
The growth and development witnessed, today in modern science, engineering, and technology owes a heavy debt to the rare, refractory, and reactive metals group, of which niobium is a member. Extractive Metallurgy of Niobium presents a vivid account of the metal through its comprehensive discussions of properties and applications, resources and resource processing, chemical processing and compound preparation, metal extraction, and refining and consolidation. Typical flow sheets adopted in some leading niobium-producing countries for the beneficiation of various niobium sources are presented, and various chemical processes for producing pure forms of niobium intermediates such as chloride, fluoride, and oxide are discussed. The book also explains how to liberate the metal from its intermediates and describes the physico-chemical principles involved. It is an excellent reference for chemical metallurgists, hydrometallurgists, extraction and process metallurgists, and minerals processors. It is also valuable to a wide variety of scientists, engineers, technologists, and students interested in the topic. This popular introduction to engineering materials features completely rewritten chapters on non-metallic materials that reflect the significant advances in the field of ceramics and composite materials since the last edition and the increased industrial use of polymers. The sections devoted to metals and alloys have also been comprehensively updated and the examination of materials and process selection has been expanded. This practical reference provides thorough and systematic coverage on both basic metallurgy and the practical engineering aspects of metallic material selection and application. The Maritime Engineering Reference Book is a one-stop source for engineers involved in marine engineering and naval architecture. This book provides an overview of the marine industry and discusses the major topics covered in marine engineering. The book covers topics such as ship design, construction, and operation, with a focus on the latest technologies and best practices in the maritime industry. It is an excellent resource for students and professionals in the field of marine engineering. The book is comprehensive and includes information on ship design, construction, and operation, with a focus on the latest technologies and best practices in the maritime industry. It is an excellent resource for students and professionals in the field of marine engineering.
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 deformation 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. The latest ideas in machine analysis and design have led to a major revision of the field's leading handbook. The book covers ergonomics, safety, and computer-aided design, with revised information on numerical methods, belt drives, statistics, standards, and codes and regulations. Key features include: *new material on ergonomics, safety, and computer-aided design; *practical reference data that helps machine designers solve common problems— with a minimum of theory. The current CAS/CAM applications, other machine computational aids, and robotics applications in machine design. This definitive machine design handbook for product designers, project engineers, design engineers, and manufacturing engineers covers every aspect of machine construction and operations. Voluminous and heavily illustrated, it discusses standards, codes and regulations; wear; solid materials, seals; flywheels; power screws; threaded fasteners; springs; lubrication; gaskets; coupling; belt drive; gears; shafting; vibration and control; linkage; and many other aspects. Specific emphasis is given to the applications of CAD/CAM in manufacturing processes. This book is an ideal tool for easy-learning about steels, their properties, specifications, heat treatment and applications. The book is conceptually divided into four parts: The first part provides comprehensive coverage of the basic metallurgical facts about steel and its characteristics, covers the most important aspects of steel metallurgy, its applications, and fundamental features of steelmaking and rolling processes, and highlights the different types of properties of steel and the need for testing and evaluation: Discussing the classifications, specifications and properties of steels in a more quantitative manner (based on popular standards and standard-based data), the second part focuses on different steel grades and their merits and properties for selection and applications. The third part focuses on heat treatment and welding of steels, various heat treatment methods and their purposes, and basic aspects of welding and welding precautions in steels. Dwelling on the application of steels, the fourth part discusses the totality of steel applications from the point of view of reliability and component integrity, the importance of cost and quality optimization in applications, and the criticality of design and manufacturing quality for prevention of failures. Steel Metallurgy has been designed to provide all necessary information and practice-based knowledge about steel characteristics, steel properties, steel grades, and steel applications for selecting, processing and using steels with right understanding and for the right purposes. The book is intended for both students and practitioners. The book will help students of metallurgy and other engineering disciplines to understand the applied and functional-basics of steels relating to their properties, specifications and applications. Engineers and technical personnel in industries dealing with steel processing and its uses will benefit from the book. The book takes the precise selection of steel for the right purposes by providing workable knowledge on steel metallurgy and steel specifications. The book is a comprehensive work that is required reading for all those involved in the selection of steel. It is written in a way that makes it easy to understand, the book provides a result of a research carried on those properties emerge during steelmaking. Fundamentals of metallurgy summarises this research and its implications for manufacturers. The first part of the book reviews the effects of processing on the properties of metals with a range of chapters on such phenomena as phase transformations, types of kinetic reaction, transport and interfacial phenomena. Authors discuss how these processes and the resulting properties of metals can be modelled and predicted. Part two discusses the implications of this research for improving steelmaking and steel properties. With its distinguished editor and international team of contributors, Fundamentals of metallurgy is an invaluable reference for steelmakers and manufacturers requiring high-performance steels in such areas as automotive and aerospace engineering. It will also be useful for those dealing with non-ferrous metals and alloys, material designers for functional materials, environmentalists and above all, high technology industries designing processes towards materials with tailored properties. Summarises key research and its implications for manufacturers Essential reading for steelmakers and manufacturers Written by leading experts from both industry and academia. Problems in Metallurgical Thermodynamics and Kinetics provides an illustration of the calculations encountered in the study of metallurgical thermodynamics and kinetics, focusing on theoretical metallurgical issues and practical applications. The chapters of this book provide comprehensive account of the theories, including basic and applied numerical examples with solutions. Unsolved numerical examples drawn from a wide range of metallurgical processes are also provided at the end of each chapter. The topics discussed include the three laws of thermodynamics; Clausius-Clapeyron equation; fugacity, activity, and equilibrium constant; thermodynamics of electrochemical cells; and kinetics. This book is beneficial to undergraduate and postgraduate students in universities, polytechnics, and technical colleges. A comprehensive yet accessible introduction to materials engineering which provides a straightforward, readable approach to the subject. The sixth edition includes a new chapter on the selection of materials, an updated discussion of new materials, and a complete glossary of key terms used in materials engineering. This renowned text has provided many thousands of students with an easily accessible introduction to the wide ranging subject area of materials engineering and manufacturing processes for over forty years. It avoids the excessive jargon and mathematical complexity so often found in textbooks for this subject, retaining the practical down-to-earth approach for which the book is noted. The increased emphasis on the selection of materials reflects the increased emphasis on this aspect of materials engineering now seen within current vocational and university courses. In addition to meeting the requirements of vocational and undergraduate engineering 2nd year college students, this text will also provide a valuable reference for professional engineers working in product design who require a quick source of information on materials and manufacturing processes. A couple of years ago a small group of people began discuss the possibility of running an advanced summer school in the area of polymer blends. There had been a number of recent advances in this field, and given the considerable interest in these new polymeric materials, we thought such a meeting would be well received both by industry and academia. We wanted it to contain a wide range of background science and technology and also up to date recent advances in the field. It became clear as the discussion progressed that the experts in the field were scattered over the length and breadth of Europe and North America and thus the cost of bringing them together for a summer school would necessitate high registration fee which would deter many of the research workers we wished to attract. The NATO Advanced Study Institute program makes it tenable for further research on topics of which the subject to be covered in depth and by giving generous funds to cover lecturers' travel and accommodation.
costs ensures that a wide spectrum of research workers can attend. We decided to apply to NATO and this book contains the results of our request. The ASI was funded under the 'Double-Jump' Programme which is not a new Olympic event but a way of supporting courses on subjects of direct industrial interest. The Institute was also backed by donations from several companies and approximately half those attending were from industrial organisations. Cast iron offers the design engineer a low-cost, high-strength material that can be easily cast into a wide variety of useful, and sometimes complex, shapes. This handbook from ASM covers the entire spectrum of one of the most widely used and versatile of all metals. Thoroughly revised and updated, this third edition of lan Polmear's Light Alloys provides the definitive overview of the metallurgy of aluminum, magnesium and titanium alloys. The emphasis remains on manufacturing processes and application areas, in which there have been significant advances in recent years. The extraction of each metal is considered briefly, followed by its casting characteristics and alloying behavior. Sections on heat treatment properties, fabrication and major applications have been expanded to give more comprehensive coverage of the subjects. Particular attention has been paid to microstructure/property relationships as well as to the role of the individual alloying elements, and new materials and novel processes are reviewed in an additional chapter. This succinct and informative introduction to the physical metallurgy of the light alloys will be essential reading for advanced undergraduates in metallurgy, materials science, manufacturing and mechanical engineering. It will also prove invaluable to metallurgists and engineers in industry seeking to expand on their knowledge. Other Titles of Interest Steels: Microstructure and Properties Second Edition R W K Honeycombe and H K D H Bhadeshia ISBN 0340589469 Properties of Engineering Materials Second Edition R A Higgins ISBN 0 340 60033 0 Engineering Metallurgy: Applied Physical Metallurgy Sixth Edition R H Higgins ISBN 0 340 56830 5For first courses in metallurgy and materials science. Here is a straightforward, clearly-written introduction whose three-part organization makes an understanding of metals-and how they "work"-truly accessible. Text coverage encompasses principles, applications, and testing. The Technology of Metallurgy focuses on providing students with an understanding of the fundamentals of metals, and of what happens when they are cold worked, heat treated, and alloyed. Mathematics is limited to algebra and trigonometry; calculus is used only when necessary for understanding. For courses with a laboratory component, appendices provide background concepts for conducting basic tests; and the accompanying Instructor's Manual contains outlines for laboratory sessions. One of two self-contained volumes belonging to the newly revised Steel Heat Treatment Handbook, Second Edition, this book examines the behavior and processes involved in modern steel heat treatment applications. Steel Heat Treatment: Metallurgy and Technologies presents the principles that form the basis of heat treatment processes while incorporating detailed descriptions of advances emerging since the 1997 publication of the first edition. Revised, updated, and expanded, this book ensures up-to-date and thorough discussions of how specific heat treatment processes and different alloy elements affect the structure and the classification and mechanisms of steel transformation, distortion of properties of steel alloys. The book includes entirely new chapters on heat-treated components, and the treatment of tool steels, stainless steels, and powder metallurgy steel components. Steel Heat Treatment: Metallurgy and Technologies provides a focused resource for everyday use by advanced students and practitioners in metallurgy, process design, heat treatment, and mechanical and materials engineering. This treatise on Engineering Materials and Metallurgy contains comprehensive treatment of the matter in simple, lucid and direct language and envelopes a large number of figures which reinforce the text in the most efficient and effective way. The book comprises five chapters (excluding basic concepts) in all and fully and exhaustively covers the syllabus in the above mentioned subject of 4th Semester Mechanical, Production, Automobile Engineering and 2nd semester Mechanical disciplines of Anna University. This text includes an overview of performance characteristics and standards for many materials. It reviews material properties, and examines modes of deterioration while emphasising preventative techniques and remedial treatment. For many years, various editions of Smallman's Modern Physical Metallurgy have served throughout the world as a standard undergraduate textbook on metals and alloys. In 1995, it was rewritten and enlarged to encompass the related subject of materials science and engineering and appeared under the title Metals & Materials: Science, Processes, Applications offering a comprehensive amount of a much wider range of engineering materials. Coverage ranged from pure elements to superalloys, from glasses to engineering ceramics, and from everyday plastics to in situ composites. Amongst other favourable reviews, Professor Bhadeshia of Cambridge University commented: "Given the amount of work that has obviously gone into this book and its extensive comments, it is very attractively priced. It is an excellent book to be recommend strongly for purchase by undergraduates in materials-related subjects, who should benefit greatly by owning a text containing so much knowledge." The book now includes new chapters on materials for sports equipment (golf, tennis, bicycles, skiing, etc.) and biomaterials (replacement joints, heart valves, tissue repair, etc.) - two of the most exciting and rewarding areas in current materials research and development. As in its predecessor, numerous examples are given of the ways in which knowledge of the relation between fine structure and properties has made it possible to optimise the service behaviour of traditional engineering materials and to develop completely new and exciting classes of materials. Special consideration is given to the crucial processing stage that enables materials to be produced as marketable commodities. Whilst attempting to produce a useful and relatively concise survey of key materials and their interrelationships, the authors have tried to make the subject accessible to a wide range of readers, to provide insights into specialised methods of examination and to convey the excitement of the atmosphere in which new materials are conceived and developed. The completely revised Second Edition of Metallurgy for the Non-Metallurgist provides a solid understanding of the basic principles and current practices of metallurgy. The new edition has been extensively updated with broader coverage of topics, new and improved illustrations, and more explanation of basic concepts. It is a "must-have" ready reference on metallurgy!