Read Book Fundamentals Of Condensed Matter And Crystalline Physics Pdf For Free

Fundamentals of Condensed Matter and Crystalline Physics Fundamentals of Condensed Matter and Crystalline Physics Frontiers in Crystalline Matter Condensed Matter Physics Bond-Orientational Order in Condensed Matter Systems Condensed Matter Physics Fundamentals of Condensed Matter Physics Solid State Physics Thermodynamics of Crystalline States Beyond the Crystalline State Principles of Condensed Matter Physics Fundamentals of Soft Matter Science Nonlinear Mechanics of Crystals The Structure of Materials Soft Condensed Matter Modern Condensed Matter Physics The Physicks of Dirt Elasticity, Plasticity and Structure of Matter Liquid Crystals Concepts of Materials Science The Molten State of Matter Defects and Geometry in Condensed Matter Physics Latest Trends in Condensed Matter Physics Crystals and Crystal Growing Shock Waves in Condensed Matter - 1983 Sensitive Matter Introduction to the Theory of Soft Matter Interfacial Wave Theory of Pattern Formation in Solidification Physical Properties of Crystals Elements of Structures and Defects of Crystalline Materials Direct Analysis of Diffraction by Matter Condensed Matter Field Theory Time Crystals Topology in Condensed Matter Condensed-Matter and Materials Physics Physics of Condensed Matter Advanced Condensed Matter Physics Soft Matter Physics Optical Properties of Condensed Matter and Applications Liquid Crystals

An advanced textbook covering important modern developments in depth rather than attempting an encyclopaedic approach. Thermodynamics is a well-established discipline of physics for properties of matter in thermal equilibrium with the surroundings. Applying to crystals, however, the laws encounter undefined properties of crystal lattice, which therefore need to be determined for a clear and well-defined description of crystalline states. Thermodynamics of Crystalline States explores the roles played by order variables and dynamic lattices in crystals in a wholly new way. The book begins by clarifying basic concepts for stable crystals. Next, binary phase transitions are discussed to study collective motion of order variables, as described mostly as classical phenomena. New to this edition is the examination of magnetic crystals, where magnetic symmetry is essential for magnetic phase transitions. The multi-electron system is also discussed theoretically, as a quantum-mechanical example, for superconductivity in metallic crystals. Throughout the book, the role played by the lattice is emphasized and studied in-depth. Thermodynamics of Crystalline States is an introductory treatise and textbook on mesoscopic phenomena in solid states, constituting a basic subject in condensed matter physics. While this book serves as a guide for advanced students in physics and material science, it can also be useful as a reference for all professionals in related fields. Minoru Fujimoto is author of Physics of Classical Electromagnetism (Springer, 2007) and The Physics of Structural Phase Transitions (Springer, 2005). Shock Waves in Condensed Matter – 1983 covers the proceedings of the American Physical Society Topical Conference, held in Santa Fe, New Mexico on July 18-21, 1983. The book focuses on the response of matter to dynamic high pressure and temperature. The selection first elaborates on the review of theoretical calculations of phase transitions and comparisons with experimental results; theoretical and experimental studies of shock-compressed benzene and polybutene; and theory of the iron equation of state and melting curve to very high pressures. The text then ponders on nonhydrostatic effects in stress-wave induced phase transformation of calcite; Bauschinger effect model suitable for use in large computer codes; and strain rate sensitivity prediction for porous bed compaction. The manuscript takes a look at flaw nucleation and energetics of dynamic fragmentation, shock loading behavior of fused quartz, and aluminum damage simulation in high-velocity impact. Shock wave diagnostics by time-resolved infrared radiometry and non-linear Raman spectroscopy; Raman scattering temperature measurement behind a shock wave; and experiments and simulation on laser-driven shock wave evolution in aluminum targets are also discussed. The selection is a dependable reference for scientists and readers interested in the response of matter when exposed to dynamic high pressure and temperature. This special issue of “Solid State Phenomena” documents some novel experimental and theoretical approaches applied to fascinating materials. Motivated by the increasing need to synthesize and understand the properties of technologically important materials, this issue represents an important step forward in improving our understanding of how modern materials can be optimised for technology and industry. The issue comprises 9 original review papers covering experimental approaches and theoretical modeling. The contributions will be very useful to researchers working in various areas of CMP and will contribute significantly to the understanding of rapidly developing materials with regard to their synthesis, characterization and properties. This book identifies opportunities, priorities, and challenges for the field of condensed-matter and materials physics. It highlights exciting recent scientific and technological developments and their societal impact and identifies outstanding questions for future research. Topics range from the science of modern technology to new materials and structures, novel quantum phenomena, nonequilibrium physics, soft condensed matter, and new experimental and computational tools. The book also addresses structural challenges for the field, including nurturing its intellectual vitality, maintaining a healthy mixture of large and small research facilities, improving the field's integration with other disciplines, and developing new ways for scientists in academia, government laboratories, and industry to work together. It will be of interest to scientists, educators, students, and policymakers. Physics of Condensed Matter is designed for a two-semester graduate course on condensed matter physics for students in physics and materials science. While the book offers fundamental ideas and topic areas of condensed matter physics, it also includes many recent topics of interest on which graduate students may choose to do further research. The text can also be used as a one-semester course for advanced undergraduate majors in physics, materials science, solid state chemistry, and electrical engineering, because it offers a breadth of topics applicable to these majors. The book begins with a clear, coherent picture of simple models of solids and properties and progresses to more advanced properties and topics later in the book. It offers a comprehensive account of the modern topics in condensed matter physics by including introductory accounts of the areas of research in which intense research is underway. The book assumes a working knowledge of quantum mechanics, statistical mechanics, electricity and magnetism and Green's function formalism (for the second-semester curriculum). Covers many advanced topics and recent developments in condensed matter physics which are not included in other texts and are hot areas: Spintronics, Heavy fermions, Metallic nanoclusters, Zno, Graphene and graphene-based electronic, Quantum hall effect, High temperature superdonductivity, Nanotechnology Offers a diverse number of Experimental techniques clearly simplified Features end of chapter problems Life would not exist without sensitive, or soft, matter. All biological structures depend on it, including red blood globules, lung fluid, and membranes. So do industrial emulsions, gels, plastics, liquid crystals, and granular materials. What makes sensitive matter so fascinating is its inherent versatility. Shape-shifting at the slightest provocation, whether a change in composition or environment, it leads a fugitive existence. Physicist Michel Mitov brings drama to molecular gastronomy (as when two irreconcilable materials are mixed to achieve the miracle of mayonnaise) and offers answers to everyday questions, such as how does paint dry on canvas, why does shampoo foam better when you "repeat, " and what allows for the controlled release of drugs? Along the way we meet a futurist cook, a scientist with a runaway imagination, and a penniless inventor named Goodyear who added sulfur to latex, quite possibly by accident, and created durable rubber. As Mitov demonstrates, even religious ritual is a lesson in the surprising science of sensitive matter. Thrice yearly, the reliquary of St. Januarius is carried down cobblestone streets from the Cathedral to the Church of St. Clare in Naples. If all goes as hoped--and since 1389 it often has--the dried blood contained in the reliquary's largest vial liquefies on reaching its destination, and Neapolitansare given a reaffirming symbol of renewal. Good,No Highlights,No Markup,all pages are intact, Slight Shelfwear,may have the corners slightly dented, may have slight color changes/slightly damaged spine. All technologies depend on the availability of suitable materials. The progress of civilisation is often measured by the materials people have used, from the stone age to the silicon age. Engineers exploit the relationships between the structure, properties and manufacturing methods of a material to optimise their design and production for particular applications. Scientists seek to understand and predict those relationships. This short book sets out fundamental concepts that underpin the science of materials and emphasizes their relevance to mainstream chemistry, physics and biology. These include the thermodynamic stability of materials in various environments, quantum behaviour governing all matter, and active matter. Others include defects as the agents of change in crystalline materials, materials at the nanoscale, the emergence of new science at increasing length scales in materials, and man-made materials with properties determined by their structure rather than their chemistry. The book provides a unique insight into the essence of materials science at a level suitable for pre-university students and undergraduates of materials science. It will also be suitable for graduates in other subjects contemplating postgraduate study in materials science. Professional materials scientists will also find it stimulating and occasionally provocative. This comprehensive work explores interfacial instability and pattern formation in dynamic systems away from the equilibrium state in solidification and crystal growth. Further, this significantly expanded 2nd edition introduces and reviews the progress made during the last two decades. In particular, it describes the most prominent pattern formation phenomena commonly observed in material processing and crystal growth in the framework of the previously established interfacial wave theory, including free dendritic growth from undercooled melt, cellular growth and eutectic growth in directional solidification, as well as viscous fingering in Hele-Shaw flow. It elucidates the key problems, systematically derives their mathematical solutions by pursuing a unified, asymptotic approach, and finally carefully examines these results by comparing them with the available experimental results. The asymptotic approach described here will be useful for the investigation of pattern formation phenomena occurring in a much broader class of inhomogeneous dynamical systems. In addition, the results on global stability and selection mechanisms of pattern formation will be of particular interest to researchers working on material processing and crystal growth. The stability mechanisms of a curved front and the pattern formation have been fundamental subjects in the areas of condensed-matter physics, materials science, crystal growth, and fluid mechanics for some time now. This book offers a stimulating and insightful introduction for all physicists, engineers and applied mathematicians working in the fields of soft condensed-matter physics, materials science, mechanical and chemical engineering, fluid dynamics, and nonlinear sciences. Modern experimental developments in condensed matter and ultracold atom physics present formidable challenges to theorists. This book provides a pedagogical introduction to quantum field theory in many-particle physics, emphasizing the applicability of the formalism to concrete problems. This second edition contains two new chapters developing path integral approaches to classical and quantum nonequilibrium phenomena. Other chapters cover a range of topics, from the introduction of many-body techniques and functional integration, to renormalization group methods, the theory of response functions, and topology. Conceptual aspects and formal methodology are emphasized, but the discussion focuses on practical experimental applications drawn largely from condensed matter physics and neighboring fields. Extended and challenging problems with fully worked solutions provide a bridge between formal manipulations and research-oriented thinking. Aimed at elevating graduate students to a level where they can engage in independent research, this book complements graduate level courses on many-particle theory. Are You Looking for a Unified and Concise Approach to Teaching and Learning the Structure of Materials? Allen and Thomas present information in a manner consistent with the way future scientists and engineers will be required to think about materials' selection, design, and use. Students will learn the fundamentals of three different states of condensed matter-glasses, crystals, and liquid crystals-and develop a set of tools for describing all of them. Above all, they'll gain a better understanding of the principles of structure common to all materials. Key concepts, such as symmetry theory, are introduced and applied to provide a common viewpoint for describing structures of ceramic, metallic, and polymeric materials. Structure-sensitive properties of real materials are introduced. The text also includes a variety of worked example problems. Other texts available in the MIT Series: Thermodynamics of Materials, Vol I, Ragone, 30885-4 Thermodynamics of Materials, Vol II: Kinetics, Ragone, 30886-2 Physical Ceramics: Principles for Ceramics Science and Engineering, Chiang, Birnie, Kingery, 59873-9 Electronic Properties of Engineering Materials, Livingston, 31627-X Solid State Physics is a textbook for students of physics, material science, chemistry, and engineering. It is the state-of-the-art presentation of the theoretical foundations and application of the quantum structure of matter and materials. This second edition provides timely coverage of the most important scientific breakthroughs of the last decade (especially in low-dimensional systems and quantum transport). It helps build readers' understanding of the newest advances in condensed matter physics with rigorous yet clear mathematics. Examples are an integral part of the text, carefully designed to apply the fundamental principles illustrated in the text to currently active topics of research. Basic concepts and recent advances in the field are explained in tutorial style and organized in an intuitive manner. The book is a basic reference work for students, researchers, and lecturers in any area of solid-state physics. Features additional material on nanostructures, giving students and lecturers the most significant features of low-dimensional systems, with focus on carbon allotropes Offers detailed explanation of dissipative and nondissipative transport, and explains the essential aspects in a field, which is commonly overlooked in textbooks Additional material in the classical and quantum Hall effect offers further aspects on magnetotransport, with particular emphasis on the current profiles Gives a broad overview of the band structure of solids, as well as presenting the foundations of the electronic band structure. Also features reported with new and revised material, which leads to the latest research This book provides the first comprehensive description of time crystals which have a repeating structure in time. It introduces the fundamental concepts behind time crystals and explores the many different branches of this new research area. The book starts with the original idea of the time crystallization in quantum systems as introduced by Wilczek and follows the development of the field up to the present day. Both spontaneous formation of crystalline structures in time and concepts of the condensed matter physics in the time domain, ranging from Anderson localization in time to many-body systems with exotic interactions, are described. The prospect of creation of novel objects by means of time engineering is also presented. The book assumes knowledge of quantum mechanics to the graduate level. It serves as a valuable reference with pointers to future research directions for graduate students and senior scientists alike. Experiments and problems to be done by the non-specialist to aid in his understanding of crystals. This undergraduate textbook merges traditional solid state physics with contemporary condensed matter physics, providing an up-to-date introduction to the major concepts that form the foundations of condensed materials. The main foundational principles are emphasized, providing students with the knowledge beginners in the field should understand. The book is structured in four parts and allows students to appreciate how the concepts in this broad area build upon each other to produce a cohesive whole as they work through the chapters. Illustrations work closely with the text to convey concepts and ideas visually, enhancing student understanding of difficult material, and end-of-chapter exercises varying in difficulty allow students to put into practice the theory they have covered in each chapter and reinforce new concepts. This text offers an introduction to the properties and behaviour of soft matter. It begins with a treatment of the underlying principles, then discusses how the properties of certain substances and systems are treated within this framework. Thermally excited defects such as vortices, disclinations, dislocations, vacancies and interstitials play a key role in the physics of crystals, superfluids, superconductors, liquid crystals and polymer arrays. Geometrical aspects of statistical mechanics become particularly important when thermal fluctuations entangle or crumple extended line-like or surface-like objects in three dimensions. In the case of entangled vortices above the first-order flux lattice melting transition in high temperature superconductors, the lines themselves are defects. A variety of low temperature theories combined with renormalization group ideas are used to describe the delicate interplay between defects, statistical mechanics and geometry characteristic of these problems in condensed matter physics. In this 2002 book, David Nelson provides a coherent and pedagogic graduate level introduction to the field of defects and geometry. Based on an established course and covering the fundamentals, central areas and contemporary topics of this diverse field, Fundamentals of Condensed Matter Physics is a much-needed textbook for graduate students. The book begins with an introduction to the modern conceptual models of a solid from the points of view of interacting atoms and elementary excitations. It then provides students with a thorough grounding in electronic structure and many-body interactions as a starting point to understand many properties of condensed matter systems - electronic, structural, vibrational, thermal, optical, transport, magnetic and superconducting - and methods to calculate them. Taking readers through the concepts and techniques, the text gives both theoretically and experimentally inclined students the knowledge needed for research and teaching careers in this field. It features 246 illustrations, 9 tables and 100 homework problems, as well as numerous worked examples, for students to test their understanding. Solutions to the problems for instructors are available at www.cambridge.org/cohenlouie. Condensed matter exhibits a rich variety of phases. Of these, the crystalline state has, until recently, received most attention. This is not surprising, given the geometric regularity of crystals. At the other extreme one has amorphous materials. In between there are the various types of liquid crystals, the recently discovered quasicrystals, and so on. While the absence of the high degree of regularity that characterizes the crystalline phase is certainly a problem, these noncrystalline states have nevertheless been receiving some attention over the years. However, it is only during the last few years that something like a uni fied view of all these phases has begun to emerge, through an application of various sophisticated concepts. Geometry and symmetry (and unusual realiza tions of the latter) provide a unifying thread in this new and emerging perspec tive. This book is an attempt to capture the flavour of some of these recent de velopments. The approach is substantially descriptive, being intended to be accessible not only to experimental physicists, but also to chemists, materials scientists, metallurgists and ceramicists, whose work borders on physics. The prerequisites for a study of this book are a familiarity with basic solid-state physics and, in places, the elements of group theory and statistical mechanics. A few special topics are included at the end to aid those who wish to pur sure further the subject matter treated here. Modern semiconductor and laser techniques would be unthinkable today without a highly developed physics of solids. As tailored materials increasingly gain significance, it is more important than ever to understand the basics of crystalline materials and the influence of their symmetry on phenomenological aspects. This first international edition of a classic German standard integrates the latest developments in the field, including two-dimensional crystals and Giant Magneto-Resistance. Its aim is to impart the knowledge necessary to comprehend the manifold peculiarities of crystalline substances in a comprehensive and easily accessible manner. The book devotes much space to a coherent introduction to tensor calculation, making this the first to address the topic in a readily understandable way. Supplemented by 40 exercises with their solutions, this is an ideal textbook for students of physics and chemistry, solid state physicists and chemists, and materials scientists, but also a comprehensive resource for those who wish to get an overview of this important topic. The study of "soft matter" materials with complex properties has raised a number of problems in physics, biology and materials science. This guide reviews these chemical bonds and structures and the great variety of research in the field. 258 illustrations. Derived from lectures at the University of Freiburg, this textbook introduces solid-state physics as well as the physics of liquids, liquid crystals and polymers. The five chapters deal with the key characteristics of condensed matter: structures, susceptibilities, molecular fields, currents, and dynamics. The author strives to present and explain coherently the terms and concepts associated with the main properties and characteristics of condensed matter, while minimizing attention to extraneous details. As a result, this text provides the firm and broad basis of understanding that readers require for further study and research. This revised edition continues to provide the most approachable introduction to the structure, characteristics, and everyday applications of soft matter. It begins with a substantially revised overview of the underlying physics and chemistry common to soft materials. Subsequent chapters comprehensively address the different classes of soft materials, from liquid crystals to surfactants, polymers, colloids, and biomaterials, with vivid, full-color illustrations throughout. There are new worked examples throughout, new problems, some deeper mathematical treatment, and new sections on key topics such as diffusion, active matter, liquid crystal defects, surfactant phases and more. • Introduces the science of soft materials, experimental methods used in their study, and wide-ranging applications in everyday life. • Provides brand new worked examples throughout, in addition to expanded chapter problem sets and an updated glossary. • Includes expanded mathematical content and substantially revised introductory chapters. This book will provide a comprehensive introductory resource to both undergraduate and graduate students discovering soft materials for the first time and is aimed at students with an introductory college background in physics, chemistry or materials science. This book presents the theory of soft matter to students at the advanced undergraduate or beginning graduate level. It provides a basic introduction to theoretical physics as applied to soft matter, explaining the concepts of symmetry, broken symmetry, and order parameters; phases and phase transitions; mean-field theory; and the mathematics of variational calculus and tensors. It is written in an informal, conversational style, which is accessible to students from a diverse range of backgrounds. The book begins with a simple “toy model” to demonstrate the physical significance of free energy. It then introduces two standard theories of phase transitions—the Ising model for ferromagnetism and van der Waals theory of gases and liquids—and uses them to illustrate principles of statistical mechanics. From those examples, it moves on to discuss order, disorder, and broken symmetry in many states of matter, and to explain the theoretical methods that are used to model the phenomena. It concludes with a chapter on liquid crystals, which brings together all of these physical and mathematical concepts. The book is accompanied online by a set of “interactive figures”—some allow readers to change parameters and see what happens to a graph, some allow readers to rotate a plot or other graphics in 3D, and some do both. These interactive figures help students to develop their intuition for the physical meaning of equations. This book will prepare advanced undergraduate or early graduate students to go into more advanced theoretical studies. It will also equip students going into experimental soft matter science to be fully conversant with the theoretical aspects and have effective collaborations with theorists. Liquid crystals in the last two decades have become part of a technological explosion, leading to advances in areas as diverse as oil recovery, the production of temperature sensors--from medical thermograms to "mood rings"--and biological research into nerve conduction and arteriosclerosis. Although they are as fundamental a phase of matter as solids, liquids, and gases, liquid crystals have over the past century puzzled scientists by their very existence. With this book Peter Collings is among the first to introduce the general reader to what is known of the chemistry and physics of liquid crystals, focusing on the basic principles behind their myriad of delicate properties. Written in a clear and lively style, this work is accessible to readers with a basic science background and the willingness to learn more about this ubiquitous technology. Collings discusses the discovery of liquid crystals and the theoretical research presently being performed. He also describes important applications, emphasizing the role of liquid crystal display technology in such devices as laptop computers, automobile dashboards, and pocket color televisions. Finally, the author covers new developments pertaining to polymers, emulsions, and biological systems as well as the importance of these advances for industry and medicine. Following a semi-quantitative approach, this book presents asummary of the basic concepts, with examples and applications, andreviews recent developments in the study of optical properties ofcondensed matter systems. Key Features: Covers basic knowledge as well as application topics Includes theory, experimental techniques and current anddeveloping applications Timely and useful contribution to the literature Written by internationally respected contributors working inphysics and electrical engineering departments and governmentlaboratories This successful and widely-reviewed book covering the physics of condensed matter systems is now available in paperback. For much of the past 60 years, the U.S. research community dominated the discovery of new crystalline materials and the growth of large single crystals, placing the country at the forefront of fundamental advances in condensed-matter sciences and fueling the development of many of the new technologies at the core of U.S. economic growth. The opportunities offered by future developments in this field remain as promising as the achievements of the past. However, the past 20 years have seen a substantial deterioration in the United States' capability to pursue those opportunities at a time when several European and Asian countries have significantly increased investments in developing their own capacities in these areas. This book seeks both to set out the challenges and opportunities facing those who discover new crystalline materials and grow large crystals and to chart a way for the United States to reinvigorate its efforts and thereby return to a position of leadership in this field. Elements of Structures and Defects of Crystalline Materials has been written to cover not only the fundamental principles behind structures and defects, but also to provide deep insights into understanding the relationships of properties, defect chemistry and processing of the concerned materials. Part One deals with structures, while Part Two covers defects. Since the knowledge of the electron configuration of elements is necessary for understanding the nature of chemical bonding, it is discussed in the opening chapter. Chapter Two then describes the bonding formation within the crystal structures of varied materials, with Chapter Three delving into how a material’s structure is formed. In view of the importance of the effects of the structure distortion on the material properties due to the fields, the related topics have been included in section 3.4. Moreover, several materials still under intensive investigation have been illustrated to provide deep insights into understanding the effects of the relationships of processing, structures and defects on the material properties. The defects of materials are explored in Part II. Chapter 4 deals with the point defects of metal and ceramics. Chapter 5 covers the fundamentals of the characteristics of dislocations, wherein physics and the atomic mechanics of several issues have been described in detail. In view of the significant influence of the morphologies including size, shape and distribution of grains, phases on the microstructure evolution, and, in turn, the properties of materials, the final chapter focuses on the fundamentals of interface energies, including single phase (grain) boundary and interphase boundary. Discusses the relationship between properties, defect chemistry and the processing of materials Presents coverage of the fundamental principles behind structures and defects Includes information on two-dimensional and three-dimensional imperfections in solids Comprehensive and accessible coverage from the basics to advanced topics in modern quantum condensed matter physics. Derived from lectures at the University of Freiburg, this textbook introduces solid-state physics as well as the physics of liquids, liquid crystals and polymers. The five chapters deal with the key characteristics of condensed matter: structures, susceptibilities, molecular fields, currents, and dynamics. The author strives to present and explain coherently the terms and concepts associated with the main properties and characteristics of condensed matter, while minimizing attention to extraneous details. As a result, this text provides the firm and broad basis of understanding that readers require for further study and research. This book describes behavior of crystalline solids primarily via methods of modern continuum mechanics. Emphasis is given to geometrically nonlinear descriptions, i.e., finite deformations. Primary topics include anisotropic crystal elasticity, plasticity, and methods for representing effects of defects in the solid on the material's mechanical response. Defects include crystal dislocations, point defects, twins, voids or pores, and micro-cracks. Thermoelastic, dielectric, and piezoelectric behaviors are addressed. Traditional and higher-order gradient theories of mechanical behavior of crystalline solids are discussed. Differential-geometric representations of kinematics of finite deformations and lattice defect distributions are presented. Multi-scale modeling concepts are described in the context of elastic and plastic material behavior. Representative substances towards which modeling techniques may be applied are single- and poly- crystalline metals and alloys, ceramics, and minerals. This book is intended for use by scientists and engineers involved in advanced constitutive modeling of nonlinear mechanical behavior of solid crystalline materials. Knowledge of fundamentals of continuum mechanics and tensor calculus is a prerequisite for accessing much of the text. This book could be used as supplemental material for graduate courses on continuum mechanics, elasticity, plasticity, micromechanics, or dislocation mechanics, for students in various disciplines of engineering, materials science, applied mathematics, and condensed matter physics. While it is responsible for today’s abundance of flat screens—on televisions, computers, and mobile devices—most of us have only heard of it in the ubiquitous acronym, LCD, with little thought as to exactly what it is: liquid crystal. In this book, Esther Leslie enlightens us, offering an accessible and fascinating look at—not a substance, not a technology—but a wholly different phase of matter. As she explains, liquid crystal is a curious material phase that organizes a substance’s molecules in a crystalline form yet allows them to move fluidly like water. Observed since the nineteenth century, this phase has been a deep curiosity to science and, in more recent times, the key to a new era of media technology. In between that time, as Leslie shows, it has figured in cultural forms from Romantic landscape painting to snow globes, from mountaineering to eco-disasters, and from touchscreen devices to DNA. Expertly written but accessible, Liquid Crystals recounts the unheralded but hugely significant emergence of this unique form of matter. The third edition of this book contains authoritative contributions from specialists in the various fields of rheology. One of the most important aspects of solid materials is the regularity of the arrangement of the constituent molecules, that is, the long-range order. The focus of this book is on the contribution made by the ordering of bond orientations (as distinguished from the orientations of the molecules themselves) on the behavior of condensed systems, particularly their phase transitions. Examples in which bond-orientational effects play an important role are liquid crystals, quasicrystals, and two-dimensional crystals. This book contains contributions by many of the foremost researchers in the field. The chapters are tutorial reviews of the subject, written both for the active researcher looking for a review of a topic and for the graduate student investigating an exciting area of research. The contributions include an overview by J.D. Brock, Cornell; a discussion of computer simulation studies by K.J. Strandburg, Argonne; chapters on phase transition in hexatic liquid crystals by C.C. Huang, Minnesota and C.A. Murray, Texas A&M; and chapters on quasicrystals by S. Sachdev, Yale, M.V. Jaric, A.I. Goldman, Iowa State, and T.-L. Ho, Ohio State.

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