Liquid Vapor Phase Change Phenomena | 7e65ae105675ad325ae88614b9a9c180

Emerging Concepts in Analysis and Applications of Hydrogels

The book focuses on new analytical, experimental, and computational developments in the field of research of heat and mass transfer phenomena. The generation, conversion, use, and exchange of thermal energy between physical systems are considered. Various mechanisms of heat transfer such as thermal conduction, thermal convection, thermal radiation, and transfer of energy by phase changes are presented. Theory and fundamental research in heat and mass transfer, numerical simulations and algorithms, experimental techniques, and measurements as they applied to all kinds of applied and emerging problems are covered.

Introduction to Statistical Physics

Handbook of Phase Change

Surface thermodynamics forms the foundation of any meaningful study of capillarity and wetting phenomena. The second edition of Applied Surface Thermodynamics offers a comprehensive state-of-the-art treatment of this critical topic. It provides students and researchers with fundamental knowledge and practical guidelines in solving real-world problems related to the measurement and interpretation of interfacial properties. Containing 40 percent new material and reorganized content, this second edition begins by presenting a generalized Gibbs theory of capillarity, including discussions of highly curved interfaces. Concentrating on drop-shape techniques, the book discusses liquid-fluid interfacial tension and its measurement. Next, the authors focus on contact angles with chapters on experimental procedures, thermodynamic models, and the interpretation of contact angles in terms of solid surface tension. The book discusses theoretical approaches to determining solid surface tension as well as interfacial tensions of particles and their manifestations. It concludes by discussing drop size dependence of contact angles and line tension. What’s New in the Second Edition: Recent progress in Axisymmetric Drop Shape Analysis (ADSA) Image processing methods for drop shape analysis Advanced applications and generalizations of ADSA Recent studies of contact angle hysteresis Contact angles on inert fluoropolymers Update on line tension and the drop size dependence of contact angles Exploring a range of different aspects of surface science and
its applications, the book logically progresses so that knowledge of previous chapters enhances the understanding of subsequent material, yet each chapter is freestanding so that experienced researchers can quickly refer to topics of particular interest.

**Liquid-Vapor Phase-Change Phenomena: An Introduction To The Thermophysics Of vaporization and condensation in heat transfer equipment**

“Micro Transport Phenomena During Boiling” reviews the new achievements and contributions in recent investigations at microscale. The content mainly includes (i) fundamentals for conducting investigations of micro boiling, (ii) microscale boiling and transport phenomena, (iii) boiling characteristics at microscale, (iv) some important applications of micro boiling transport phenomena. This book is intended for researchers and engineers in the field of micro energy systems, electronic cooling, and thermal management in various compact devices/systems at high heat removal and/or heat dissipation. Dr. Xiaofeng Peng, who had passed away on Sep. 10, 2009, was a professor at the Department of Thermal Engineering, Tsinghua University, China.

**Drop-Surface Interactions**

This book is an Up-to-date and authoritative account on physicochemical principles, pharmaceutical and biomedical applications of hydrogels. It consists of eight contributions from different authors highlighting properties and synthesis of hydrogels, their characterization by various instrumental methods of analysis, comprehensive review on stimuli-responsive hydrogels and their diverse applications, and a special section on self-healing hydrogels. Thus, this book will equip academia and industry with adequate basic and applied principles related to hydrogels.

**Handbook of Thermal Science and Engineering**

Comprehensive and unique source integrates the material usually distributed among a half a dozen sources. * Presents a unified approach to modeling of new designs and develops the skills for complex engineering analysis. * Provides industrial insight to the applications of the basic theory developed.

**Electronics Cooling**

The first of two volumes, this edited proceedings book features research presented at the XVI International Conference on Hyperbolic Problems held in Aachen, Germany in summer 2016. It focuses on the theoretical, applied, and computational aspects of hyperbolic partial differential equations (systems of hyperbolic conservation laws, wave equations, etc.) and of related mathematical models (PDEs of mixed type, kinetic equations, nonlocal or/discrete models) found in the field of applied sciences.

**Heat Transfer**

Heat transfer enhancement in single-phase and two-phase flow heat exchangers in important in such industrial applications as power generating plant, process and chemical industry, heating, ventilation, air conditioning and refrigeration systems, and the cooling of electronic equipment. Energy savings are of primary importance in the design of such systems, leading to more efficient, environmentally friendly devices. This book provides invaluable information for such purposes.

**Electrical Power Equipment Maintenance and Testing**
* Third edition of a well-known and well established text both in industry and for teaching * Fully up-to-date and includes extra problems This book is an aid to heat exchanger design written primarily for design and development engineers in the chemical process, power generation, and refrigeration industries. It provides a comprehensive reference on two-phase flows, boiling, and condensation. The text covers all the latest advances like flows over tube bundles and two-phase heat transfer regarding refrigerants and petrochemicals. Another feature of this third edition is many new problems at chapter ends to enhance its use as a teaching text for graduate and post-graduate courses on two-phase flow and heat transfer. - ;This book is written for practising engineers as a comprehensive reference on two-phase flows, boiling, and condensation. It deals with methods for estimating two-phase flow pressure drops and heat transfer rates. It is a well-known reference book in its third edition and is also used as a text for advanced university courses. Both authors write from practical experience as both are professional engineers. -

**Liquid Vapor Phase Change Phenomena**

Microchannel Heat transfer is the cooling application of high power density microchips in the CPU system, micropower systems and many other large scale thermal systems requiring effective cooling capacity. This book offers the latest research and recommended models on the microsize cooling system which not only significantly reduces the weight load, but also enhances the capability to remove much greater amount of heat than any of large scale cooling systems. A detailed reference in microchannel phase change (boiling and condensation) including recommended models and correlations for various requirements such as pressure loss, and heat transfer coefficient. Researchers, engineers, designers and students will benefit from the collated, state-of-the-art of the research put together in this book and its systematic, addressing all the relevant issues and providing a good reference for solving problems of critical analysis. Up-to-date information will help delineate further research direction in the microchannel heat transfer The latest modeling information and recommendations will help in design method and purpose.

**Convective Boiling and Condensation**

The second edition of a bestseller, this definitive text covers all aspects of testing and maintenance of the equipment found in electrical power systems serving industrial, commercial, utility substations, and generating plants. It addresses practical aspects of routing testing and maintenance and presents both the methodologies and engineering basics needed to carry out these tasks. It is an essential reference for engineers and technicians responsible for the operation, maintenance, and testing of power system equipment. Comprehensive coverage includes dielectric theory, dissolved gas analysis, cable fault locating, ground resistance measurements, and power factor, dissipation factor, DC, breaker, and relay testing methods.

**Transport Phenomena in Multiphase Systems**

The book focuses on basic elements of condensation and vaporization processes. The basic physical mechanisms associated with a particular phase-change phenomenon are described in detail, followed by a representative sample of the best models applicable to the circumstances of interest. Throughout the text, the importance of the basic phenomena to a wide variety of applications is discussed.

**Liquid Crystals**

Heathkit was world renowned as a manufacturer of electronics in kit form. This book covers Heathkit’s test equipment, starting with a brief history of Heathkit, an overview of the test equipment product lines and tips on buying and restoring vintage test equipment from sources like eBay. Separate chapters cover the major categories of component testers and substitution boxes, frequency counters, meters, oscilloscopes, power supplies, signal generators, tube testers and checkers and miscellaneous test equipment. Each chapter includes one or more “In-Depth” sections that look at a representative model from the author’s Heathkit collection covering its features, operation, and notable quirks or trivia. The appendix provides a list of references and resources including books, web sites, and suppliers of parts, manuals and related products and services.
Micro Transport Phenomena During Boiling

This textbook presents a modern treatment of fundamentals of heat and mass transfer in the context of all types of multiphase flows with possibility of phase-changes among solid, liquid and vapor. It serves equally as a textbook for undergraduate senior and graduate students in a wide variety of engineering disciplines including mechanical engineering, chemical engineering, material science and engineering, nuclear engineering, biomedical engineering, and environmental engineering. Multiphase Heat Transfer and Flow can also be used to teach contemporary and novel applications of heat and mass transfer. Concepts are reinforced with numerous examples and end-of-chapter problems. A solutions manual and PowerPoint presentation are available to instructors. While the book is designed for students, it is also very useful for practicing engineers working in technical areas related to both macro- and micro-scale systems that emphasize multiphase, multicomponent, and non-conventional geometries with coupled heat and mass transfer and phase change, with the possibility of full numerical simulation.

Cavitation and Bubble Dynamics

Engineering students in a wide variety of engineering disciplines from mechanical and chemical to biomedical and materials engineering must master the principles of transport phenomena as an essential tool in analyzing and designing any system or systems wherein momentum, heat and mass are transferred. This textbook was developed to address that need, with a clear presentation of the fundamentals, ample problem sets to reinforce that knowledge, and tangible examples of how this knowledge is put to use in engineering design. Professional engineers, too, will find this book invaluable as reference for everything from heat exchanger design to chemical processing system design and more. * Develops an understanding of the thermal and physical behavior of multiphase systems with phase change, including microscale and porosity, for practical applications in heat transfer, bioengineering, materials science, nuclear engineering, environmental engineering, process engineering, biotechnology and nanotechnology * Brings all three forms of phase change, i.e., liquid vapor, solid liquid and solid vapor, into one volume and describes them from one perspective in the context of fundamental treatment * Presents the generalized integral and differential transport phenomena equations for multi-component multiphase systems in local instance as well as averaging formulations. The molecular approach is also discussed with the connection between microscopic and molecular approaches * Presents basic principles of analyzing transport phenomena in multiphase systems with emphasis on melting, solidification, sublimation, vapor deposition, condensation, evaporation, boiling and two-phase flow heat transfer at the micro and macro levels * Solid/liquid/vapor interfacial phenomena, including the concepts of surface tension, wetting phenomena, disjoining pressure, contact angle, thin films and capillary phenomena, including interfacial balances for mass, species, momentum, and energy for multi-component and multiphase interfaces are discussed * Ample examples and end-of-chapter problems, with Solutions Manual and PowerPoint presentation available to the instructors

Applied Surface Thermodynamics, Second Edition

Liquid crystals exhibit amazingly interesting properties that make them indispensable for several technological applications. The book Liquid Crystals - Recent Advancements in Fundamental and Device Technologies is aimed to focus on various aspects of research and development that liquid crystal mediums have come across in recent years. This would be ranging from the physical and chemical properties to the important applications that the liquid crystals have in our everyday life. It is expected that the book will make the expert researchers to be abreast of recent research advancements, whereas the novice researchers will benefit from both the conceptual understanding and the recent developments in the area. Multitudes of research themes and directions pivoted to liquid crystals remain the essence, which the readers would get the glimpse of and move ahead for further investigations.

Nucleation Theory
Assembling recent research and theories, this book describes the phase and state transitions that affect technological properties of biological materials occurring in food processing and storage. It covers the role of water as a plasticizer, the effect of transitions on mechanical and chemical changes, and the application of modeling in predicting stability rates of changes. The volume presents methods for detecting changes in the physical state and various techniques used to analyze phase behavior of biopolymers and food components. This book should become a valuable resource for anyone involved with food engineering, processing, storage, and quality, as well as those working on related properties of pharmaceuticals and other biopolymers. Contains descriptions of nonfat food solids as “biopolymers” which exhibit physical properties that are highly dependent on temperature, time, and water content. Details the effects of water on the state and stability of foods. Includes information on changes occurring in state and physicochemical properties during processing and storage. The only book on phase and state transitions written specifically for the applications in food industry, product development, and research. No recent competition.

Fundamentals of Multiphase Heat Transfer and Flow

Liquid-Vapor Phase-Change Phenomena presents the basic thermophysics and transport principles that underlie the mechanisms of condensation and vaporization processes. The text has been thoroughly updated to reflect recent innovations in research and to strengthen the fundamental focus of the first edition. Starting with an integrated presentation of the nonequilibrium thermodynamics and interfacial phenomena associated with vaporization and condensation, coverage follows of the heat transfer and fluid flow mechanisms in such processes. The second edition includes significant new material on the nanoscale and microscale thermophysics of boiling and condensation phenomena and the use of advanced computational tools to create new models of phase-change events. The importance of basic phenomena to a wide variety of applications is emphasized and illustrated throughout using examples and problems. Suitable for senior undergraduate and first-year graduate students in mechanical or chemical engineering, the book can also be a helpful reference for practicing engineers or scientists studying the fundamental physics of nucleation, boiling and condensation.

Classic Heathkit Electronic Test Equipment

Today, the application of phase change materials (PCMs) has developed in different industries, including the solar cooling and solar power plants, photovoltaic electricity systems, the space industry, waste heat recovery systems, preservation of food and pharmaceutical products, and domestic hot water. PCMs use the principle of latent heat thermal storage to absorb energy in large quantities when there is a surplus and release it when there is a deficit. This promising technology has already been successfully implemented in many construction projects. The aim of this book is to assist the scientists and to provide the reader with a comprehensive overview of the properties that characterize the phase change materials from theoretical and experimental perspectives with a focus on their technological applications. The present status and future perspectives of phase change material are discussed.

Phase Transition Dynamics

Predictive theories of phenomena involving phase change with applications in engineering are investigated in this volume, e.g. solid-liquid phase change, volume and surface damage, and phase change involving temperature discontinuities. Many other phase change phenomena such as solid-solid phase change in shape memory alloys and vapor-liquid phase change are also explored. Modeling is based on continuum thermo-mechanics. This involves a renewed principle of virtual power introducing the power of the microscopic motions responsible for phase change. This improvement yields a new equation of motion related to microscopic motions, beyond the classical equation of motion for macroscopic motions. The new theory sensibly improves the phase change modeling. For example, when warm rain falls on frozen soil, the dangerous black ice phenomenon can be comprehensively predicted. In addition, novel equations predict the evolution of clouds, which are themselves a mixture of air, liquid water and vapor.
Heat Routing with Liquid-vapor Phase Change Phenomena in Microscale Porous Media

In the wake of energy crisis due to rapid growth of industries, the efficient heat transfer could play a vital role in energy saving. Industries, household equipment, transportation, offices, etc., all are dependent on heat exchanging equipment. Considering this, the book has incorporated different chapters on heat transfer phenomena, analytical and experimental heat transfer investigations, heat transfer enhancement and applications.

Encyclopedia of Microfluidics and Nanofluidics

This book presents a comprehensive overview of fluid mechanical, thermal and physico-chemical aspects of drop-surface interactions. Basic physical mechanisms pertaining to free-surface flow phenomena characteristic of drop impact on solid and liquid surfaces are explained emphasizing the importance of scaling. Moreover, physico-chemical fundamentals relating to a forced spreading of complex solutions, analytical tools for calculating compressibility effects, and heat transfer and phase change phenomena occurring during solidification and evaporation processes, respectively, are introduced in detail. Finally, numerical approaches particularly suited for modeling drop-surface interactions are consisely surveyed with a particular emphasis on boundary integral methods and Navier-Stokes algorithms (volume of fluid, level set and front tracking algorithms). The book is closed by contributions to a workshop on Drop-Surface Interactions held at the International Centre of Mechanical Sciences.

Droplet Wetting and Evaporation

Explore a Kinetic Approach to the Description of Nucleation - An Alternative to the Classical Nucleation Theory Kinetic Theory of Nucleation presents an alternative to the classical theory of nucleation in gases and liquids—the kinetic nucleation theory of Ruckenstein-Narsimhan-Nowakowski (RNNT). RNNT uses the kinetic theory of fluids to calculate the rate of evaporation of molecules from clusters, and unlike the classical nucleation theory (CNT), does not require macroscopic thermodynamics or the detailed balance principle. The book compares the rates of evaporation of molecules from—and condensation on—the surface of a nucleus of a new phase, and explains how this alternate approach can provide much higher nucleation rates than the CNT. It applies RNNT to various case studies that include the liquid-to-solid and vapor-to-liquid phase transitions, binary nucleation, heterogeneous nucleation, nucleation on soluble particles and protein folding. It also describes the system, introduces the basic equations of the kinetic theory, and defines a new model for the nucleation mechanism of protein folding. Adaptable to coursework as well as self-study, this insightful book: Uses a kinetic approach to calculate the rate of growth and decay of a cluster Includes description of vapor-to-liquid and liquid-to-solid nucleation Outlines the application of density-functional theory (DFT) methods to nucleation Proposes the combination of the new kinetic theory of nucleation with the DFT methods Illustrates the new theory with numerical calculations Describes the model for the nucleation mechanism of protein folding, and more A comprehensive guide dedicated to the kinetic theory of nucleation and cluster growth, Kinetic Theory of Nucleation emphasizes the basic concepts of the kinetic nucleation theory, incorporates findings developed from years of research and experience, and is written by highly-regarded experts.

Apparent and Microscopic Contact Angles

One of the most striking phenomena in condensed matter physics is the occurrence of abrupt transitions in the structure of a substance at certain temperatures or pressures. These are first order phase transitions, and examples such as the freezing of water are familiar in everyday life. The conditions at which the transformation takes place can sometimes vary. For example, the freezing point of water is not always 0°C, but the liquid can be supercooled considerably if it is pure enough and treated carefully. The reason for this phenomenon is nucleation. This monograph covers all major available routes of theoretical research of nucleation phenomena (phenomenological models, semi-phenomenological theories, density functional theories, microscopic and semi-microscopic approaches), with emphasis on the formation of liquid droplets from a metastable vapor.
Also, it illustrates the application of these various approaches to experimentally relevant problems. In spite of the familiarity of the involved phenomena, it is still impossible to calculate nucleation accurately, as the properties and the kinetics of the daughter phase are insufficiently well known. Existing theories based upon classical nucleation theory have on the whole explained the trends in behavior correctly. However they often fail spectacularly to account for new data, in particular in the case of binary or, more generally, multi-component nucleation. The current challenge of this book is to go beyond such classical models and provide a more satisfactory theory by using density functional theory and microscopic computer simulations in order to describe the properties of small clusters. Also, semi-phenomenological models are proposed, which attempt to relate the properties of small clusters to known properties of the bulk phases. This monograph is an introduction as well as a compendium to researchers in soft condensed matter physics and chemical physics, graduate and post-graduate students in physics and chemistry starting on research in the area of nucleation, and to experimentalists wishing to gain a better understanding of the efforts being made to account for their data.

Heat Transfer Enhancement of Heat Exchangers

Rigorous and comprehensive, this textbook introduces undergraduate students to simulation methods in statistical physics. The book covers a number of topics, including the thermodynamics of magnetic and electric systems; the quantum-mechanical basis of magnetism; ferrimagnetism, antiferromagnetism, spin waves and magnons; liquid crystals as a non-ideal system of technological relevance; and diffusion in an external potential. It also covers hot topics such as cosmic microwave background, magnetic cooling and Bose-Einstein condensation. The book provides an elementary introduction to simulation methods through algorithms in pseudocode for random walks, the 2D Ising model, and a model liquid crystal. Any formalism is kept simple and derivations are worked out in detail to ensure the material is accessible to students from subjects other than physics.

Handbook of Surface and Colloid Chemistry

Featuring contributions from the renowned researchers and academicians in the field, this book covers key conventional and emerging cooling techniques and coolants for electronics cooling. It includes following thematic topics: - Cooling approaches and coolants - Boiling and phase change-based technologies - Heat pipes-based cooling - Microchannels cooling systems - Heat loop cooling technology - Nanofluids as coolants - Theoretical development for the junction temperature of package chips. This book is intended to be a reference source and guide to researchers, engineers, postgraduate students, and academicians in the fields of thermal management and cooling technologies as well as for people in the electronics and semiconductors industries.

Kinetics of Evaporation

This book chronicles the proceedings of the International Symposium on Apparent and Microscopic Contact Angles, held in conjunction with the American Chemical Society meeting in Boston, August 24--27, 1998. The symposium provided an opportunity to discuss several controversial issues associated with interfacial phenomena that govern the behavior of

The Physics of Phase Transitions

This Handbook provides researchers, faculty, design engineers in industrial R&D, and practicing engineers in the field concise treatments of advanced and more-recently established topics in thermal science and engineering, with an important emphasis on micro- and nanosystems, not covered in earlier references on applied thermal science, heat transfer or relevant aspects of mechanical/chemical engineering. Major sections address new developments in heat transfer, transport phenomena, single- and multiphase flows with energy transfer, thermal-bioengineering, thermal radiation, combined mode heat transfer, coupled heat and mass transfer, and energy systems. Energy transport at the macro-scale and
micro/nano-scales is also included. The internationally recognized team of authors adopt a consistent and systematic approach and writing style, including ample cross reference among topics, offering readers a user-friendly knowledgebase greater than the sum of its parts, perfect for frequent consultation. The Handbook of Thermal Science and Engineering is ideal for academic and professional readers in the traditional and emerging areas of mechanical engineering, chemical engineering, aerospace engineering, bioengineering, electronics fabrication, energy, and manufacturing concerned with the influence thermal phenomena.

**Kinetic Theory of Nucleation**

Droplet Wetting and Evaporation provides engineers, students, and researchers with the first comprehensive guide to the theory and applications of droplet wetting and evaporation. Beginning with a relevant theoretical background, the book moves on to consider specific aspects, including heat transfer, flow instabilities, and the drying of complex fluid droplets. Each chapter covers the principles of the subject, addressing corresponding practical issues and problems. The text is ideal for a broad range of domains, from aerospace and materials, to biomedical applications, comprehensively relaying the challenges and approaches from the different communities leading the way in droplet research and development. Provides a broad, cross-subject coverage of theory and application that is ideal for engineers, students and researchers who need to follow all major developments in this interdisciplinary field includes comprehensive discussions of heat transfer, flow instabilities, and the drying of complex fluid droplets. Begins with an accessible summary of fundamental theory before moving on to specific areas such as heat transfer, flow instabilities, and the drying of complex fluid droplets.

**Theory, Numerics and Applications of Hyperbolic Problems I**

Provides a comprehensive coverage of the basic phenomena. It contains twenty-five chapters which cover different aspects of boiling and condensation. First the specific topic or phenomenon is described, followed by a brief survey of previous work, a phenomenological model based on current understanding, and finally a set of recommended design equa.

**Phase Change in Mechanics**

An overview of recent developments in the field of first-order phase transitions, which may be considered a continuation of the previous work 'Aggregation Phenomena in Complex Systems', covering work done and discussed since then. Each chapter features a different aspect of the field written by international specialists, and covers such topics as nucleation and crystallization kinetic of silicate glasses, nucleation in concentration gradients, the determination of coefficients of emission of nucleation theory, diamonds from vitreous carbon.

**Solutions Manual - Liquid Vapor Phase Change Phenomena**

Since the second edition of Liquid-Vapor Phase-Change Phenomena was written, research has substantially enhanced the understanding of the effects of nanostructured surfaces, effects of microchannel and nanochannel geometries, and effects of extreme wetting on liquid-vapor phase-change processes. To cover advances in these areas, the new third edition includes significant new coverage of microchannels and nanostructures, and numerous other updates. More worked examples and numerous new problems have been added, and a complete solution manual and electronic figures for classroom projection will be available for qualified adopting professors.

**Phase Transitions in Foods**

This monograph discusses the essential principles of the evaporation process by looking at it at the molecular and atomic level. In the first part
methods of statistical physics, physical kinetics and numerical modeling are outlined including the Maxwell's distribution function, the Boltzmann kinetic equation, the Vlasov approach, and the CUDA technique. The distribution functions of evaporating particles are then defined. Experimental results on the evaporation coefficient and the temperature jump on the evaporation surface are critically reviewed and compared to the theory and numerical results presented in previous chapters. The book ends with a chapter devoted to evaporation in different processes, such as boiling and cavitation. This monograph addresses graduate students and researchers working on phase transitions and related fields.

**Heat Transfer**

This new edition of the Handbook of Surface and Colloid Chemistry informs you of significant recent developments in the field. It highlights new applications and provides revised insight on surface and colloid chemistry's growing role in industrial innovations. The contributors to each chapter are internationally recognized experts. Several chapter

**Fundamentals of Heat Exchanger Design**

**Liquid-Vapor Phase-Change Phenomena**

Cavitation and Bubble Dynamics deals with fundamental physical processes of bubble dynamics and cavitation for graduate students and researchers.

**Phase Change Materials and Their Applications**

Covering all aspects of transport phenomena on the nano- and micro-scale, this encyclopedia features over 750 entries in three alphabetically-arranged volumes including the most up-to-date research, insights, and applied techniques across all areas. Coverage includes electrical double-layers, optofluidics, DNC lab-on-a-chip, nanosensors, and more.

**Geothermal Engineering**

This book explains the engineering required to bring geothermal resources into use. The book covers specifically engineering aspects that are unique to geothermal engineering, such as measurements in wells and their interpretation, transport of near-boiling water through long pipelines, turbines driven by fluids other than steam, and project economics. The explanations are reinforced by drawing comparisons with other energy industries.

**Nucleation Theory and Applications**

Phase transition dynamics is centrally important to condensed matter physics. This 2002 book treats a wide variety of topics systematically by constructing time-dependent Ginzburg-Landau models for various systems in physics, metallurgy and polymer science. Beginning with a summary of advanced statistical-mechanical theories including the renormalization group theory, the book reviews dynamical theories, and covers the kinetics of phase ordering, spinodal decomposition and nucleation in depth. The phase transition dynamics of real systems are discussed, treating interdisciplinary problems in a unified manner. Topics include supercritical fluid dynamics, stress-diffusion coupling in polymers and mesoscopic dynamics at structural phase transitions in solids. Theoretical and experimental approaches to shear flow problems in fluids are reviewed. Phase Transition Dynamics provides a comprehensive account, building on the statistical mechanics of phase transitions covered in many introductory
textbooks. It will be essential reading for researchers and advanced graduate students in physics, chemistry, metallurgy and polymer science.

**Microchannel Phase Change Transport Phenomena**

*This book occupies an important place at the crossroads of several fields central to materials sciences. The expanded second edition incorporates new developments in the states of matter physics, and includes end-of-chapter problems and complete answers.*

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