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Transport Phenomena in Materials Processing Transport Phenomena in Materials Processing **An Introduction to Transport Phenomena in Materials Engineering** **Basic Transport Phenomena in Materials Engineering** *Transport Phenomena in Materials Processing Transport Phenomena and Materials Processing* Transport Phenomena in Materials Processing **Non Linear Phenomena in Materials Science II** *An Introduction to Transport Phenomena in Materials Engineering* **Transport Phenomena and Drying of Solids and Particulate Materials** *Transport Phenomena in Manufacturing and Materials Processing* **Transport phenomena in materials processing. Papers ; 1990** *Transport Phenomena and Materials Processing* **Nanoscopic Materials** **Shock Wave and High-Strain-Rate Phenomena in Materials** **Transport Phenomena and Materials Processing** **Fundamental Phenomena in the Materials Sciences** Materials Kinetics **Nonlinear Phenomena and Chaos in Magnetic Materials** *Tunneling Phenomena in Solids* Fundamental Phenomena in the Materials Sciences *Fundamental Phenomena in the Materials Sciences* **Solid State Phenomena** *Shock Wave and High-Strain-Rate Phenomena in Materials* **Fundamental Phenomena in the Materials Sciences** *Theory and Phenomena of Metamaterials* **Diffusion Phenomena in Engineering Materials** Condensed Matter Physics in the Prime of the 21st Century **Computer Modelling of Heat and Fluid Flow in Materials Processing** **Multiscale Phenomena in Plasticity: From Experiments to Phenomenology, Modelling and Materials Engineering** **Self-Healing Phenomena in Cement-Based Materials** **Dielectric Phenomena in Solids** Fundamental Phenomena in the Materials Sciences **Solutions Manual to Accompany Transport Phenomena in Materials Processing** **Transport Phenomena of Foods and Biological Materials** Physics of Continuous Matter Material-Tissue Interfacial Phenomena *Ballistic Materials and Penetration Mechanics* **Shock Waves and High-Strain-Rate Phenomena in Metals** *Kinetics of Materials*

An Introduction to Transport Phenomena in Materials Engineering Oct 10 2023 This introduction to transport phenomena in materials engineering balances an explanation of the fundamentals governing fluid flow and the transport of heat and mass with their common applications to specific systems in materials engineering. It introduces the influences of properties and geometry on fluid flow using familiar fluids such as air and water. Covers topics such as engineering units and pressure in static fluids; momentum transport and laminar flow of Newtonian fluids; equations of continuity and conservation of momentum and fluid flow past submerged objects; turbulent flow; mechanical energy balance and its application to fluid flow; transport of heat by conduction; transport of heat by convection; transient heat flow; heat transport by thermal radiation; mass transport in the solid state by diffusion; mass transport in fluids. Includes extensive appendices.

Transport Phenomena of Foods and Biological Materials Jul 15 2021 Transport Phenomena of Foods and Biological Materials provides comprehensive coverage of transport phenomena modeling in foods and other biological materials. The book is unique in its consideration of models ranging from rigorous mathematical to empirical approaches, including phenomenological and semi-empirical models. It examines cell structure and descriptions of other non-traditional models, such as those based on irreversible thermodynamics or those focused on the use of the chemical and electrochemical potential as the driving forces of transport. Other topics discussed include the source term (important for the coupling transport phenomena-reaction or other intentional/unintentional phenomena) and the connections between transport phenomena modeling and design aspects. Some 100 tables provide useful summaries of the characteristics of each model and provide data about the transport properties of an extensive variety of foods. Transport Phenomena of Foods and Biological Materials will benefit a broad audience of chemists, biochemists, biotechnologists, and other scientists in the academic and industrial realm of foods and biological materials.

Transport Phenomena and Materials Processing Jun 06 2023

Solutions Manual to Accompany Transport Phenomena in Materials Processing Aug 16 2021 This text provides a teachable and readable approach to transport phenomena by providing numerous examples and applications. The text leads the reader through the development and solution of relevant differential equations by applying familiar principles of conservation to numerous situations and by including many worked examples in each chapter. The book is organized similarly to other texts in transport phenomena. Section I deals with the properties and mechanics of fluid motion; Section II with thermal properties and heat transfer; and Section III with diffusion and mass transfer. The authors depart from tradition by building on a presumed understanding of the relationships between the structure and properties of matter, particularly in the chapters devoted to the transport properties. Generous portions of the text, numerous examples, and many problems apply transport phenomena to materials processing.

Shock Wave and High-Strain-Rate Phenomena in Materials Apr 04 2023 These proceedings of EXPLOMET 90, the International Conference on the Materials Effects of Shock-Wave and High-Strain-Rate Phenomena, held August 1990, in La Jolla, California, represent a global and up-to-date appraisal of this field. Contributions (more than 100) deal with high-strain-rate deforma

Transport phenomena in materials processing. Papers ; 1990 Jul 07 2023

Computer Modelling of Heat and Fluid Flow in Materials Processing Jan 21 2022 The understanding and control of transport phenomena in materials processing play an important role in the improvement of conventional processes and in the development of new techniques. Computer modeling of these phenomena can be used effectively for this purpose. Although there are several books in the literature covering the analysis of heat tra

Ballistic Materials and Penetration Mechanics Apr 11 2021 Ballistic Materials and Penetration Mechanics deals with ballistically protective materials and penetration mechanics. The book discusses historical and practical considerations of ballistic protection, including metallic armor, as well as ballistic testing methodology, the ability of a protective material to stop or slow down a particular projectile, and the theoretical aspects of penetration mechanics. It also highlights the importance of stress wave analysis in the penetration and spalling phenomena. Organized into 12 chapters, this volume begins with an overview of the history of the armor and the modern helmet. It proceeds with a discussion of variations in ballistic test methods, errors in test methods, and the importance of the hardness and geometry of both the target and the projectile. The next chapters focus on the importance of fibrous armor, materials that are visually transparent and resistant to penetration by high-energy projectiles and fragments, and transparent armor and ceramic composite armor. The reader is also introduced to materials used in the design of metallic armor, the role of stress waves in the penetration problem, and the use of computer simulation to analyze ballistic impact experiments. The book looks at numerical techniques for modeling hypervelocity impact and concludes with a chapter on the penetration mechanics of textile structures. This book is a valuable resource for scientists working at government, industrial, and university laboratories, as well as law enforcement officers and others who want information on materials that provide the best protection against damage from impacts, explosions, and bullets.

Nanoscopic Materials May 05 2023 Nanotechnology has been hailed as a key technology of the 21st century. This book focuses on a qualitative and quantitative approach, discussing all areas of nanotechnology with particular emphasis on the underlying physico-chemical and physical principles of nanoscience.

Fundamental Phenomena in the Materials Sciences Aug 28 2022

Self-Healing Phenomena in Cement-Based Materials Nov 18 2021 Self-healing materials are man-made materials which have the built-in capability to repair damage. Failure in materials is often caused by the occurrence of small microcracks throughout the material. In self-healing materials phenomena are triggered to counteract these microcracks. These processes are ideally triggered by the occurrence of damage itself. Thus far, the self-healing capacity of cement-based materials has been considered as something "extra". This could be called passive self-healing, since it was not a designed feature of the material, but an inherent property of it. Centuries-old buildings have been said to have survived these centuries because of the inherent self-healing capacity of the binders used for cementing building blocks together. In this State-of-the-Art Report a closer look is taken at self-healing phenomena in cement-based materials. It is shown what options are available to design for this effect rather than have it occur as a "coincidental extra".

Transport Phenomena in Materials Processing May 17 2024

Transport Phenomena in Materials Processing Dec 12 2023 This text provides a teachable and readable approach to transport phenomena (momentum, heat, and mass transport) by providing numerous examples and applications, which are particularly important to metallurgical, ceramic, and materials engineers. Because the authors feel that it is important for students and practicing engineers to visualize the physical situations, they have attempted to lead the reader through the development and solution of the relevant differential equations by applying the familiar principles...

Transport Phenomena in Materials Processing Jun 18 2024 This text provides a teachable and readable approach to transport phenomena (momentum, heat, and mass transport) by providing numerous examples and applications, which are particularly important to metallurgical, ceramic, and materials engineers. Because the authors feel that it is important for students and practicing engineers to visualize the physical situations, they have attempted to lead the reader through the development and solution of the relevant differential equations by applying the familiar principles of conservation to numerous situations and by including many worked examples in each chapter. The book is organized in a manner characteristic of other texts in transport phenomena. Section I deals with the properties and mechanics of fluid motion; Section II with thermal properties and heat transfer; and Section III with diffusion and mass transfer. The authors depart from tradition by building on a presumed understanding of the relationships between the structure and properties of matter, particularly in the chapters devoted to the transport properties (viscosity, thermal conductivity, and the diffusion coefficients). In addition, generous portions of the text, numerous examples, and many problems at the ends of the chapters apply transport phenomena to materials processing.

Solid State Phenomena Jul 27 2022 Solid State Phenomena explores the fundamentals of the structure and their influence on the properties of solids. This book is composed of five chapters that focus on the electrical and thermal conductivities of crystalline solids. Chapter 1 describes the nature of solids, particularly metals and crystalline materials. This chapter also presents a model to evaluate crystal structure, the forces between atom pairs, and the mechanism of plastic and elastic deformation. Chapter 2 demonstrates random vibrations of atoms in a solid using a one-dimensional array, while Chapter 3 examines the resistance of tungsten under various temperatures and measures its temperature coefficient of resistance. Chapter 4 surveys the increase in the number of conducting electrons in a solid when illuminated with light of sufficiently high photon energy to excite electrons out of filled valence bands. Chapter 5 considers the concept of diagmagnetism, paramagnetism, and ferromagnetism in solids.

Condensed Matter Physics in the Prime of the 21st Century Feb 19 2022 This is a collection of lectures by 11 active researchers, renowned specialists in a number of modern, promising, dynamically-developing research directions in condensed matter/solid state theory. The lectures are concerned with phenomena, materials and ideas, discussing theoretical and experimental features, as well as with methods of calculation.Readers will find up-to-date presentations of the methods of carrying out efficient calculations for electronic systems and quantum spin systems, together with applications to describe phenomena and to design new materials. These applications include systems of quantum dots, quantum gates, semiconductor materials for spintronics, and the unusual characteristics of warm dense matter.

Diffusion Phenomena in Engineering Materials Mar 23 2022 This volume of Diffusion Foundations entitled Diffusion Phenomena in Engineering Materials captures an important cross section of the contemporary scene of diffusion in solids, ranging from the fundamental science of diffusion through to the application of diffusion concepts in technology. The chapters are written by well-acknowledged experts in their respective areas. In the first chapter, Professor Dayananda provides an in depth overview of some of the important findings from the vast literature on multicomponent diffusion in alloys. In Chapter 2, Professors Belova and Murch and co-workers describe a new solution to the important problem of accurately estimating a tracer diffusivity in a binary alloy, given the other tracer diffusivity, the interdiffusivity and thermodynamic factor. This is followed by Chapter 3 where Professor Lidiard gives a penetrating perspective on the state of knowledge about the Soret effect and thermodiffusion (thermotransport) in solids. In Chapter 4, Professor Kozlowski and colleagues describe important new findings about the critical dimensions of ferromagnetic nanoparticles of iron. This is followed by Chapter 5 where Professor çimenoglu and co-workers present an in depth overview of surface hardening of titanium and its alloys by way of diffusion of the interstitial atoms of oxygen, nitrogen and boron. In Chapter 6 Professor Morton-Blake describes fascinating new molecular dynamics simulations of sodium and chloride ions in a synthetic ion channel in a membrane. Finally, in Chapter 7, Professor Seetharaman and colleagues describe the important role of diffusion phenomena in process metallurgy. We wish to thank the authors for their prompt contributions and the reviewers for their input.

Fundamental Phenomena in the Materials Sciences Feb 02 2023

Materials Kinetics Jan 01 2023 Materials Kinetics: Transport and Rate Phenomena provides readers with a clear understanding of how physical-chemical principles are applied to fundamental kinetic processes. The book integrates advanced concepts with foundational knowledge and cutting-edge computational approaches, demonstrating how diffusion, morphological evolution, viscosity, relaxation and other kinetic phenomena can be applied to practical materials design problems across all classes of materials. The book starts with an overview of thermodynamics, discussing equilibrium, entropy, and irreversible processes. Subsequent chapters focus on analytical and numerical solutions of the diffusion equation, covering Fick's laws, multicomponent diffusion, numerical solutions, atomic models, and diffusion in crystals, polymers, glasses, and polycrystalline materials. Dislocation and interfacial motion, kinetics of phase separation, viscosity, and advanced nucleation theories are examined next, followed by detailed analyses of glass transition and relaxation behavior. The book concludes with a series of chapters covering molecular dynamics, energy landscapes, broken ergodicity, chemical reaction kinetics, thermal and electrical conductivities, Monte Carlo simulation techniques, and master equations. Covers the full breadth of materials kinetics, including organic and inorganic materials, solids and liquids, theory and experiments, macroscopic and microscopic interpretations, and analytical and computational approaches Demonstrates how diffusion, viscosity microstructural evolution, relaxation, and other kinetic phenomena can be leveraged in the practical design of new materials Provides a seamless connection between thermodynamics and kinetics Includes practical exercises that reinforce key concepts at the end of each chapter

Shock Wave and High-Strain-Rate Phenomena in Materials Jun 25 2022 These proceedings of EXPLOMET 90, the International Conference on the Materials Effects of Shock-Wave and High-Strain-Rate Phenomena, held August 1990, in La Jolla, California, represent a global and up-to-date appraisal of this field. Contributions (more than 100) deal with high-strain-rate deforma

An Introduction to Transport Phenomena in Materials Engineering Apr 16 2024 "An Introduction to Transport Phenomena in Materials Engineering elucidates the important role of conduction, convection, and radiation heat transfer, mass transport in solids and fluids, and internal and external fluid flow in the behavior of materials processes. These phenomena are critical in materials engineering because of the connection of transport to the evolution and distribution of microstructural properties during processing. From making choices in derivation of fundamental conservation equations, to using scaling (order-of-magnitude) analysis showing relationships among different phenomena, to giving examples of how to represent real systems by simple models, the book takes the reader through the fundamentals of transport phenomena applied to materials processing. Fully updated, this Third Edition of a classic textbook offers a significant shift from the previous editions in the approach to this subject, representing an evolution incorporating the original ideas and extending them to a more comprehensive approach to the topic. The text: introduces order of magnitude (scaling) analysis and uses it to quickly obtain approximate solutions for complicated problems throughout the book, focuses on building models to solve practical problems, adds new sections on non-Newtonian flows, turbulence, and measurement of heat transfer coefficients and offers expanded sections on thermal resistance networks, transient heat transfer, two-phase diffusion mass transfer, and flow in porous media. Additional features: more homework problems, mostly on the analysis of practical problems, and new examples from a much broader range of materials classes and processes, including metals, ceramics, polymers, and electronic materials, includes homework problems for the review of the mathematics required for a course based on this book and connects the theory represented by mathematics with real-world problems. This text is aimed at advanced engineering undergraduates and students early in their graduate studies, as well as practicing engineers interested in understanding the behavior of heat and mass transfer and fluid flow during materials processing. While it is designed primarily for materials engineering education, it is a good reference for practicing materials engineers looking for insight into phenomena controlling their processes. A solutions manual, lectures slides, and figure slides are available for qualifying adopting professors"--

Dielectric Phenomena in Solids Oct 18 2021 In general, a dielectric is considered as a non-conducting or insulating material (such as a ceramic or polymer used to manufacture a microelectronic device). This book describes the laws governing all dielectric phenomena. · A unified approach is used in describing each of the dielectric phenomena, with the aim of answering "what?", "how?" and "why" for the occurrence of each phenomenon;· Coverage unavailable in other books on ferroelectrics, piezoelectrics, pyroelectrics, electro-optic processes, and electrets;· Theoretical analyses are general and broadly applicable;· Mathematics is simplified and emphasis is placed on the physical insight of the mechanisms responsible for the phenomena;· Truly comprehensive coverage not available in the current literature.

Fundamental Phenomena in the Materials Sciences Sep 28 2022

Multiscale Phenomena in Plasticity: From Experiments to Phenomenology, Modelling and Materials Engineering Dec 20 2021 The various scales of the physical phenomena occurring during plastic flow are reviewed from the atomic level to the constitutive laws, from both theoretical and experimental sides. The fundamentals of plastic flow are revisited, revealing the impact of recent experimental breakthroughs on the theoretical formulation. New developments (constrained plasticity, indentation) are also addressed. The importance of atomic scale phenomena on macroscopic mechanical behaviour are demonstrated in the case of cross-slip and its influence on fatigue properties, and in the effect of hydrogen on ductility. These developments emphasise the importance of the numerical methods used to connect the various scales and show that much remains to be done in this area. Classical fundamental problems, such as the brittle to ductile transition, are described by both experimentalists and theoreticians, as are constrained and heterogeneous deformation.

Transport Phenomena and Drying of Solids and Particulate Materials Sep 09 2023 The purpose of this book, Transport Phenomena and Drying of Solids and Particulate Materials, is to provide a collection of recent contributions in the field of heat and mass transfer, transport phenomena, drying and wetting of solids and particulate materials. The main benefit of the book is that it discusses some of the most important topics related to the heat and mass transfer in solids and particulate materials. It includes a set of new developments in the field of basic and applied research work on the physical and chemical aspects of heat and mass transfer phenomena, drying and wetting processes, namely, innovations and trends in drying science and technology, drying mechanism and theory, equipment, advanced modelling, complex simulation and experimentation. At the same time, these topics will be going to the encounter of a variety of scientific and engineering disciplines. The book is divided in several chapters that intend to be a resume of the current state of knowledge for benefit of professional colleagues.

Basic Transport Phenomena in Materials Engineering Mar 15 2024 This book presents the basic theory and experimental techniques of transport phenomena in materials processing operations. Such fundamental knowledge is highly useful for researchers and engineers in the field to improve the efficiency of conventional processes or develop novel technology. Divided into four parts, the book comprises 11 chapters describing the principles of momentum transfer, heat transfer, and mass transfer in single phase and multiphase systems. Each chapter includes examples with solutions and exercises to facilitate students' learning. Diagnostic problems are also provided at the end of each part to assess students' comprehension of the material. The book is aimed primarily at students in materials science and engineering. However, it can also serve as a useful reference text in chemical engineering as well as an introductory transport phenomena text in mechanical engineering. In addition, researchers and engineers engaged in materials processing operations will find the material useful for the design of experiments and mathematical models in transport phenomena. This volume contains unique features not usually found in traditional transport phenomena texts. It integrates experimental techniques and theory, both of which are required to adequately solve the inherently complex problems in materials processing operations. It takes a holistic approach by considering both single and multiphase systems, augmented with specific practical examples. There is a discussion of flow and heat transfer in microscale systems, which is relevant to the design of modern processes such as fuel cells and compact heat exchangers. Also described are auxiliary relationships including turbulence modeling, interfacial phenomena, rheology, and particulate systems, which are critical to many materials processing operations.

Shock Waves and High-Strain-Rate Phenomena in Metals Mar 11 2021 The scientific understanding of high-velocity deformation has advanced substantially during the past decade. On the one hand, the framework for a theory explaining the metallurgical effects of shock waves is beginning to take shape; on the other hand, the technological applications of high strain-rate processes have found their way into industries in countries around the world. Ex plosive cladding, welding, forming, compaction and consolidation, cutting, and hardening, in addition to high energy-rate deformation processes using other energy sources, are some of the topics of contemporary technological importance. Metallurgical effects are of the utmost importance in both the scientific understanding of the phenomena involved, and in the successful development and utilization of the associated applications. The international conference upon which this book is based had as its major objectives the acceleration of progress in the field of high-strain rate deformation and fabrication, including applications, by providing a forum for the exchange of state-of-the art information on the metallurgical effects of high strain-rate deformation and fabrication; and the organization of this informa tion into a timely and coherent body of knowledge focused around significant areas and applications. This volume is a manifestation of these objectives. In addition, the contents of this book were organized to provide for a somewhat logical perspective of the fundamentals, development, and state-of-the-art applications of high strain-rate and shock phenomena.

Transport Phenomena in Manufacturing and Materials Processing Aug 08 2023 Motivated by international competition and an easy access to high-speed computers the manufacturing and materials processing industry has seen many changes in recent times. New techniques are constantly being devloped based on a broad range of basic sciences including physics, chemistry and particularly thermal-fluids sciences and kinetics. In order to produce and treat massive products, the industry is also in need of a very

wide range of engineering knowledge and skill for integrating metallurgy, mechanics, electricity, transport phenomena, instrumentation and computer control. This monograph covers a part of these demands, namely by presenting the available knowledge on transport phenomena in manufacturing and materials processing. It is divided into four parts. Part I deals with the fundamentals of transport phenomena, including the transfer of momentum, energy, mass, electric and magnetic properties. Parts II and III are concerned with applications of the fundamentals in transport phenomena occurring in manufacturing and materials processing, respectively. Emphasis has been placed on common aspects of both disccipline s, such as forming, machining, welding, casting, injection molding, surface processes, heating and cooling, solidification, crystal growth and diffusion. Part IV deals with beam technology and microgravity, two topics of current importance.

Fundamental Phenomena in the Materials Sciences May 25 2022

Material-Tissue Interfacial Phenomena May 13 2021 Material-Tissue Interfacial Phenomena: Contributions from Dental and Craniofacial Reconstructions explores the material/tissue interfacial phenomena using dental and craniofacial reconstructions as a model system. As the mouth is a particularly caustic environment, the synthetic and/or bio-enabled materials used to repair damaged tissues and restore form, function, and esthetics to oral structures must resist a variety of physical, chemical, and mechanical challenges. These challenges are magnified at the interface between dissimilar structures such as the tooth/material interface. Interfacial reactions at the atomic, molecular, and nano-scales initiate the failure of materials used to repair, restore, and reconstruct dental and craniofacial tissues. Understanding the phenomena that lead to failure at the interface between dissimilar structures, such as synthetic materials and biologic tissues, is confounded by a variety of factors that are thoroughly discussed in this comprehensive book. Provides a specific focus on the oral environment Combines clinical views and basic science into a useful reference book Presents comprehensive coverage of material-interfacial phenomena within the oral environment

Transport Phenomena in Materials Processing Feb 14 2024 Materials processing and manufacturing are fields of growing importance whereby transport phenomena play a central role in many of the applications. This volume is one of the first collections of contributions on thesubject. The five papers cover a wide variety of applications

Kinetics of Materials Feb 07 2021 A classroom-tested textbook providing a fundamental understandingof basic kinetic processes in materials This textbook, reflecting the hands-on teaching experience of itsthree authors, evolved from Massachusetts Institute of Technology'sfirst-year graduate curriculum in the Department of MaterialsScience and Engineering. It discusses key topics collectivelyrepresenting the basic kinetic processes that cause changes in thesize, shape, composition, and atomistic structure of materials.Readers gain a deeper understanding of these kinetic processes andof the properties and applications of materials. Topics are introduced in a logical order, enabling students todevelop a solid foundation before advancing to more sophisticatedtopics. Kinetics of Materials begins with diffusion, offering adescription of the elementary manner in which atoms and moleculesmove around in solids and liquids. Next, the more complex motion ofdislocations and interfaces is addressed. Finally, still morecomplex kinetic phenomena, such as morphological evolution andphase transformations, are treated. Throughout the textbook, readers are instilled with an appreciationof the subject's analytic foundations and, in many cases, theapproximations commonly used in the field. The authors offer manyextensive derivations of important results to help illuminate theirorigins. While the principal focus is on kinetic phenomena incrystalline materials, select phenomena in noncrystalline materialsare also discussed. In many cases, the principles involved apply toall materials. Exercises with accompanying solutions are provided throughoutKinetics of Materials, enabling readers to put their newfoundknowledge into practice. In addition, bibliographies are offeredwith each chapter, helping readers to investigate specializedtopics in greater detail. Several appendices presenting importantbackground material are also included. With its unique range of topics, progressive structure, andextensive exercises, this classroom-tested textbook provides anenriching learning experience for first-year graduate students.

Non Linear Phenomena in Materials Science II Nov 11 2023 One of the main characteristics of materials science is that it deals with properties which often deviate from linear relationships when compared with such parameters as temperature, pressure, and concentration. The reasons for this behavior of materials are twofold: the speed of linear reaction can vary greatly, and abrupt changes may occur in the static or dynamic states of self-organisation.

Transport Phenomena and Materials Processing Mar 03 2023 An extremely useful guide to the theory and applications of transport phenomena in materials processing This book defines the unique role that transport phenomena play in materials processing and offers a graphic, comprehensive treatment unlike any other book on the subject. The two parts of the text are, in fact, two useful books. Part I is a very readable introduction to fluid flow, heat transfer, and mass transfer for materials engineers and anyone not yet thoroughly familiar with the subject. It includes governing equations and boundary conditions particularly useful for studying materials processing. For mechanical and chemical engineers, and anyone already familiar with transport phenomena, Part II covers the many specific applications to materials processing, including a brief description of various materials processing technologies. Readable and unencumbered by mathematical manipulations (most of which are allocated to the appendixes), this book is also a useful text for upper-level undergraduate and graduate-level courses in materials, mechanical, and chemical engineering. It includes hundreds of photographs of materials processing in action, single and composite figures of computer simulation, handy charts for problem solving, and more. Transport Phenomena and Materials Processing: Describes eight key materials processing technologies, including crystal growth, casting, welding, powder and fiber processing, bulk and surface heat treating, and semiconductor device fabrication Covers the latest advances in the field, including recent results of computer simulation and flow visualization Presents special boundary conditions for transport phenomena in materials processing Includes charts that summarize commonly encountered boundary conditions and step-by-step procedures for problem solving Offers a unique derivation of governing equations that leads to both overall and differential balance equations Provides a list of publicly available computer programs and publications relevant to transport phenomena in materials processing

Theory and Phenomena of Metamaterials Apr 23 2022 Theory and Phenomena of Metamaterials offers an in-depth look at the theoretical background and basic properties of electromagnetic artificial materials, often called metamaterials. A volume in the Metamaterials Handbook, this book provides a comprehensive guide to working with metamaterials using topics presented in a concise review format along with numerous references. With contributions from leading researchers, this text covers all areas where artificial materials have been developed. Each chapter in the text features a concluding summary as well as various cross references to address a wide range of disciplines in a single volume.

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Tunneling Phenomena in Solids Oct 30 2022 The aim of this volume is to provide advanced predoctoral students and young postdoctoral physicists with an opportunity to study the concepts of tunneling phenomena in solids and the theoretical and experimental techniques for their investigation. The contributions are primarily tutorial in nature, covering theoretical and experimental aspects of electron tunnel ing in semiconductors, metals, and superconductors, and atomic tunneling in solids. The work is based upon the lectures delivered at the Advanced Study Institute on "Tunneling Phenomena in Solids," held at the Danish A. E. C. Research Establishment, Riso, Denmark, June 19-30, 1967. Sponsored by the Danish Atomic Energy Commission, the Nordic Institute for Theoretical Physics (NORDITA), and the Science Affairs Division of NATO, with the cooperation of the University of Copenhagen, the Technical University of Denmark, Chalmers Institute of Technology, and the University of Penn sylvania, the lectures were presented by a distinguished panel of scientists who have made major contributions in the field. The relatively large number of lecturers was, in part, made possible by the close coordination of the Advanced Study Institute with the Second International Conference on Electron Tunneling in Solids, which was held at Riso on June 29, 30 and July 1, 1967, under the sponsorship of the U. S. Army Research Office Durham. We are indebted to I. Giaever, E. O. Kane, J. Rowell, and J. R. Schrieffer for advice and assistance in planning the lecture program of the Institute.

Fundamental Phenomena in the Materials Sciences Sep 16 2021

Physics of Continuous Matter Jun 13 2021 Offering a modern approach to this most classical of subjects, Physics of Continuous Matter is first and foremost an introduction to the basic concepts and phenomenology of continuous systems, and the derivations of the equations of continuum mechanics from Newtonian mechanics. Although many examples, particularly in the earlier chapters, are taken from geophysics and astrophysics, the author places the emphasis frimly on generic methods and applications. Each chapter begins with a ‘soft’ introduction, placing the discussion within an everyday context, and the level of difficulty then rises steadily, a pattern which is reflected throughout the text as a whole. The necessary mathematical tools are developed in parallel with the physics on a ‘need-to-know’ basis, an approach that avoids lengthy mathematical preliminaries.

Nonlinear Phenomena and Chaos in Magnetic Materials Nov 30 2022 In this book, some of the principal investigators of the phenomena have reviewed their successes. The contributions include an overview of the field by H Suhl, followed by a detailed review of the high-power response of magnetic materials. Following that chapter, a number of authors review the phenomena for a variety of magnetic materials and pumping configurations.In the final chapter, evidence of another nonlinear effect is reviewed. Using a pulsed driving field, it is possible to excite a travelling spin wave. The nonlinear contributions will give rise to a ?bunching? effect which compensates for the dispersive effects to produce a shape-preserving traveling wave pulse known as solitons.Ordered magnetic materials have provided a rich source for the investigation of nonlinear phenomena. These investigations have contributed much to our knowledge of the behavior of chaotic systems, as well as to a better understanding of the high-power response of the magnetic materials themselves.