensitivity of shape memory properties to am parameters including part geometry effects and post process treatments design for am and a number of different am methods are discussed with materials covered including shape memory alloys shape memory polymers high temperature shape memory alloys and magnetic shape memory alloys characterization and modeling methods are also included as is a chapter dedicated to real world applications of these production techniques and materials provides an overview of various shape memory materials their additive manufacturing techniques and processes their applications and opportunities and challenges related to their production and use outlines the thermomechanical and functional properties of shape memory alloys that can be applied to their additive manufacturing processes covers techniques for additive manufacturing of shape memory polymers shape memory alloys high temperature shape memory alloys and magnetic shape memory alloys discusses characterization post processing modeling and applications of shape memory materials

Alloy Modeling & Design

1994

a comprehensive evaluation of the modeling of heat treatment processes the book summarizes the current achievements on numerical modeling for the heat treatment process providing academic researchers and engineers with a comprehensive understanding helping to realize the physical problems improve the studies optimize the operation and enhance the quality of parts for the heat treatment process the book summarizes years of the authors research work and a systematic structure is presented for numerical modeling of heat treatment processes with the integration of multi physics models stressed it includes the thermal analysis microstructural evolution mechanical modeling diffusion compound formation modeling of equipment and the concept of integration it covers the fundamentals of simulation for heat treatment processes illustrate physics based models to the pertinent phenomena and help the readers to have a general and comprehensive understanding to this field together with a small group of contributors the authors present current research on thermal modeling in heat treatment processes microstructural evolution for steel and aluminum mechanical modeling diffusion and compound formation heat treatment equipment integration modeling provides a systematic structure for the numerical modeling of heat treatment processes with integration of multi physics models includes thermal

analysis microstructure evolution mechanical modeling diffusion compound formation modeling of equipments and the concept of integration covers the fundamental technologies of heat treatment based on theory and experimental results introducing computational simulation for such treatments which affect physical properties of metallic alloys fully illustrated throughout and accompanied by a website to include supplementary papers demo case files programs and source code

Pseudoelasticity of Shape Memory Alloys

2015-03-20

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 with contributions from internationally recognized experts in the field it enables researchers to enhance engineering processes and reduce production costs in materials and component development

Applied Computational Materials Modeling

2007-12-19

this book provides a comprehensive description of mechanical behavior of advanced materials using modeling and simulation it includes such materials as high entropy alloys and amorphous alloys nickel based superalloys graphene lithium light alloys and nanostructured reinforced composites

Metallurgical Modeling for Aluminum Alloys

2003

an alloy refers to a mixture of chemical elements of which at least one is a metal element after cooling alloy mixture crystallizes into a solid solution intermetallic compound or a mixture alloys are typically produced to be corrosion resistant less brittle stronger or to have a more desirable color and luster compared to the constituent metals they are produced using processes such as electro deposition method powder metallurgy fusion method and the reduction method the microstructure chemical composition and the production technology used to produce the alloys determine the functional properties of alloys most commonly alloys are modeled using the calphad approach which involves computer coupling of

phase diagrams and thermo chemistry brass white gold sterling silver stainless steel bronze and 14k gold are some of the prominent examples of alloys this book aims to shed light on the microstructural aspects characterization and modeling concepts of alloys it consists of contributions made by international experts a number of latest researches have been included to keep the readers up to date with the global concepts in this area of study

Additive Manufacturing of Shape Memory Materials

2024-10-01

with the recent developments in the field there exists a need for a systematic summary and detailed introduction of the modeling and simulation methods for these materials this book provides a comprehensive description of mechanical behavior of advanced materials using modeling and simulation it includes materials such as high entropy alloys high entropy amorphous alloys nickel based superalloys light alloys electrode materials and nanostructured reinforced composites reviews the performance and application of a variety of advanced materials and provides the detailed theoretical modeling and simulation of mechanical properties covers the topics of deformation fracture diffusion and fatigue features worked examples and exercises that help readers test their

understanding this book is aimed at researchers and advanced students in solid mechanics material science engineering material chemistry and those studying mechanics of materials

Computational Modeling and Simulation of Heat Treatment for Metal Alloy

2014-08-25

the phase field method is a powerful tool in computer aided materials science as it allows for the analysis of the time spatial evolution of microstructures on the mesoscale a multi phase field model is adopted to run numerical simulations in two different areas of scientific interest polycrystalline thin films growth and the ferromagnetic shape memory effect fft techniques norm conservative integration and rve methods are necessary to make the coupled problems numerically feasible

Modeling and Simulation for Material Selection and Mechanical Design

2003-12-02

diffusion is an omnipresent but important phenomenon in a wide variety of disciplines and applications in physical chemical biological geologic

materials science and engineering processes while diffusion controlled phase transformations involve in a variety of materials processes ranging from solidification to different solid state transformations modeling of diffusion and diffusion controlled phase transformations in alloys has been of long standing fundamental interests because advance modeling can help to improve the understanding of complex materials processes moreover as the recent boost in integrated computational materials engineering icme and materials genome initiative mgi projects additional emphasis on the necessity and urgency of the quantitative modeling of diffusion and diffusion controlled phase transformations in alloys has been laying which can provide useful information for accelerating the novel alloys design consequently the purpose of this book entitled modeling of diffusion and diffusion controlled phase transformations in alloys is to provide a collection of the commonly used computational approaches for modeling diffusion and diffusion controlled phase transformations as well as their current status recent developments future trends and applications in different alloys

Mechanical Behavior of Advanced Materials

2023-11-29

casting of metals evolved first as witchcraft gradually became an art then technology and became only recently a science many of the processes

used in a metal casting are still empirical in nature but many others are deeply rooted in mathematics in whatever form casting of metals is an activity fundamental in the very existence of our world as we know it today foundry reports indicate that solidification modeling is not only a cost effective investment but also a major technical asset it helps foundries move into markets with more complex and technically demanding work however to the best of the author s knowledge there have been no attempts to synthesize the information that can be used for engineering calculations pertinent to computational modeling of casting solidification this book is based on the author s thirty years of experience with teaching research and the industrial practice of solidification science as applied to casting processes it is an attempt to describe solidification theory through the complex mathematical apparatus that includes partial differential equations and numerical analysis which are required for a fundamental treatment of the problem the mathematics however is restricted to the element essential to attain a working knowledge of the field this is in line with the main goal of the book which is to educate the reader in the fast moving area of computational modeling of solidification of casting for the sake of completeness a special effort has been made to introduce the reader to the latest developments in solidification theory even if the reader has no engineering applications at this time the text is designed to be self contained the author s teaching experience demonstrates that some of the students interested in solidification science

are not fully proficient in partial differential equations pde and or numerical analysis accordingly elements of pde and numerical analysis required to obtain a working knowledge of computational solidification modeling have been introduced in the text while attempting to avoid the interruption of the fluency of the subject numerous modeling and calculation examples using the excel spreadsheet as an engineering tool are provided the book is addressed to graduate students and seniors in solidification science as well as to industrial researchers who work in the field of solidification in general and casting modeling in particular

Alloys: Microstructural Aspects, Characterization and Modeling Concepts

2023-09-19

in this book models for the prediction of lattice parameters of substitutional and interstitial solid solutions as a function of concentration and temperature are presented for substitutional solid solutions the method is based on the hypothesis that the measured lattice parameter versus concentration is the average of the interatomic spacing within a selected region of a bravais lattice the model is applied on ni cu and ge si solid solutions for the interstitial solid solution of the fe c system the method is based on the assumption that the change in lattice parameter of the pure fe phase is due to the occupation by carbon atoms to the

octahedral holes in the fcc austenite and bct martensite the model of lattice parameter versus temperature for both substitutional and interstitial solid solutions is based on the relative change in length and vacancy concentration at lattice sites that are in thermal equilibrium combinations of both models then facilitate the calculation of lattice parameters as a function of concentration and temperature the results are discussed accordingly

Mechanical Behavior of Advanced Materials

2023

this book provides a systematic and comprehensive description of high entropy alloys heas the authors summarize key properties of heas from the perspective of both fundamental understanding and applications which are supported by in depth analyses the book also contains computational modeling in tackling heas which help elucidate the formation mechanisms and properties of heas from various length and time scales

Phase-field Modeling of Multi-domain Evolution in Ferromagnetic Shape Memory Alloys and of

Polycrystalline Thin Film Growth

2014-05-13

volume is indexed by thomson reuters bci wos this collection offers a fully representative snapshot of modelling activities as applied to processes involving extrusion it covers a wide range of topics grouped into the categories benchmark keynotes material flow and constitutive equations microstructure seam welds and process optimization dies and tools the core intent of the collection was to exploit fem code capabilities and expert users knowledge for the purpose of simulating an industrial extrusion process this work is sure to inspire similar future studies these proceedings of the conference held in salerno italy in april 2007 describe work in basic research modeling and applications for advanced extrusion and related processes including computer simulation of new materials such as light alloys general topics include benchmarks material flow and constitutive equations microstructures optimization dies and tools other papers cover such specialties as new materials including hard magnesium alloys new products composite profiles of new processes such as hot profile bending and information about research and applications of semi solid processing such as thixo casting and thixo molding all papers include full references and the editors include materials from the keynote speeches and a full index

Modeling of Diffusion and Diffusion-controlled Phase Transformations in Alloys

2018-01-03

with the growth in importance of the aluminium industry has come increased demand to invest into the quality improvement of the different aluminium based hot extruded products one of the main mechanisms which can influence deformation at high temperature within the 6xxx aluminium is linked to the presence of the alfesi intermetallic phases these phases severely restrict hot workability when present as hard and brittle plate like precipitates b alfesi damage initiation occurs in these alloys by decohesion or fracture of these intermetallic inclusions the understanding and modeling of the deformation and fracture behavior of aluminium alloys at room and at hot working temperature is very important for optimizing manufacturing processes such as extrusion the ductility of 6xxx aluminium alloys can be directly related to chemical composition and to the microstructural evolution occurring during the heat treatment procedures preceding extrusion if proper physics based deformation and fracture models are used in this thesis room temperature and hot tensile tests are adopted to address the problem xperimentally the damage evolution mechanisms is defined at various temperatures and a micromechanics based model of the gurson type considering several

populations of cavities nucleated by different second phase particles groups is developed on the basis of the experimental observations this model allows relating quantitatively microstructure and ductility at various temperatures strain rates and stress triaxialities finite element simulations based on an enhanced micromechanics based model are used to validate the model finally the effect of some key factors that determine the extrudability of aluminium is also discussed and a correlation between the ductility calculations in uniaxial tension and the maximum extrusion speed is developed for one defined profile

Science and Engineering of Casting Solidification

2002

casting aluminum alloys second edition the follow up to the fall 2007 work on the structure properties thermal resistance corrosion and fatigue of aluminum alloys in industrial manufacturing discusses findings from the past decade including sections on new casting alloys novel casting technologies and new methods of alloys design the book also includes other hot topics such as the implementation of computational technologies for the calculation of phase equilibria and thermodynamic properties of alloys the development of software for calculation of diffusion processes in aluminum alloys computational modeling of solidification microstructure and texture evolution of multi component aluminum materials in addition

to changes in computational predictive abilities there is a review of novel casting aluminum alloy compositions and properties as well as descriptions of new casting technologies and updates to coverage on the mechanical properties of aluminum casting alloys presents a discussion of thermodynamic calculations used for assessing non equilibrium solidifications of casting aluminum alloys expands coverage of mathematical models for alloy mechanical properties helping facilitate the selection of the best prospective candidate for new alloy development contains a new section that describes the self consistent evaluation of phase equilibria and thermodynamic properties of aluminum alloys

Modeling the Lattice Parameters of Solid Solution Alloys

2017

focuses entirely on demystifying the field and subject of icme and provides step by step guidance on its industrial application via case studies this highly anticipated follow up to mark f horstemeyer s pedagogical book on integrated computational materials engineering icme concepts includes engineering practice case studies related to the analysis design and use of structural metal alloys a welcome supplement to the first book which includes the theory and methods required for teaching the subject in the classroom integrated computational materials

engineering icme for metals concepts and case studies focuses on engineering applications that have occurred in industries demonstrating the icme methodologies and aims to catalyze industrial diffusion of icme technologies throughout the world the recent confluence of smaller desktop computers with enhanced computing power coupled with the emergence of physically based material models has created the clear trend for modeling and simulation in product design which helped create a need to integrate more knowledge into materials processing and product performance integrated computational materials engineering icme for metals case studies educates those seeking that knowledge with chapters covering body centered cubic materials designing an interatomic potential for fe c alloys phase field crystal modeling simulating dislocation plasticity in bcc metals by integrating fundamental concepts with macroscale models steel powder metal modeling hexagonal close packed materials multiscale modeling of pure nickel predicting constitutive equations for materials design and more presents case studies that connect modeling and simulation for different materials processing methods for metal alloys demonstrates several practical engineering problems to encourage industry to employ icme ideas introduces a new simulation based design paradigm provides web access to microstructure sensitive models and experimental database integrated computational materials engineering icme for metals case studies is a must have book for researchers and industry professionals aiming to comprehend and employ icme in the

design and development of new materials

High-Entropy Alloys

2018-05-26

this book presents the state of the art concerning the fundamental aspects of semi solid processing of alloys and composites together with the industrial applications the fundamental aspects include both the microstructure development and characterization and the rheology of alloy slurries with special attention to both experimental determination and modeling the industrial applications are also surveyed and particular consideration is given to recent developments in slurry formation foreword provided by prof merton c flemings mit the father and originator of semi solid processing

Plastic Deformation Modeling of Magnesium Alloys

2010

this book reviews the latest developments and applications of modeling and simulation techniques in aluminum shape castings and the need for improvement of these computational techniques specifically topics include

design of both the cast aluminum alloy as well as aluminum casting and gating system modeling simulation and optimization of both the casting process and heat treatment modeling and simulation of both casting defect and microstructure prediction of mechanical performance and influence of subsequent processing on final performance developers and users of computational techniques applied to aluminum shape castings as well as end users of castings will find this book extremely helpful

Advances on Extrusion Technology and Simulation of Light Alloys

2008

Modeling of the Damage Mechanisms in AlMgSi Alloys

2006

Casting Aluminum Alloys

2018-09-03

Integrated Computational Materials Engineering (ICME) for Metals

2018-03-01

Semi-solid Processing of Alloys

2010

Simulation of Aluminum Shape Casting Processing

2006-11

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