Structure And Properties Of Engineering Alloys

Elements of Structures and Defects of Crystalline Materials has been written to cover not only the fundamental principles behind structures and defects, but also to provide deep insights into understanding the relationships of properties, defect chemistry and processing of the concerned materials. Part One deals with structures, while Part Two covers defects. Since the knowledge of the electron configuration of elements is necessary for understanding the nature of chemical bonding, it is discussed in the opening chapter. Chapter Two then describes the bonding formation within the crystal structures of varied materials, with Chapter Three delving into how a material ' s structure is formed. In view of the importance of the effects of the structure distortion on the material properties due to the fields, the related topics have been included in section 3.4. Moreover, several materials still under intensive investigation have been illustrated to provide deep insights into understanding the effects of the relationships of processing, structures and defects on the material properties. The defects of materials are explored in Part II. Chapter 4 deals with the point defects of metal and ceramics. Chapter 5 covers the fundamentals of the characteristics of dislocations, wherein physics and the atomic mechanics of several issues have been described in detail. In view of the significant influence of the morphologies including size, shape and distribution of grains, phases on the microstructure evolution, and, in turn, the properties of materials, the final chapter focuses on the fundamentals of interface energies, including single phase (grain) boundary and interphase boundary. Discusses the relationship between properties, defect chemistry and the processing of materials Presents coverage of the fundamental principles behind structures and defects Includes information on two-dimensional and three-dimensional imperfections in solids
The physical properties of a polymer are strongly dependent on the size or length of the polymer chain. As chain length is increased, melting and boiling temperatures increase quickly. Impact resistance also tends to increase with chain length, as does the viscosity, or resistance to flow, of the polymer in its melted state. In this book, the authors present topical research in the study of the structure, physical properties and industrial uses of polymer chains. Topics discussed include the flexibility of polyheteroarylenes and the effect on several physical properties of these polymers; aliphatic polyester-based nanocomposites; bioplastic-based blends; interactions in small permeants in polymeric matrices; the role of polymer chain ends in plasma surface modification and pre-ceramic polymer chains.
Covers the art and science of concrete, emphasizing structure-property relations. This new edition gives improved coverage of viscoelastic behaviour and covers treatment of thermal shrinkage and stresses, plastic settlement cracks and crazing, and technology of structural lightweight concrete.
Tensors, matrices, symmetry, and structure-property relationships form the main subjects of the book. While tensors and matrices provide the mathematical framework for understanding anistropy, on which the physical and chemical properties of crystals and textured materials often depend, atomistic arguments are also needed to qualify the property coefficients in various directions. The atomistic arguments are partly based on symmetry and party on the basic physics and chemistry of materials.
Structure, Properties, and Materials
Nanocrystalline Materials
Polymer Chains
Nanocellulose: Synthesis, Structure, Properties And Applications
Advanced Polymeric Materials
Elements of Structures and Defects of Crystalline Materials
This book presents the latest findings on mechanical and materials engineering as applied to the design of modern engineering materials and components. The contributions cover the classical fields of mechanical, civil and materials engineering, as well as bioengineering and advanced materials processing and optimization. The materials and structures discussed can be categorized into modern steels, aluminium and titanium alloys, polymers/composite materials, biological and natural materials, material hybrids and modern nano-based materials. Analytical modelling, numerical simulation, state-of-the-art design tools and advanced experimental techniques are applied to characterize the materials' performance and to design and optimize structures in different fields of engineering applications.
MATERIALOGY: Structure & Properties - discusses Bonding and Structure of Materials, Thermal and Mechanical Behaviour of Materials, Electrical and Dielectric Properties of Materials, Magnetic and Optical Properties of Materials. It is a textbook forBTech/MTech(Mechanical /Aeroautical Engineering) and a reference book for manufacturing, metallurgical engineering and materials engineering. It shall serve as a handbook for engineering industrialists and research scientists working with Engineering Materials and Manufacturing Processes.
An Introduction to Materials Engineering and Science forChemical and Materials Engineers provides a solid background inmaterials engineering and science for chemical and materialsengineering students. This book: Organizes topics on two levels; by engineering subject area andby materials class. Incorporates instructional objectives, active-learningprinciples, design-oriented problems, and web-based information andvisualization to provide a unique educational experience for thestudent. Provides a foundation for understanding the structure andproperties of materials such as ceramics/glass, polymers,composites, bio-materials, as well as metals and alloys. Takes an integrated approach to the subject, rather than a"metals first" approach.
Designed for the first year course on Materials Science the book exhaustively covers all the topics taught to students of engineering. The book benefits from an updated treatment of the subject and emphasises on common characteristics of engineering mate.
High Nitrogen Steels
Materialogy
Unit Manufacturing Processes
International Series of Monographs in Solid State Physics
Thermosets
Structure and Properties of Engineering Alloys
Polymeric Foams Structure–Property–Performance: A Design Guide is a response to the design challenges faced by engineers in a growing market with evolving standards, new regulations, and an ever-increasing variety of application types for polymeric foam. Bernard Obi, an author with wide experience in testing, characterizing, and applying polymer foams, approaches this emerging complexity with a practical design methodology that focuses on understanding the relationship between structure–properties of polymeric foams and their performance attributes. The book not only introduces the fundamentals of polymer and foam science and engineering, but also goes more in-depth, covering foam processing, properties, and uses for a variety of applications. By connecting the diverse technologies of polymer science to those from foam science, and by linking both micro- and macrostructure–property relationships to key performance attributes, the book gives engineers the information required to solve pressing design problems involving the use of polymeric foams and to optimize foam performance. With a focus on applications in the automotive and transportation industries, as well as uses of foams in structural composites for lightweight applications, the author provides numerous case studies and design examples of real-life industrial problems from various industries and their solutions. Provides the science and engineering fundamentals relevant for solving polymer foam application problems Offers an exceptionally practical methodology to tackle the increasing complexity of real-world design challenges faced by engineers working with foams Discusses numerous case studies and design examples, with a focus on automotive and transportation Utilizes a practical design methodology focused on understanding the relationship between structure-properties of polymeric foams and their performance attributes
Foods are ingested and become part of our body. This book describes the science and procedure behind the materials in foods that impart their desirable properties. The book can serve as a text in a course in food materials science at the senior or graduate level or as a supplemental text in an advanced food technology course. It cac also serve as a reference book for professionals in the food industry.
Structure and Properties of Additive Manufactured Polymer Components provides a state-of-the-art review from leading experts in the field who discuss key developments that have appeared over the last decade or so regarding the use of additive manufacturing (AM) methods in the production of neat and reinforced polymeric components. A major focus is given to materials science aspects, i.e., how the quality of the polymer preforms, the parameters of the chosen AM method, and how these factors can affect the microstructure and properties of the final product. The book not only covers production technologies and the relationship between processing, microstructure and fundamental properties of the produced parts, but also gives readers ideas on the use of AM polymer parts in medicine, automotive, aerospace, tribology, electronics, and more. Focuses on industrial aspects and applications Dedicated purely to recent advances in polymer composite additive manufacturing Emphasizes processing, structure and property relationships
This book gives a fresh point of view on the curing processes, structure and properties of crosslinked polymers. The general view is that the structure and properties of crosslinked polymers are defined by their density, this book demonstrates that the parameters are defined by the supermolecular (a more precisely, supersegmental structure) of the crosslinked polymers.The quantitative relationships of the structures/properties are obtained for these polymers. Using an epoxy polymer as a nanofiller for a nanocomposite is discussed and a new class of polymer is proposed. The introduction of the nanofiller gives variation in the mechanical properties, degree of crystallinity, gas permeability and so on. The use of these crosslinked polymers as natural nanocomposites is proposed. Practical methods of crosslinked polymer's supersegmental structure regulation are considered, and all the changes that this gives their properties are detailed.This book will be of significance to all material scientists and students of material science.
Properties of Materials
Structure, Physical Properties, and Industrial Uses
Anisotropy, Symmetry, Structure
Structure Property Relationships
Issues and Opportunities in Research

This junior/senior textbook presents fundamental concepts ofstructure property relations and a description of how theseconcpets apply to every metallic element except iron. Part One of the book describes general concepts of crystalstructure, 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 twoperspectives: First it explains how the concepts presented in PartOne define the properties of a particular metallic element and itsalloys. Second is a description of the major engineering uses ofeach metal. This section features sidebar pieces describingparticular physical property oddities, engineering applications andcase studies. An Instructor's Manual presenting detailed solutionsto all the problems in the book is available from the Wileyeditorial department. An Instructor's Manual presenting detailed solutions to all theproblems in the book is available from the Wiley editorialdepartment.
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.
This text offers basic understanding of the electronic structure of covalent and ionic solids, simple metals, transition metals and their compounds; also explains how to calculate dielectric, conducting, bonding properties.
Structure and Properties of Nanoalloys is devoted to the topic of alloy nanoparticles, the bi-or multicomponent metallic nanoparticles that are often called nanoalloys. The interest in nanoalloys stems from the wide spectrum of their possible applications in the fields of catalysis, magnetism, and optics. Nanoalloys are also interesting from a basic science point-of-view due to the complexity of their structures and properties. Nanoalloys are presently a very lively research area, with impressive developments in the last ten years. This book meets the need to systematize the wealth of experimental and computational results generated over the last decade. Provides a well-organized, coherent overall structure, with a tutorial style format ideal for teaching and self-study In-depth and fluent descriptions by a single leading academic Presents a wealth of experimental and computational results generated over the last decade
From Structure-Property Relationships to Engineering
Food Materials Science
Structure and Properties of Nanoalloys
A Design Guide
Structure-Property Relations
Structure and Properties
Civil Engineering Materials: From Theory to Practice presents the state-of-the-art in civil engineering materials, including the fundamental theory of materials needed for civil engineering projects and unique insights from decades of large-scale construction in China. The title includes the latest advances in new materials and techniques for civil engineering, showing the relationship between composition, structure and properties, and covering ultra-high-performance concrete and self-compacting concrete developed in China. This book provides comprehensive coverage of the most commonly used, most advanced materials for use in civil engineering. This volume consists of eight chapters covering the fundamentals of materials, inorganic cementing materials, Portland cement concrete, bricks, blocks and building mortar, metal, wood, asphalt and polymers. Describes the most commonly used civil engineering materials and updates on advanced materials Presents advanced materials and their applications in civil engineering Looks at engineering problems pragmatically from both a materials and civil engineering perspective Gives knowledge and guidance rooted in decades of experience in Chinese civil engineering projects Contextualises knowledge of civil engineering materials in infrastructure construction, including high-speed rail
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.
In this new edition, Thermosets: Structure, Properties, and Applications builds on and updates the existing review of mechanical and thermal properties, as well as rheology and curing processes of thermosets, and the role of nanostructures in thermoset toughening. All chapters have been updated or re-written, and new chapters have been added to reflect ongoing changes and developments in the field of thermosetting materials and the applications of these materials. Applications of thermosets are the focus of the second part of the book, including the use of thermosets in the building and construction industry, aerospace technology and as insulation materials. Thermoset adhesives and coatings, including epoxy resins, acrylates and polyurethanes are also discussed, followed by a review of thermosets for electrical applications. New chapters include coverage of thermoset nanocomposites, recycling issues, and applications such as consumer goods, transportation, energy and defence. With its distinguished editor and international team of expert contributors, the second edition of Thermosets: Structure, Properties, and Applications is an essential guide for engineers, chemists, physicists and polymer scientists involved in the development, production and application of thermosets, as well as providing a useful review for academic researchers in the field. Links structure, properties, and applications, making this book relevant to both academia and engineers in industry Includes entirely new chapters on the use of thermosets in aerospace, transport, defense, and a range of consumer applications Enables practitioners to stay current on the latest developments in recycling of thermosets and their composites
When it was learned that Professor Scholze was revising his classic work on the nature, structure, and properties of glass, it was natural to conceive the idea of translating the new edition into English. Professor Scholze enthusiastically endorsed this suggestion and asked for the concurrence of his publisher, Springer-Verlag. Springer-Verlag welcomed the idea and readily agreed to provide support. With the essential agreements in place, Professor Michael Lakin, Professor of German at Alfred University, was asked to do the transla tion, and I subsequently agreed to work with Professor Lakin to check for technical accuracy. I was happy to accept this task because of my respect for Professor Scholze and because of the value to glass scientists and engineers of having available an English edition of Glas. Professor Scholze died before publication ofthis English edition of his work. However, he had reviewed the entire English text and had approved it. Professor Lakin and I appreciated the confidence he placed in us, and we were gratified with his acceptance of our efforts. His scientific contributions were numerous and important; they will long serve as guideposts for research in many key areas. We hope this translation of Glas will help make his legacy accessible to more people. Professor Lakin and I have tried to provide a translation that is accurate and true to the original but that has a distinctive English "flavor"; that is, it is not just a literal translation.
Mechanical and Materials Engineering of Modern Structure and Component Design
Structure-Property Relations in Nonferrous Metals
Structure, Properties, and Applications
Electronic Structure and the Properties of Solids
Structure, Properties, Manufacture, Applications
Structure and Properties of Engineering Materials
Featuring contributions from experts at some of the world's leading academic and industrial institutions, Advanced Polymeric Materials: Structure Property Relationships brings into book form a wealth of information previously available primarily only within computer programs. In a welcome narrative treatment, it provides comprehensive coverage of polymeric materials, including polymer composites as well as the more commonly addressed polymer blends. Along with discussion on a variety of applications, topics include general aggregate properties, design considerations, characterization and enhancement of physical and mechanical properties, processing and manufacturing, and components failure.
The unique design of this book provides many helpful features for a sound and proven approach to learning about modern materials science and technology. Interesting case studies, applications, and illustrations, with numerous sample problems and activities, have been provided to facilitate the learning process. The book's extensive index and handy tables qualifies it as a useful "ready reference", on the job or elsewhere. You will learn about engineering materials and many associated topics through an integrated approach centering around innovative trends in design and manufacturing that often focus on environmentally friendly processes and products. Special strategies and clear explanations clarify the relationships among the major facets of materials technology.
Basic research and new manufacturing methods have led to high nitrogen steels (HNS), a promising new group of materials for use in advanced applications in mechanical and chemical engineering. The book deals with the atomic structure, constitution, properties, manufacturing and application of martensitic, austenitic, duplex and dualphase steels of superior strength and corrosion resistance. Combining metallurgy and engineering aspects. It gives a detailed overview and presents new results on HNS. The book is intended for scientists as well as technologists, who will find stimulating information.

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.
The Structure of Materials
Structure & Properties
Bonding, Structure, and Structure-Property Relationships
The PROCEEDINGS of the research conference on structure properties of engineering materials, held March 12-13, 1962 at North Cariolina State College, Raleigt, N.C. Conducted by the Achool of Engineering and the College Extension Division of North Carolina State College in cooperation with the U.S.Army Research Office
An Introduction to Materials Engineering and Science for Chemical and Materials Engineers
Engineering Materials 2
Structure and Properties of Inorganic Solids, Volume 7 is a reference book that describes the structure of metals, intermetallics, halides, hydrides, carbides, borides, and other inorganic phases as well as some of their properties. Among the inorganic solids discussed are CsCl, NaCl, ZnS, NiAs, perovskite, spinel, corundum, beta tungsten, and graphite. This volume is comprised of 12 chapters and opens with an overview of crystallography and material properties, followed by a discussion on the structural relationships of elemental solids. The reader is then introduced to the ZnS, NiAs, CsCl, NaCl, graphite, perovskite, spinel, corundum, and beta tungsten type structures. The final chapter offers a brief summary of the structure of various types of inorganic compounds covered in the text. This book is written to meet the needs of teachers of advanced undergraduate and graduate courses and of researchers in the various disciplines that make up the field of materials sciences. It will also be of interest to those with diverse backgrounds such as engineering, chemistry, metallurgy, physics, ceramics, and mineralogy.
Nanocellulose, a unique and promising natural material extracted from native cellulose, has received immense interest for its broad spectrum of applications owing to its remarkable physical properties, special surface chemistry, and excellent biological properties (biocompatibility, biodegradability and low toxicity). In attempts to meet the requirements of humanity's well-being, biomaterials scientists taking advantage of the structure and properties of nanocellulose aim to develop new and formerly non-existing materials with novel and multifunctional properties.This book highlights the importance of nanocellulose and reviews its synthesis, types, structure and properties. Further, it discusses various biofabrication approaches and applications of nanocellulose-based biomaterials in various fields such as the environment, biomedicine, optoelectronics, pharmaceutics, paper, renewable energy and the food industry. Devised to have a broad appeal, this book will be useful to beginners, who will appreciate its comprehensive approach, as well as active researchers, who will find the focus on recent advancements highly valuable.
The current chemical engineering curriculum concentrates on process: the efficient manufacturing in quantity of traditional chemical products such as ammonia and benzene. However, many chemical companies now invent and manufacture specialty products with particular properties such as pharmaceuticals, cosmetics, and electronic coatings, and their employees need to know how to design the products as well as manufacture them. James Wei, a famous chemical engineer, is writing this book to provide theories and case studies in product engineering the design of new, useful products with desired properties. The first section relates historical case studies of successful product invention and development by individuals and companies. The second part of the book describes the toolbox of molecular structure-property relations. A desired product needs to have certain properties (for example, phase transition or thermal properties) and the chemist must find or design a molecular structure with the required properties This section will instruct chemists in the analysis of structure and property information. The third section is concerned with the next stage: product research and design. It will discuss improving the desired product by additives and blending, among other strategies. It will also cover future challenges in product engineering.
Are You Looking for a Unified and Concise Approach to Teaching and Learning the Structure of Materials? Allen and Thomas present information in a manner consistent with the way future scientists and engineers will be required to think about materials' selection, design, and use. Students will learn the fundamentals of three different states of condensed matter-glasses, crystals, and liquid crystals-and develop a set of tools for describing all of them. Above all, they'll gain a better understanding of the principles of structure common to all materials. Key concepts, such as symmetry theory, are introduced and applied to provide a common viewpoint for describing structures of ceramic, metallic, and polymeric materials. Structure-sensitive properties of real materials are introduced. The text also includes a variety of worked example problems. Other texts available in the MIT Series: Thermodynamics of Materials, Vol I, Ragone, 30885-4 Thermodynamics of Materials, Vol II: Kinetics, Ragone, 30886-2 Physical Ceramics: Principles for Ceramics Science and Engineering, Chiang, Birnie, Kingery, 59873-9 Electronic Properties of Engineering Materials, Livingston, 31627-X
Concrete
Nature, Structure, and Properties
Civil Engineering Materials
Principles and Practice
From Theory to Practice
Materials Engineering
An easy-to-read textbook linking together bond strength and the arrangement of atoms in space with the properties that they control.
The book is intended to reveal the correlation between the chemical structure and the physical characteristics of plastics necessary for appropriate material selection, design, and processing. The entire spectrum of plastics is addressed, including thermoplastics, thermosets, elastomers, and blends. One of the special features is the extensive discussion and explanation of the interdependence between polymer structure and properties and processing. Polymeric Materials contains several application-oriented examples and is presented at an intermediate level for both practicing plastic engineers and advanced engineering students. Contents: · General Characteristics of Polymeric Materials · Molecular Structure and Synthesis of Polymers · Structure of Polymeric Materials · Thermomechanical Properties · Mechanical Behaviour · Aging and Stabilization · Overview of Selected Polymeric Materials · Guide Values of the Physical Properties
The knowledge about crystal structure and its correlation with physical properties is the prerequisite for designing new materials with taylored properties. This work provides for researchers and graduates a valuable resource on various techniques for crystal structure determinations. By discussing a broad range of different materials and tools the authors enable the understanding of why a material might be suitable for a particular application.
Structure and Properties of Engineering AlloysMcGraw-Hill Science, Engineering & Mathematics
Polymeric Foams Structure-Property-Performance
Molecular Structure and Properties
Polymeric Materials
Structure and Properties of Additive Manufactured Polymer Components
Glass
Structure, Properties, Applications
A junior-senior level text and reference for use by materials engineers and mechanical engineers in courses entitled advanced physical metallurgy.
It has become increasingly evident that there is much to begained from a detailed understanding of the structure and properties of polymers in the oriented state. This book reftects the growth of interest in this area of polymer scienceand attempts to give the reader an up to date viewofthe present position. The individual chapters are for the most part self contained, and cover a very wide range of topics. It is intended that each of them should serve the dual purpose of an expository introduction to the subject and a topical review of recent research. It is inevitable that there will be differences of style and approach in the contributions from the different authors. No aternpt has been made to moderate these differences, as they serve to illustrate the diversity of approaches required to give the reader a balanced view of the subject. I should like to thank the contributors for their endeavours, and especially for their patience in accepting modifications and corrections which make for consistency in the book as a whole. 1 am particularly indebted to Professor Leslie Holliday who originally approached me with the proposition that such a book would be a worthwhile venture and to the publishers who have given me every assistance in making its progress as painless as possible.
As a boy I loved to build model airplanes, not the snap-together plastic models of today, but the old-fashioned Spads and Sopwith Camels made of balsa wood and tissue paper. I dreamed of EDDIE RICKENBACKER and dogfights with the Red Baron as I sat there sniffing airplane glue. Mother thought I would never grow up to make an honest living, and mothers are never wrong. Thirty years later I sit in a research laboratory surrounded by crystal models and dream of what it would be like to be 1 A tall, to rearrange atoms with pick and shovel, and make funny things happen inside. Professor VON HIPPEL calls it "Molecular Engineering," the building of materials and devices to order: We begin to design materials with prescribed properties, to under stand the molecular causes of their failings, to build into them safe guards against such failure, and to arrive at true yardsticks of ultimate performance. No longer shackled to presently available materials, we are free to dream and find answers to unprecedented challenges. It is this revolutionary situation which makes scientists and engineers true allies in a great adventure of the human mind [1]. This book is about structure-property relationships, more especially applications of crystal chemistry to engineering problems. Faced with the task of finding new materials, the crystallographer uses ionic radii, crystal fields, anisotropic atomic groupings, and symmetry arguments as criteria in the materials selection process.
Cellular solids include engineering honeycombs and foams (which can now be made from polymers, metals, ceramics, and composites) as well as natural materials, such as wood, cork, and cancellous bone. This new edition of a classic work details current understanding of the structure and mechanical behavior of cellular materials, and the ways in which they can be exploited in engineering design. Gibson and Ashby have brought the book completely up to date, including new work on processing of metallic and ceramic foams and on the mechanical, electrical and acoustic properties of cellular solids. Data for commercially available foams are presented on material property charts; two new case studies show how the charts are used for selection of foams in engineering design. Over 150 references appearing in the literature since the publication of the first edition are cited. It will be of interest to graduate students and researchers in materials science and engineering.
Concise Encyclopedia of the Structure of Materials
Structures, Processing, Properties & Selection
Crystallography in Materials Science
The Physics of the Chemical Bond
Structure and Properties of Crosslinked Polymers
Cellular Solids
*Nanocrystalline materials with new functionalities show great promise for use in industrial applications - such as reinforcing fillers in novel polymer composites - and substantial progress has been made in the past decade in their synthesis and processing. However, there are several issues that need to be addressed to develop these materials further. Among these, exploration of novel methods for the large-scale synthesis of low cost self-assembled nanostructures is a challenging research topic. Accordingly, there has emerged a demand to study their synthesis-structure-property relationships in order to understand the fundamental concepts underlying the observed physical and mechanical properties. With contributions from leading experts, this book describes the fundamental theories and concepts that illustrate the complexity of the problem in developing novel nanocrystalline materials. It reviews the most up-to-date progress in the synthesis, microstructural characterization, physical and mechanical behavior, and application of nanomaterials. * Investigates the synthesis, characterisation and properties of a huge variety of nanocrystalline materials, and their applications in industry * Keeps the prominent challenges in nanomaterials fabrication at the forefront while offering the most up-to-date scientific findings*
*This Concise Encyclopedia draws its material from the award-winning Encyclopedia of Materials: Science and Technology, and includes updates and revisions not available in the original set. This customized collection of articles provides a handy reference for materials scientists and engineers with an interest in the structure of metals, polymers, ceramics and glasses, biomaterials, wood, paper, and liquid crystals. Materials science and engineering is concerned with the relationship between the properties and structure of materials. In this context "structure" may be defined on the atomic scale in the case of crystalline materials, on the molecular scale (in the case of polymers, for example), or on the microscopic scale. Each of these definitions has been applied in making the present selection of articles. * Brings together articles from the Encyclopedia of Materials: Science & Technology that focus on the structure of materials at the atomic, molecular and microscopic levels, plus recent updates * Every article has been commissioned and written by an internationally recognized expert and provides a concise overview of a particular aspect of the field * Extensive bibliographies, cross-referencing and indexes guide the user to the most relevant reading in the primary literature*
An Introduction to Microstructures, Processing and Design
Product Engineering
Structure and Properties of Inorganic Solids
Engineering Materials Technology
Their Synthesis-Structure-Property Relationships and Applications
Structure and Properties of Oriented Polymers