

Structure And Properties Of Engineering Alloys

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Advanced Structural Materials - Winston O Soboyejo 2019-08-30

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 industries in the twenty-first century. The book presents an overview of the structure, properties, and applications of these materials, including the basic ideas behind their design. It contains examples and accessible language, elucidating the basic concepts that guide the development of new alloys and composite materials. With in-depth reviews from leading contributors, the text develops an understanding of the breadth and depth of advances in the field. It begins with a broad introduction to advanced structural materials, then examines materials at the frontiers of emerging applications such as biomaterials, MEMS, amorphous materials, and nanotechnology. The chapter authors are experts in their own right and they assume no prior knowledge of a given material system, delineating the fundamental concepts and applications of advanced structural materials. The rich array of carefully selected topics provides useful insights into the structure, properties, and applications of advanced structural materials.

Structure-Property Relations in Nonferrous Metals - Alan Russell 2005-07-08

This junior/senior textbook presents fundamental concepts of structure property relations and a description of how these concepts apply to every metallic element except iron. Part One of the book describes general concepts of crystal structure, microstructure and related factors on the mechanical, thermal, magnetic and electronic properties of nonferrous metals, intermetallic compounds and metal matrix composites. Part Two discusses all the nonferrous metallic elements from two perspectives: First it explains how the concepts presented in Part One define the properties of a particular metallic element and its alloys. Second is a description of the major engineering uses of each metal. This section features sidebar pieces describing particular physical property oddities, engineering applications and case studies. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Nickel, Cobalt, and Their Alloys - Joseph R. Davis 2000-01-01

This book is a comprehensive guide to the compositions, properties, processing, performance, and applications of nickel, cobalt, and their alloys. It includes all of the essential information contained in the ASM Handbook series, as well as new or updated coverage in many areas in the nickel, cobalt, and related industries.

Alloys and Intermetallic Compounds - Cristina Artini 2017-07-12

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.

Heat Treatment, Structure, and Properties of Nonferrous Alloys - Charlie R. Brooks 1982

Coated Metal - Leonid Tushinsky 2002-04-23

This book can be viewed as a scientific investigation combined with methodological studies. For practical reasons each of the methods is described in the following general manner including: the uses and the scientific investigation tasks; methods of sampling; testing equipment; test preparation; tests; data processing; controversial issues and conclusions. Each of the 37 methods contains a range of 1 to 8 variants. As far as we know, the book is the first publication in the field.

High-Entropy Alloys - B.S. Murty 2019-03-16

High-Entropy Alloys, Second Edition provides a complete review of the current state of the field of high entropy alloys (HEA). Building upon the first edition, this fully updated release includes new theoretical understandings of these materials, highlighting recent developments on modeling and new classes of HEAs, such as Eutectic HEAs and Dual phase HEAs. Due to their unique properties, high entropy alloys have attracted considerable attention from both academics and technologists. This book presents the fundamental knowledge, the spectrum of various alloy systems and their characteristics, key focus areas, and the future scope of the field in terms of research and technological applications. Provides an up-to-date, comprehensive understanding on the current status of HEAs in terms of theoretical understanding and modeling efforts Gives a complete idea on alloy design criteria of various classes of HEAs developed so far Discusses the microstructure property correlations in HEAs in terms of structural and functional properties Presents a comparison of HEAs with other multicomponent systems, like intermetallics and bulk metallic glasses

Metal and Alloy Bonding - An Experimental Analysis - R. Saravanan 2011-09-20

Charge density analysis of materials provides a firm basis for the evaluation of the properties of materials. The design and engineering of a new combination of metals requires a firm knowledge of intermolecular features. Recent advances in technology and high-speed computation have made the crystal X-ray diffraction technique a unique tool for the determination of charge density distribution in molecular crystal. Methods have been developed to make experimental probes capable of unraveling the features of charge densities in the intra- and inter-molecular regions of crystal structures. In *Metal and Alloy Bonding - An Experimental Analysis*, the structural details of materials are elucidated with the X-ray diffraction technique. Analyses of the charge density and the local and average structure are given to reveal the structural properties of technologically important materials. Readers will gain a new understanding of the local and average structure of existing materials. The electron density, bonding, and charge transfer studies in *Metal and Alloy Bonding - An Experimental Analysis* contain useful information for researchers in the fields of physics, chemistry, materials science, and metallurgy. The properties described in these studies can contribute to the successful engineering of these technologically important materials.

Structure and Properties of Engineering Alloys - William Fortune Smith 1993

A junior-senior level text and reference for use by materials engineers and mechanical engineers in courses entitled advanced physical metallurgy.

Embrittlement of Engineering Alloys - C. L. Briant 2013-10-22

Treatise on Materials Science and Technology, Volume 25: Embrittlement of Engineering Alloys is an 11-chapter text that describes some situations that produce premature failure of several engineering alloys, including steels and nickel- and aluminum-base alloys. Chapters 1 to 3 consider situations where improper

alloy composition, processing, and/or heat treatment can lead to a degradation of mechanical properties, even in the absence of an aggressive environment or an elevated temperature. Chapters 4 and 5 examine the effect of elevated temperatures on the mechanical properties of both ferrous and nonferrous alloys. Chapters 6 and 7 discuss the effects of corrosive environments on both stressed and unstressed materials. In these environments anodic dissolution is the primary step that leads to failure. Chapters 8 to 10 deal with the effects of aggressive environments that lead to enhanced decohesion or embrittlement of the metal, such as hydrogen, liquid metal, and irradiation-induced embrittlement. Chapter 11 looks into the embrittlement phenomena occurring during welding, one of the most common processing conditions to which a material could be subjected. This book will prove useful to materials scientists and researchers.

Physical Metallurgy and Advanced Materials - R. E. Smallman 2011-02-24

Physical Metallurgy and Advanced Materials is the latest edition of the classic book previously published as Modern Physical Metallurgy and Materials Engineering. Fully revised and expanded, this new edition is developed from its predecessor by including detailed coverage of the latest topics in metallurgy and material science. It emphasizes the science, production and applications of engineering materials and is suitable for all post-introductory materials science courses. This book provides coverage of new materials characterization techniques, including scanning tunneling microscopy (STM), atomic force microscopy (AFM), and nanoindentation. It also boasts an updated coverage of sports materials, biomaterials and nanomaterials. Other topics range from atoms and atomic arrangements to phase equilibria and structure; crystal defects; characterization and analysis of materials; and physical and mechanical properties of materials. The chapters also examine the properties of materials such as advanced alloys, ceramics, glass, polymers, plastics, and composites. The text is easy to navigate with contents split into logical groupings: fundamentals, metals and alloys, nonmetals, processing and applications. It includes detailed worked examples with real-world applications, along with a rich pedagogy comprised of extensive homework exercises, lecture slides and full online solutions manual (coming). Each chapter ends with a set of questions to enable readers to apply the scientific concepts presented, as well as to emphasize important material properties. Physical Metallurgy and Advanced Materials is intended for senior undergraduates and graduate students taking courses in metallurgy, materials science, physical metallurgy, mechanical engineering, biomedical engineering, physics, manufacturing engineering and related courses. Renowned coverage of metals and alloys, plus other materials classes including ceramics and polymers. Updated coverage of sports materials, biomaterials and nanomaterials. Covers new materials characterization techniques, including scanning tunneling microscopy (STM), atomic force microscopy (AFM), and nanoindentation. Easy to navigate with contents split into logical groupings: fundamentals, metals and alloys, nonmetals, processing and applications. Detailed worked examples with real-world applications. Rich pedagogy includes extensive homework exercises.

Aluminium Alloys - Jürgen Hirsch 2008-11-17

Aluminium is a well established modern lightweight engineering and functional material with a unique combination of specific properties like strength, formability, durability, conductivity, corrosion resistance, etc. It is present in many intelligent solutions in established markets like building, transport, packaging, printing, and many others, in our fast moving modern society. The various aluminium alloys can be processed quite efficiently in large quantities by conventional fabrication routes, as well as in special sophisticated forms and material combinations for highly innovative high-tech solutions and applications. This book contains latest information about all these aspects in form of the refereed papers of the II th International Conference on Aluminium Alloys "ICAA", where world-wide experts from academia and engineers from industry present latest results and new ideas in fundamental as well as applied research. Since 22 years the ICAA series provides scientists and engineers with a complete overview over the latest scientific and technological developments, featuring profound technology-based overviews and new innovative perspectives. This book is a reference for the scientific community as well as for the aluminium industry working on aluminium alloy development, processing and application issues. It gives a global perspective on the current focus of international research with emphasis on in-depth understanding of the specific properties and applications of conventional and advanced aluminium alloys.

Metals Engineering Quarterly - 1964

Structure and Properties of Engineering Materials - Daniel Henkel 2001

Henkel & Pense, STRUCTURE & PROPERTIES OF ENGINEERING MATERIALS 5/e provides an updated look at various engineering materials, including metals, metal alloys, polymers, ceramics and composites. Best suited for a second-level materials course, or a first course focusing on structures & properties, the new edition outlines and describes how structural aspects of materials determine their use in engineering. Numerous photomicrographs, and other illustrations, are used to show the structural characteristics of various materials. Charts and tables are included throughout, and provide a good resource for materials selection referencing. Chapter problems and references have been revised and updated, and a Book Web Site is available for students and professors. Instructor's will also have access to password protected problem solutions.

The Structures of Alloys of Iron - W. Hume-Rothery 2016-01-26

The Structures of Alloys of Iron: An Elementary Introduction provides an elementary review of some of the factors affecting the structures of alloys of iron, with examples illustrating points of interest. In view of the existence of books dealing with the technology and properties of iron alloys it was decided that the present book should be concerned only with the structures, and not with the properties of the alloys. In connection with steels it was thought best, in the space available, to deal only with those based on iron-carbon alloys. The book begins with chapters on the metal iron, the crystal structures of iron, the diffusion of iron and its alloys, and the intermetallic chemistry of iron. Subsequent chapters deal with the structure of steels, plain carbon steels, the structure of alloy steels, and cast irons. This book is intended for those wanting to make a general survey of the subject before undertaking a detailed study. The reader must understand clearly that much further work will be necessary before he can hope to understand properly even one class of the alloys of industry .

Elements of Metallurgy and Engineering Alloys - Flake C. Campbell 2008

This practical reference provides thorough and systematic coverage on both basic metallurgy and the practical engineering aspects of metallic material selection and application.

Aluminum Alloys - L. F. Mondolfo 2013-09-24

Aluminum Alloys: Structure and Properties is a reference book that provides a concise description of the practical aspects of structures and properties of aluminum alloys. The book first covers the traits of pure and commercial aluminum, which include the composition, physical and thermal properties, and radiation. Next, the text covers the various classifications of aluminum alloys, such as binary, ternary, and commercial alloys. The text will be of great use to metallurgical engineers, inorganic chemists, and other researchers and practitioners who deal with aluminum and its alloys.

Neutrons and Synchrotron Radiation in Engineering Materials Science - Peter Staron 2017-06-19

Retaining its proven concept, the second edition of this ready reference specifically addresses the need of materials engineers for reliable, detailed information on modern material characterization methods. As such, it provides a systematic overview of the increasingly important field of characterization of engineering materials with the help of neutrons and synchrotron radiation. The first part introduces readers to the fundamentals of structure-property relationships in materials and the radiation sources suitable for materials characterization. The second part then focuses on such characterization techniques as diffraction and scattering methods, as well as direct imaging and tomography. The third part presents new and emerging methods of materials characterization in the field of 3D characterization techniques like three-dimensional X-ray diffraction microscopy. The fourth and final part is a collection of examples that demonstrate the application of the methods introduced in the first parts to problems in materials science. With thoroughly revised and updated chapters and now containing about 20% new material, this is the must-have, in-depth resource on this highly relevant topic.

Introduction to Aerospace Materials - Adrian P Mouritz 2012-05-23

The structural materials used in airframe and propulsion systems influence the cost, performance and safety of aircraft, and an understanding of the wide range of materials used and the issues surrounding them is essential for the student of aerospace engineering. Introduction to aerospace materials reviews the main structural and engine materials used in aircraft, helicopters and spacecraft in terms of their production, properties, performance and applications. The first three chapters of the book introduce the

reader to the range of aerospace materials, focusing on recent developments and requirements. Following these introductory chapters, the book moves on to discuss the properties and production of metals for aerospace structures, including chapters covering strengthening of metal alloys, mechanical testing, and casting, processing and machining of aerospace metals. The next ten chapters look in depth at individual metals including aluminium, titanium, magnesium, steel and superalloys, as well as the properties and processing of polymers, composites and wood. Chapters on performance issues such as fracture, fatigue and corrosion precede a chapter focusing on inspection and structural health monitoring of aerospace materials. Disposal/recycling and materials selection are covered in the final two chapters. With its comprehensive coverage of the main issues surrounding structural aerospace materials, Introduction to aerospace materials is essential reading for undergraduate students studying aerospace and aeronautical engineering. It will also be a valuable resource for postgraduate students and practising aerospace engineers. Reviews the main structural and engine materials used in aircraft, helicopters and space craft in terms of their properties, performance and applications Introduces the reader to the range of aerospace materials, focusing on recent developments and requirements, and discusses the properties and production of metals for aerospace structures Chapters look in depth at individual metals including aluminium, titanium, magnesium, steel and superalloys

Nanostructured Metals and Alloys - S H Whang 2011-03-22

Tensile strength, fatigue strength and ductility are important properties of nanostructured metallic materials, which make them suitable for use in applications where strength or strength-to-weight ratios are important. Nanostructured metals and alloys reviews the latest technologies used for production of these materials, as well as recent advances in research into their structure and mechanical properties. One of the most important issues facing nanostructured metals and alloys is how to produce them. Part one describes the different methods used to process bulk nanostructured metals and alloys, including chapters on severe plastic deformation, mechanical alloying and electrodeposition among others. Part two concentrates on the microstructure and properties of nanostructured metals, with chapters studying deformation structures such as twins, microstructure of ferrous alloys by equal channel angular processing, and characteristic structures of nanostructured metals prepared by plastic deformation. In part three, the mechanical properties of nanostructured metals and alloys are discussed, with chapters on such topics as strengthening mechanisms, nanostructured metals based on molecular dynamics computer simulations, and surface deformation. Part four focuses on existing and developing applications of nanostructured metals and alloys, covering topics such as nanostructured steel for automotives, steel sheet and nanostructured coatings by spraying. With its distinguished editor and international team of contributors, Nanostructured metals and alloys is a standard reference for manufacturers of metal components, as well as those with an academic research interest in metals and materials with enhanced properties.

Metallurgy and Design of Alloys with Hierarchical Microstructures - Krishnan K. Sankaran 2017-06-14

Metallurgy and Design of Alloys with Hierarchical Microstructures covers the fundamentals of processing-microstructure-property relationships and how multiple properties are balanced and optimized in materials with hierarchical microstructures widely used in critical applications. The discussion is based principally on metallic materials used in aircraft structures; however, because they have sufficiently diverse microstructures, the underlying principles can easily be extended to other materials systems. With the increasing microstructural complexity of structural materials, it is important for students, academic researchers and practicing engineers to possess the knowledge of how materials are optimized and how they will behave in service. The book integrates aspects of computational materials science, physical metallurgy, alloy design, process design, and structure-properties relationships, in a manner not done before. It fills a knowledge gap in the interrelationships of multiple microstructural and deformation mechanisms by applying the concepts and tools of designing microstructures for achieving combinations of engineering properties—such as strength, corrosion resistance, durability and damage tolerance in multi-component materials—used for critical structural applications. Discusses the science behind the properties and performance of advanced metallic materials Provides for the efficient design of materials and processes to satisfy targeted performance in materials and structures Enables the selection and development of new alloys for specific applications based upon evaluation of their microstructure as illustrated in this work

Advanced Multicomponent Alloys - Zengbao Jiao 2022-10-18

This book integrates aspects of computational materials science, physical metallurgy, alloy design, structure-properties relationships, and applications of advanced multicomponent alloys. It can serve as a textbook for courses on advanced structural and functional materials for undergraduate and graduate students. Notably, the book compiles cutting-edge research on the progress of materials science of multicomponent alloys from fundamentals to engineering applications. It can be of considerable interest for researchers and scientists in the field of materials science and engineering, mechanical engineering, and metallurgy engineering. In addition, this book not only summarizes the compositions, properties, and applications of various types of multicomponent alloys but also presents a complete idea on the efficient design of materials and processes to satisfy targeted performance in materials and structures. Thus, it can also be used as a reference book for engineers and researchers in industries.

Magnesium and Its Alloys - Leszek A. Dobrzanski 2019-08-01

Magnesium and Its Alloys: Technology and Applications covers a wide scope of topics related to magnesium science and engineering, from manufacturing and production to finishing and applications. This handbook contains thirteen chapters, each contributed by experts in their respective fields, and presents a broad spectrum of new information on pure magnesium, magnesium alloys, and magnesium matrix MgMCs composites. It covers such topics as computational thermodynamics, modern Mg-alloys with enhanced creep or fatigue properties, cutting-edge approaches to melt treating (grain refinement, micro-alloying, and the resulting solidification and growth), coatings, surface engineering, environmental protection (recycling and green energy storage and production), as well as biomedical applications. Aimed at researchers, professionals, and graduate students, the book conveys comprehensive and cutting-edge knowledge on magnesium alloys. It is especially useful to those in the fields of materials engineering, mechanical engineering, manufacturing engineering, and metallurgy.

Understanding Materials Science - Rolf E. Hummel 2006-05-11

This introduction for engineers examines not only the physical properties of materials, but also their history, uses, development, and some of the implications of resource depletion and materials substitutions.

Encyclopedia of Aluminum and Its Alloys, Two-Volume Set (Print) - George E. Totten 2018-12-07

This encyclopedia, written by authoritative experts under the guidance of an international panel of key researchers from academia, national laboratories, and industry, is a comprehensive reference covering all major aspects of metallurgical science and engineering of aluminum and its alloys. Topics covered include extractive metallurgy, powder metallurgy (including processing), physical metallurgy, production engineering, corrosion engineering, thermal processing (processes such as metalworking and welding, heat treatment, rolling, casting, hot and cold forming), surface engineering and structure such as crystallography and metallography.

Engineering Properties and Applications of Lead Alloys - Sivaraman Guruswamy 1999-11-09

Focusing on the uses of lead in pure or alloy form for engineering applications, this text presents data on the physical, mechanical, corrosive, acoustic, damping and nuclear properties of lead and lead alloys. It organizes information according to alloy type in tables, graphs and text, and examines the processing of commercially available lead products, including casting, rolling, extrusion, machining, welding and mechanical joining techniques.

Modern Physical Metallurgy - R. E. Smallman 2016-06-24

Modern Physical Metallurgy, Fourth Edition discusses the fundamentals and applications of physical metallurgy. The book is comprised of 15 chapters that cover the experimental background of a metallurgical phenomenon. The text first talks about the structure of atoms and crystals, and then proceeds to dealing with the physical examination of metals and alloys. The third chapter tackles the phase diagrams and solidifications, while the fourth chapter covers the thermodynamics of crystals. Next, the book discusses the structure of alloys. The next four chapters deal with the deformations and defects of crystals, metals, and alloys. Chapter 10 discusses work hardening and annealing, while Chapters 11 and 12 cover phase transformations. The succeeding two chapters talk about creep, fatigue, and fracture, while the last chapter covers oxidation and corrosion. The text will be of great use to undergraduate students of materials engineering and other degrees that deal with metallurgical properties.

Innovations in Everyday Engineering Materials - T. DebRoy 2021-01-04

This book provides an invaluable reference of materials engineering written for a broad audience in an engaging, effective way. Several stories explain how perseverance and organized research helps to discover new processes for making important materials and how new materials with unmatched properties are theoretically conceived, tested in the laboratory, mass produced and deployed for the benefit of all. This book provides a welcome introduction to how advances are made in the world of materials that sustain and define our contemporary standard of living. Suitable for trained materials scientists and the educated layman with an appreciation of engineering, the book will be especially appealing to the young materials engineer, for whom it will serve as a long-term reference due to its clear and rigorous illustration of the field's essential features.

Structure and Properties of Engineering Materials - Robert Maynard Brick 1977

Aluminum Alloys--Contemporary Research and Applications - A. K. Vasudevan 2012-12-02

This book discusses the structure and properties of the current and potential aluminum alloys in terms of their structure (and structural transformations by new processing methods) and the relationship between structure and mechanical and other properties. The alternative materials that challenge aluminum are considered as well, since the challenge of new competitive materials is a strong influence on innovation. The book bridges the gap between current scientific understanding and engineering practice. It is an up-to-date reference that will be of use to researchers and advanced students in metallurgy and materials engineering.

Titanium and Titanium Alloys - Christoph Leyens 2006-03-06

This handbook is an excellent reference for materials scientists and engineers needing to gain more knowledge about these engineering materials. Following introductory chapters on the fundamental materials properties of titanium, readers will find comprehensive descriptions of the development, processing and properties of modern titanium alloys. There then follows detailed discussion of the applications of titanium and its alloys in aerospace, medicine, energy and automotive technology.

Materials for Engineering - J Martin 2006-04-28

This third edition of what has become a modern classic presents a lively overview of Materials Science which is ideal for students of Structural Engineering. It contains chapters on the structure of engineering materials, the determination of mechanical properties, metals and alloys, glasses and ceramics, organic polymeric materials and composite materials. It contains a section with thought-provoking questions as well as a series of useful appendices. Tabulated data in the body of the text, and the appendices, have been selected to increase the value of Materials for engineering as a permanent source of reference to readers throughout their professional lives. The second edition was awarded Choice's Outstanding Academic Title award in 2003. This third edition includes new information on emerging topics and updated reading lists.

Unit Manufacturing Processes - National Research Council 1995-01-03

Manufacturing, reduced to its simplest form, involves the sequencing of product forms through a number of different processes. Each individual step, known as an unit manufacturing process, can be viewed as the fundamental building block of a nation's manufacturing capability. A committee of the National Research Council has prepared a report to help define national priorities for research in unit processes. It contains an organizing framework for unit process families, criteria for determining the criticality of a process or manufacturing technology, examples of research opportunities, and a prioritized list of enabling technologies that can lead to the manufacture of products of superior quality at competitive costs. The study was performed under the sponsorship of the National Science Foundation and the Defense

Department's Manufacturing Technology Program.

Structure and Properties of Engineering Materials - Bryan Harris 1977

Heusler Alloys - Claudia Felser 2015-11-12

This book gives an overview of the physics of Heusler compounds ranging from fundamental properties of these alloys to their applications. Especially Heusler compounds as half-metallic ferromagnetic and topological insulators are important in condensed matter science due to their potential in magnetism and as materials for energy conversion. The book is written by world-leaders in this field. It offers an ideal reference to researchers at any level.

Heusler Alloys - Julia Coleman 2017

Rapidly Solidified Alloys - Liebermann 1993-05-20

This volume details the principles underlying rapid solidification processing, material structure and properties, and their applications. This practical resource presents a manifold approach to both amorphous and crystalline rapidly solidified metallic alloys.;Written by over 30 internationally acclaimed specialists in their respective fields, Rapidly Solidified Alloys: surveys nucleation and growth studies in undercooled melts; examines various processes for the production of rapidly solidified alloys; discusses the compaction of amorphous alloys; describes surface remelting treatments for the rapid solidification of surface layers and the resultant improved workpiece properties; covers the closely related topics of structural relaxation, atomic transport and other thermally induced processes; demonstrates microstructure-property relationships in rapidly quenched crystalline alloy systems and their beneficial effects in applications; and elucidates the basic, engineering, and applications-oriented magnetic properties of amorphous alloys.;Furnishing more than 2300 literature citations for further study of specific subjects, Rapidly Solidified Alloys is intended for materials, mechanical, product, and civil engineers; metallurgists; magneticians; physicists; physical chemists; and graduate students in these disciplines.

Engineering Materials 2 - Michael F. Ashby 2014-06-28

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.

Copper and Copper Alloys - Joseph R. Davis 2001-01-01

This handbook is a comprehensive guide to the selection and applications of copper and copper alloys, which constitute one of the largest and most diverse families of engineering materials. The handbook includes all of the essential information contained in the ASM Handbook series, as well as important reference information and data from a wide variety of ASM publications and industry sources.

Semiconductor Alloys - An-Ben Chen 1995-11-30

In the first comprehensive treatment of these technologically important materials, the authors provide theories linking the properties of semiconductor alloys to their constituent compounds. Topics include crystal structures, bonding, elastic properties, phase diagrams, band structures, transport, ab-initio theories, and semi-empirical theories. Each chapter includes extensive tables and figures as well as problem sets.