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KEY=MATERIALS - ROMAN HOWARD

An Introduction to Materials Engineering and Science for Chemical and Materials Engineers

John Wiley & Sons **An Introduction to Materials Engineering and Science for Chemical and Materials Engineers provides a solid background in materials engineering and science for chemical and materials engineering students. This book: Organizes topics on two levels; by engineering subject area and by materials class. Incorporates instructional objectives, active-learning principles, design-oriented problems, and web-based information and visualization to provide a unique educational experience for the student. Provides a foundation for understanding the structure and properties 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.**

Food Materials Science and Engineering

John Wiley & Sons **Food Materials Science and Engineering covers a comprehensive range of topics in relation to food materials, their properties and characterisation techniques, thus offering a new approach to understanding food production and quality control. The opening chapter will define the scope and application of food materials science, explaining the relationship between raw material structure and processing and quality in the final product. Subsequent chapters will examine the structure of food materials and how they relate to quality, sensory perception, processing attributes and nutrient delivery. The authors also address applications of nanotechnology to food and packaging science. Methods of manufacturing food systems with improved shelf-life and quality attributes will be highlighted in the book.**

Materials Science and Engineering

An Introduction

Materials Science and Engineering

An Introduction

Wiley Global Education **Materials Science and Engineering: An Introduction** promotes student understanding of the three primary types of materials (metals, ceramics, and polymers) and composites, as well as the relationships that exist between the structural elements of materials and their properties.

Biosurfaces

A Materials Science and Engineering Perspective

John Wiley & Sons **Ideal as a graduate textbook, this title is aimed at helping design effective biomaterials, taking into account the complex interactions that occur at the interface when a synthetic material is inserted into a living system. Surface reactivity, biochemistry, substrates, cleaning, preparation, and coatings are presented, with numerous case studies and applications throughout. Highlights include: Starts with concepts and works up to real-life applications such as implantable devices, medical devices, prosthetics, and drug delivery technology. Addresses surface reactivity, requirements for surface coating, cleaning and preparation techniques, and characterization. Discusses the biological response to coatings. Addresses biomaterial-tissue interaction. Incorporates nanomechanical properties and processing strategies.**

Fundamentals of Materials Science and Engineering: An Integrated Approach, 5th Edition

Wiley Global Education **Fundamentals of Materials Science and Engineering** takes an integrated approach to the sequence of topics - one specific structure, characteristic, or property type is covered in turn for all three basic material types: metals, ceramics, and polymeric materials. This presentation permits the early introduction of non-metals and supports the engineer's role in choosing materials based upon their characteristics. Using clear, concise terminology that is familiar to students, **Fundamentals** presents material at an appropriate level for both student comprehension and instructors who may not have a materials background.

Phase-Field Methods in Materials Science and Engineering

John Wiley & Sons **This comprehensive and self-contained, one-stop source discusses phase-field methodology in a fundamental way, explaining advanced numerical techniques for solving phase-field and related continuum-field models. It also presents numerical techniques used to simulate various phenomena in a detailed, step-by-step way, such that readers can carry out their own code developments. Features many examples of how the methods explained can be used in materials science and engineering applications.**

Callister's Materials Science and Engineering

John Wiley & Sons **Callister's Materials Science and Engineering: An Introduction** promotes student understanding of the three primary types of materials (metals, ceramics, and polymers) and composites, as well as the relationships that exist between the structural elements of materials and their properties. The 10th edition provides new or updated coverage on a number of topics, including: the Materials Paradigm and Materials Selection Charts, 3D printing and additive manufacturing, biomaterials, recycling issues and the Hall effect.

Bioinspired Materials Science and Engineering

John Wiley & Sons **An authoritative introduction to the science and engineering of bioinspired materials** Bioinspired Materials Science and Engineering offers a comprehensive view of the science and engineering of bioinspired materials and includes a discussion of biofabrication approaches and applications of bioinspired materials as they are fed back to nature in the guise of biomaterials. The authors also review some biological compounds and shows how they can be useful in the engineering of bioinspired materials. With contributions from noted experts in the field, this comprehensive resource considers biofabrication, biomacromolecules, and biomaterials. The authors illustrate the bioinspiration process from materials design and conception to application of bioinspired materials. In addition, the text presents the multidisciplinary aspect of the concept, and contains a typical example of how knowledge is acquired from nature, and how in turn this information contributes to biological sciences, with an accent on biomedical applications. This important resource: Offers an introduction to the science and engineering principles for the development of bioinspired materials Includes a summary of recent developments on biotemplated formation of inorganic materials using natural templates Illustrates the fabrication of 3D-tumor invasion models and their potential application in drug assessments Explores electroactive hydrogels based on natural polymers Contains information on turning mechanical properties of protein hydrogels for biomedical applications Written for chemists, biologists, physicists, and engineers, Bioinspired Materials Science and Engineering contains an indispensable resource for an understanding of bioinspired materials science and engineering.

Hydrogen Science and Engineering

Materials, Processes, Systems and Technology, 2 Volume Set

John Wiley & Sons **Authored by 50 top academic, government and industry researchers, this handbook explores mature, evolving technologies for a clean, economically viable alternative to non-renewable energy.** In so doing, it also discusses such broader topics as the environmental impact, education, safety and regulatory developments. The text is all-encompassing, covering a wide range that includes hydrogen as an energy carrier, hydrogen for storage of renewable energy, and incorporating hydrogen technologies into existing technologies.

Computational Methods in Catalysis and Materials Science

An Introduction for Scientists and Engineers

John Wiley & Sons **This practical guide describes the basic computational methodologies for catalysis and materials science at an introductory level, presenting the methods with relevant applications, such as spectroscopic properties, chemical reactivity and transport properties of catalytically interesting materials.** Edited and authored by internationally recognized scientists, the text provides examples that may be considered and followed as state-of-the art.

Callister's Materials Science and Engineering

John Wiley & Sons

Click Chemistry for Biotechnology and Materials Science

John Wiley & Sons **Mimicking natural biochemical processes, click chemistry is a modular approach to organic synthesis, joining together small chemical units quickly, efficiently and predictably.** In contrast to complex traditional synthesis, click reactions offer high selectivity and yields, near-perfect reliability and exceptional tolerance towards a wide range of functional groups and reaction conditions. These 'spring loaded' reactions are achieved by using a high thermodynamic driving force, and are attracting tremendous attention

throughout the chemical community. Originally introduced with the focus on drug discovery, the concept has been successfully applied to materials science, polymer chemistry and biotechnology. The first book to consider this topic, *Click Chemistry for Biotechnology and Materials Science* examines the fundamentals of click chemistry, its application to the precise design and synthesis of macromolecules, and its numerous applications in materials science and biotechnology. The book surveys the current research, discusses emerging trends and future applications, and provides an important nucleation point for research. Edited by one of the top 100 young innovators with the greatest potential to have an impact on technology in the 21st century according to *Technology Review* and with contributions from pioneers in the field, *Click Chemistry for Biotechnology and Materials Science* provides an ideal reference for anyone wanting to learn more about click reactions.

Materials Science of Membranes for Gas and Vapor Separation

John Wiley & Sons **Materials Science of Membranes for Gas and Vapor Separation** is a one-stop reference for the latest advances in membrane-based separation and technology. Put together by an international team of contributors and academia, the book focuses on the advances in both theoretical and experimental materials science and engineering, as well as progress in membrane technology. Special attention is given to comparing polymer and inorganic/organic separation and other emerging applications such as sensors. This book aims to give a balanced treatment of the subject area, allowing the reader an excellent overall perspective of new theoretical results that can be applied to advanced materials, as well as the separation of polymers. The contributions will provide a compact source of relevant and timely information and will be of interest to government, industrial and academic polymer chemists, chemical engineers and materials scientists, as well as an ideal introduction to students.

Biomimetic Principles and Design of Advanced Engineering Materials

John Wiley & Sons This book explores the structure-property-process relationship of biomaterials from engineering and biomedical perspectives, and the potential of bio-inspired materials and their applications. A large variety of natural materials with outstanding physical and mechanical properties have appeared in the course of evolution. From a bio-inspired viewpoint, materials design requires a novel and highly cross disciplinary approach. Considerable benefits can be gained by providing an integrated approach using bio-inspiration with materials science and engineering. The book is divided into three parts; Part One focuses on mechanical aspects, dealing with conventional material properties: strength, toughness, hardness, wear resistance, impact resistance, self-healing, adhesion, and adaptation and morphing. Part Two focuses on functional materials with unique capabilities, such as self-cleaning, stimuli-response, structural color, anti-reflective materials, catalytic materials for clean energy conversion and storage, and other related topics. Part Three describes how to mimic natural materials processes to synthesize materials with low cost, efficient and environmentally friendly approaches. For each chapter, the approach is to describe situations in nature first and then biomimetic materials, fulfilling the need for an interdisciplinary approach which overlaps both engineering and materials science.

Crystal Plasticity Finite Element Methods in Materials Science and Engineering

John Wiley & Sons Written by the leading experts in computational materials science, this handy reference concisely reviews the most important aspects of plasticity modeling: constitutive laws, phase transformations, texture methods, continuum approaches and damage mechanisms. As a result, it provides the knowledge needed to avoid failures in critical systems under mechanical load. With its various application examples to micro- and macrostructure mechanics, this is an invaluable resource for mechanical engineers as well as for researchers wanting to improve on this method and extend its outreach.

Materials Science and Engineering

John Wiley & Sons Building on the success of previous editions, this book continues to provide engineers with a strong understanding of the three primary types of materials and composites, as well as the relationships that exist between the structural elements of materials and their properties. The relationships among processing, structure, properties, and

performance components for steels, glass-ceramics, polymer fibers, and silicon semiconductors are explored throughout the chapters. The discussion of the construction of crystallographic directions in hexagonal unit cells is expanded. At the end of each chapter, engineers will also find revised summaries and new equation summaries to reexamine key concepts.

Advanced Engineering Materials and Modeling

John Wiley & Sons The engineering of materials with advanced features is driving the research towards the design of innovative materials with high performances. New materials often deliver the best solution for structural applications, precisely contributing towards the finest combination of mechanical properties and low weight. The mimicking of nature's principles lead to a new class of structural materials including biomimetic composites, natural hierarchical materials and smart materials. Meanwhile, computational modeling approaches are the valuable tools complementary to experimental techniques and provide significant information at the microscopic level and explain the properties of materials and their very existence. The modeling also provides useful insights to possible strategies to design and fabricate materials with novel and improved properties. The book brings together these two fascinating areas and offers a comprehensive view of cutting-edge research on materials interfaces and technologies the engineering materials. The topics covered in this book are divided into 2 parts: Engineering of Materials, Characterizations & Applications and Computational Modeling of Materials. The chapters include the following: Mechanical and resistance behavior of structural glass beams Nanocrystalline metal carbides - microstructure characterization SMA-reinforced laminated glass panel Sustainable sugarcane bagasse cellulose for papermaking Electrospun scaffolds for cardiac tissue engineering Bio-inspired composites Density functional theory for studying extended systems First principles based approaches for modeling materials Computer aided materials design Computational materials for stochastic electromagnets Computational methods for thermal analysis of heterogeneous materials Modelling of resistive bilayer structures Modeling tunneling of superluminal photons through Brain Microtubules Computer aided surgical workflow modeling Displaced multiwavelets and splitting algorithms

Computational Materials Science

The Simulation of Materials, Microstructures and Properties

Wiley-VCH Modeling and simulation play an ever increasing role in the development and optimization of materials. Computational Materials Science presents the most important approaches in this new interdisciplinary field of materials science and engineering. The reader will learn to assess which numerical method is appropriate for performing simulations at the various microstructural levels and how they can be coupled. This book addresses graduate students and professionals in materials science and engineering as well as materials-oriented physicists and mechanical engineers.

Electronic Materials Science

John Wiley & Sons A thorough introduction to fundamental principles and applications From its beginnings in metallurgy and ceramics, materials science now encompasses such high-tech fields as microelectronics, polymers, biomaterials, and nanotechnology. Electronic Materials Science presents the fundamentals of the subject in a detailed fashion for a multidisciplinary audience. Offering a higher-level treatment than an undergraduate textbook provides, this text benefits students and practitioners not only in electronics and optical materials science, but also in additional cutting-edge fields like polymers and biomaterials. Readers with a basic understanding of physical chemistry or physics will appreciate the text's sophisticated presentation of today's materials science. Instructive derivations of important formulae, usually omitted in an introductory text, are included here. This feature offers a useful glimpse into the foundations of how the discipline understands such topics as defects, phase equilibria, and mechanical properties. Additionally, concepts such as reciprocal space, electron energy band theory, and thermodynamics enter the discussion earlier and in a more robust fashion than in other texts. Electronic Materials Science also features: * An orientation towards industry and academia drawn from the author's experience in both arenas * Information on applications in semiconductors, optoelectronics, photocells, and nanoelectronics * Problem sets and important references throughout * Flexibility for various pedagogical needs Treating the subject with more depth than any other introductory text, Electronic Materials Science prepares graduate and upper-level undergraduate students for advanced topics in the discipline and gives scientists in associated disciplines a clear review of the field and its leading technologies.

Introduction to Diffraction in Materials Science and Engineering

Wiley-Interscience **Fundamentals and practical applications of diffraction for researchers, engineers, and students** Materials science relies heavily on diffraction for the analysis of materials. **Introduction to Diffraction in Materials Science and Engineering** is a survey of the practical aspects of this valuable tool. Though it contains basic discussion of the theory and physics of diffraction, this book emphasizes understanding and the practical application of diffraction in materials science-making it a valuable text and resource for students, professionals, and researchers. Designed as a teaching and self-study text, this resource begins with a treatment of the fundamentals of crystallography and crystal structure and its importance in diffraction before moving on to cover important aspects of diffraction applications. Numerous examples and problems at the end of each chapter, including critical thinking questions, make this an excellent tool for learning and understanding. The book includes treatments of: * Basics of crystallography * Geometrical representation of crystals and reciprocal space * X-rays and neutrons * Structure factors and intensity * Powder diffraction * Qualitative (Powder Diffraction File) and quantitative phase analysis * Use of the International Tables for more complex structures and the Reitveld method * Residual stress * Introductions to texture, small diffracting units, and long-range order Aaron Krawitz provides both a practical introduction to diffraction that suits the needs of students and a resource for professionals already at work in materials science or engineering who want to utilize the power of diffraction in the study of materials.

Materials Science and Engineering

An Introduction: Solutions Manual

Food Materials Science

Principles and Practice

Springer Science & Business Media **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 can also serve as a reference book for professionals in the food industry.**

Materials Science and Engineering

An Introduction

This text has received many accolades for its ability to clearly and concisely convey materials science and engineering concepts at an appropriate level to ensure student understanding.

Fuel Cell Science and Engineering, 2 Volume Set

Materials, Processes, Systems and Technology

John Wiley & Sons Fuel cells are expected to play a major role in the future power supply that will transform to renewable, decentralized and fluctuating primary energies. At the same time the share of electric power will continually increase at the expense of thermal and mechanical energy not just in transportation, but also in households. Hydrogen as a perfect fuel for fuel cells and an outstanding and efficient means of bulk storage for renewable energy will spearhead this development together with fuel cells. Moreover, small fuel cells hold great potential for portable devices such as gadgets and medical applications such as pacemakers. This handbook will explore specific fuel cells within and beyond the mainstream development and focuses on materials and production processes for both SOFC and lowtemperature fuel cells, analytics and diagnostics for fuel cells, modeling and simulation as well as balance of plant design and components. As fuel cells are getting increasingly sophisticated and industrially developed the issues of quality assurance and methodology of development are included in this handbook. The contributions to this book come from an international panel of experts from academia, industry, institutions and government. This handbook is oriented toward people looking for detailed information on specific fuel cell types, their materials, production processes, modeling and analytics. Overview information on the contrary on mainstream fuel cells and applications are provided in the book 'Hydrogen and Fuel Cells', published in 2010.

Materials Science and Engineering, Ninth Edition, SI Version Wiley E-Text Reg Card

Neutrons and Synchrotron Radiation in Engineering Materials Science

From Fundamentals to Material and Component Characterization

Wiley-VCH

Reviews in Computational Chemistry

John Wiley & Sons The Reviews in Computational Chemistry series brings together leading authorities in the field to teach the newcomer and update the expert on topics centered on molecular modeling, such as computer-assisted molecular design (CAMD), quantum chemistry, molecular mechanics and dynamics, and quantitative structure-activity relationships (QSAR). This volume, like those prior to it, features chapters by experts in various fields of computational chemistry. Topics in Volume 29 include: Noncovalent Interactions in Density-Functional Theory Long-Range Inter-Particle Interactions: Insights from Molecular Quantum Electrodynamics (QED) Theory Efficient Transition-State Modeling using Molecular Mechanics Force Fields for the Everyday Chemist Machine Learning in Materials Science: Recent Progress and Emerging Applications Discovering New Materials via a priori Crystal Structure Prediction Introduction to Maximally Localized Wannier Functions Methods for a Rapid and Automated Description of Proteins: Protein Structure, Protein Similarity, and Protein Folding

Materials Science and Engineering

Materials Science and Engineering, 9th Edition provides engineers with a strong understanding of the three primary types of materials and composites, as well as the relationships that exist between the structural elements of materials and their properties. The relationships among processing, structure, properties, and performance components for steels, glass-ceramics, polymer fibers, and silicon semiconductors are explored throughout the chapters.

Materials Science and Engineering

An Introduction 7th Edition with Wiley Plus Set

Kinetic Processes

Crystal Growth, Diffusion, and Phase Transitions in Materials

John Wiley & Sons In this completely revised edition, all the chapters have been updated to reflect the current state of crystal growth kinetics. At the same time, fifteen percent additional content now allows coverage of computer-assisted modeling of second-order phase changes, microstructure development, novel data and images of coarsening mechanisms, with the most significant single addition being breakthrough results on spinodal decomposition -- published here for the first time in book form. The refined didactical approach with a streamlined presentation now allows readers to grasp the kinetic concepts even more easily, coherently introducing the field of kinetic processes, especially those involved in crystal growth, and explaining such phenomena as diffusion, nucleation, segregation and phase transitions at a level accessible to graduate students. In addition to the basic kinetic concepts, the textbook presents modern applications where these processes play a major role, including ion implantation, plasma deposition and rapid thermal processing.

Wide Bandgap Semiconductors for Power Electronics

Materials, Devices, Applications

John Wiley & Sons A guide to the field of wide bandgap semiconductor technology Wide Bandgap Semiconductors for Power Electronics is a comprehensive and authoritative guide to wide bandgap materials silicon carbide, gallium nitride, diamond and gallium(III) oxide. With contributions from an international panel of experts, the book offers detailed coverage to the growth of these materials, their characterization, and how they are used in a variety of power electronics devices such as transistors and diodes and in the areas of quantum information and hybrid electric vehicles. The book is filled with the most recent developments in the burgeoning field of wide bandgap semiconductor technology and includes information from cutting-edge semiconductor companies as well as material from leading universities and research institutions. By taking both scholarly and industrial perspectives, the book is designed to be a useful resource for scientists, academics, and corporate researchers and developers. This important book: Presents a review of wide bandgap materials and recent developments Links the high potential of the wide bandgap semiconductor with the technologic implementation capabilities Offers a unique combination academic and industrial perspectives Meets the demand for a resource that addresses wide bandgap materials in a comprehensive manner Written for materials scientists, semiconductor physicists, electrical engineers, Wide Bandgap Semiconductors for Power Electronics provides a state of the art guide to the technology and application of SiC and related wide bandgap materials.

Kinetic Processes

Crystal Growth, Diffusion, and Phase Transformations in Materials

John Wiley & Sons The formation of solids is governed by kinetic processes, which are closely related to the macroscopic behaviour of the resulting materials. With the main focus on ease of understanding, the author begins with the basic processes at the atomic level to illustrate their connections to material properties. Diffusion processes during crystal growth and phase transformations are examined in detail. Since the underlying mathematics are very complex, approximation methods typically used in practice are the prime choice of approach. Apart from metals and alloys, the book places special emphasis on the growth of thin films and bulk crystals, which are the two main pillars of modern device and semiconductor technology. All the presented phenomena are tied back to the basic thermodynamic properties of the materials and to the underlying physical processes for clarity.

The Far Right Today

John Wiley & Sons The far right is back with a vengeance. After several decades at the political margins, far-right politics has again taken center stage. Three of the world's largest democracies - Brazil, India, and the United States - now have a radical right leader, while far-right parties continue to increase their profile and support within Europe. In this timely book, leading global expert on political extremism Cas Mudde provides a concise overview of the fourth wave of postwar far-right politics, exploring its history, ideology, organization, causes, and consequences, as well as the responses available to civil society, party, and state actors to challenge its ideas and influence. What defines this current far-right renaissance, Mudde argues, is its mainstreaming and normalization within the contemporary political landscape. Challenging orthodox thinking on the relationship between conventional and far-right politics, Mudde offers a complex and insightful picture of one of the key political challenges of our time.

Materials Science and Engineering: An Introduction, 10e WileyPLUS Student Package

Wiley

Generation Left

John Wiley & Sons Increasingly age appears to be the key dividing line in contemporary politics. Young people across the globe are embracing left-wing ideas and supporting figures such as Corbyn and Sanders. Where has this 'Generation Left' come from? How can it change the world? This compelling book by Keir Milburn traces the story of Generation Left. Emerging in the aftermath of the 2008 financial crash, it has now entered the electoral arena and found itself vying for dominance with ageing right-leaning voters and a 'Third Way' political elite unable to accept the new realities. By offering a new concept of political generations, Milburn unveils the ideas, attitudes and direction of Generation Left and explains how the age gap can be bridged by reinventing youth and adulthood. This book is essential reading for anyone, young or old, who is interested in addressing the multiple crises of our time.

Fundamentals of Materials Science and Engineering

An Integrated Approach

Wiley This text is an unbound, binder-ready edition. Callister and Rethwisch's Fundamentals of Materials Science and Engineering 4th Edition continues to take the integrated approach to the organization of topics. That is, one specific structure, characteristic, or property type at a time is discussed for all three basic material types — metals, ceramics, and polymeric materials. This order of presentation allows for the early introduction of non-metals and supports the engineer's role in choosing materials based upon their characteristics. Also discussed are new, cutting-edge materials. Using clear, concise terminology that is familiar to students, Fundamentals presents material at an appropriate level for both student comprehension and instructors who may not have a materials background.

Handbook of Supercapacitor Materials

Synthesis, Characterization, and Applications

John Wiley & Sons Discover foundational and cutting-edge concepts in the supercapacitor materials industry Dramatic population growth and the development of lightweight portable electronic devices have accelerated the demand for faster and more sustainable energy storage systems. Supercapacitors promise to revolutionize the field due to their high energy and power density, long cycle life, fast rate of charge-discharge, and excellent safety record. In *Handbook of Supercapacitor Materials: Synthesis, Characterization, and Applications*, a distinguished team of researchers delivers a comprehensive review of nature-inspired, organic, inorganic, and polymeric materials used in supercapacitor technology. The book explores aspects of synthesis methods, properties, foundational concepts, and the mechanisms of supercapacitor electrode materials. The distinguished editors also provide resources that focus on supercapacitor performance utilizing electrical double layer electrodes and pseudocapacitor electrodes. State-of-the-art research is discussed in detail and will be extraordinary useful for graduate students, faculty, engineers, and scientists in solid-state chemistry, energy science, and materials science departments. Readers will also find: Overviews of mussel-inspired materials for electrochemical supercapacitors, bio-inspired active materials for supercapacitors, and self-healing supercapacitors Practical discussions of polysaccharide-derived materials for supercapacitors, bio-derived carbon-based materials for supercapacitors, and metal oxides A thorough introduction to metal chalcogenides and metal hydroxides for supercapacitors An examination of template strategy direction towards conducting polymer for supercapacitors A treatment of the morphology paradigm of conducting polymers Perfect for materials scientists, electrochemists, engineers in power technology, *Handbook of Supercapacitor Materials: Synthesis, Characterization, and Applications* is also a must-have resource for professionals working in the electrotechnical and automobile industries.

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Wiley

Callister'S Materials Science And Engineering: Indian Adaptation (W/Cd)

John Wiley & Sons This accessible book provides readers with clear and concise discussions of key concepts while also incorporating familiar terminology. The author treats the important properties of the three primary types of materials (metals, ceramics, and polymers) and composites, as well as the relationships that exist between the structural elements of materials and their properties. Throughout, the emphasis is placed on mechanical behavior and failure, including techniques that are employed to improve performance. · Introduction · Atomic Structure and Interatomic Bonding · The Structure of Crystalline Solids · Imperfections in Solids · Diffusion · Mechanical Properties of Metals · Dislocations and Strengthening Mechanisms · Failure · Phase Diagrams · Phase Transformations in Metals: Development of Microstructure and Alteration of Mechanical Properties · Applications and Processing of Metal Alloys · Structures and Properties of Ceramics · Applications and Processing of Ceramics · Polymer Structures · Characteristics, Applications, and Processing of Polymers · Composites · Corrosion and Degradation of Materials · Electrical Properties · Thermal Properties · Magnetic Properties · Optical Properties · Materials Selection and Design Considerations · Economic, Environmental, and Societal Issues in Materials Science and Engineering