Superconductivity Elsevier Insights

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Nanophysics: Coherence and Transport Springer Science & Business Media
This book focuses on an increasingly important area of materials science and technology, namely, the fabrication and properties of artificial materials where slabs of magnetized materials are sandwiched between slabs of nonmagnetized materials. It includes reviews by experts on the theory and descriptions of the various experimental techniques such as those using nuclear or electron spin probes, as well as optical, X-ray or neutron probes. It also reviews potential applications such as the giant magnetoresistance, and one specialized preparation technique, the electrodeposition. The various chapters are tutorial in nature, making the subject accessible to nonspecialists, as well as useful to researchers in the field. Contents: Application of Magnetic Multilayers (M Pardavi-Horvath)Magnetic Coupling in Metallic Multilayers (Y Yafet)First-Principles Calculations of Magnetic Interfaces and Multilayers (M Weinert ' S Blügel)Influence of Imperfections on the Magnetic Properties of Fe/Ag Films and Multilayers (J Pirnay et al.)NMR Studies on Magnetic Multilayers (H A M de Gronckel ' W J M de Jonge)Conversion Electron Mössbauer Spectroscopy of Magnetic Multilayers (Ch Sauer ' W Zinn)Resonance in Coupled Ferromagnetic Layer Structures (P E Wigen)Magnetic Circular X-Ray Dichroism (F Baudelet et al.)Magneto-Optical Spectra in Multilayers (K Sato)Neutron and X-Ray Diffraction Studies of Magnetic Multilayers (C F Majkrzak et al.)Giant Magnetoresistance (GMR) in Multilayers (M Pardavi-Horvath)Electrodeposited Magnetic Multilayers (M P Dariel et al.) Readership: Graduate students, professional researchers and well-educated others (eg. contract officers). keywords:Magnetic Multilayers;Circular Dichroism;Giant Magnetoresistance;Magnetic Interfaces;Magnetic Multilayers: Effect of Imperfections;Conversion Electron Mossbauer Spectroscopy;Multilayer Magnetic Coupling;Magneto-Optical Spectroscopy;Neutron Diffraction;Magnetic Xray Diffraction;Magnetic Multilayer Fabrication;Supermirrors;Magnetic Recording;RKKY Coupling;Nuclear Magnetic Resonance;Ferromagnetic Resonance
High-Temperature Superconducting Materials Science and Engineering Elsevier
One of the most spectacular consequences of the description of the superfluid condensate in superfluid He or in superconductors as a single macroscopic quantum state is the quantization of circulation, resulting in quantized vortex lines. This book draws no distinction between superfluid He3 and He4 and superconductors. The reader will find the essential introductory chapters and the most recent theoretical and experimental progress in our understanding of the vortex state in both superconductors and superfluids, from lectures given by leading experts in the field, both experimentalists and theoreticians, who gathered in Cargèse for a NATO ASI. The peculiar features related to short coherence lengths, 2D geometry, high temperatures, disorder, and pinning are thoroughly discussed.
Nanoscience and Engineering in Superconductivity Elsevier
Superconductivity, provides a basic introduction to one of the most innovative areas in condensed matter physics today. This book includes ample tutorial material, including illustrations, chapter summaries, graded problem sets, and concise examples. This book is part of the Oxford Master Series in Condensed Matter Physics.
Electronic Materials and Devices Elsevier
Quantum sensing is a vast and emerging field enabling in-situ studies of quantum systems and hence the development of quantum hybrid systems. This work creates the fundament of direct

superconducting-magnetic hybrid systems by developing a local microwave sensing scheme and studying the influence of a static magnetic field on a superconducting qubit. Finally, a proof-of-principle hybrid system is demonstrated, which opens the path towards superconducting-magnetic quantum circuits.

Superconductivity, Superfluids and Condensates Elsevier

Mechanics and Physics of Structured Media: Asymptotic and Integral Methods of Leonid Filshtinsky provides unique information on the macroscopic properties of various composite materials and the mathematical techniques key to understanding their physical behaviors. The book is centered around the arguably monumental work of Leonid Filshtinsky. His last works provide insight on fracture in electromagnetic-elastic systems alongside approaches for solving problems in mechanics of solid materials. Asymptotic methods, the method of complex potentials, wave mechanics, viscosity of suspensions, conductivity, vibration and buckling of functionally graded plates, and critical phenomena in various random systems are all covered at length. Other sections cover boundary value problems in fracture mechanics, two-phase model methods for heterogeneous nanomaterials, and the propagation of acoustic, electromagnetic, and elastic waves in a one-dimensional periodic two-component material. Covers key issues around the mechanics of structured media, including modeling techniques, fracture mechanics in various composite materials, the fundamentals of integral equations, wave mechanics, and more Discusses boundary value problems of materials, techniques for predicting elasticity of composites, and heterogeneous nanomaterials and their statistical description Includes insights on asymptotic methods, wave mechanics, the mechanics of piezo-materials, and more Applies homogenization concepts to various physical systems

Superconductivity in d-and f=Band Metals Elsevier Science & Technology

SuperconductivityElsevier

Quantum Sensing Experiments with Superconducting Qubits Elsevier

This book provides a modern introduction to the growth, characterization, and physics of iron-based superconducting thin films. Iron pnictide and iron chalcogenide compounds have become intensively studied key materials in condensed matter physics due to their potential for high temperature superconductivity. With maximum critical temperatures of around 60 K, the new superconductors rank first after the celebrated cuprates, and the latest announcements on ultrathin films promise even more. Thin film synthesis of these superconductors began in 2008 immediately after their discovery, and this growing research area has seen remarkable progress up to the present day, especially with regard to the iron chalcogenides FeSe and FeSe1-xTex, the iron pnictide BaFe2-xCoxAs2 and iron-oxyarsenides. This essential volume provides comprehensive, state-of-the-art coverage of iron-based superconducting thin films in topical chapters with detailed information on thin film synthesis and growth, analytical film characterization, interfaces, and various aspects on physics and materials properties. Current efforts towards technological applications and functional films are outlined and discussed. The development and latest results for monolayer FeSe films are also presented. This book serves as a key reference for students, lecturers, industry engineers, and academic researchers who would like to gain an overview of this complex and growing research area.

Physics Briefs Elsevier

Functional materials have assumed a very prominent position in several high-tech areas. Such materials are not being classified on the basis of their origin, nature of bonding or processing techniques but are classified on the basis of the functions they can perform. This is a significant departure from the earlier schemes in which materials were described as metals, alloys, ceramics, polymers, glass materials etc. Several new processing techniques have also evolved in the recent past. Because of the diversity of materials and their functions it has become extremely difficult to obtain information from single source. Functional Materials: Preparation, Processing and Applications provides a comprehensive review of the latest developments. Serves as a ready reference for Chemistry, Physics and Materials Science researchers by covering a wide range of functional materials in one book Aids in the design of new materials by emphasizing structure or microstructure – property correlation Covers the processing of functional materials in detail, which helps in conceptualizing the applications of them

Functional Materials Elsevier

This volume examines in detail the role of chronic inflammatory processes in the development of several types of cancer. Leading experts describe the latest results of molecular and cellular research on infection, cancer-related inflammation and tumorigenesis. Further, the clinical significance of these findings in preventing cancer progression and approaches to treating the diseases are discussed. Individual chapters cover cancer of the lung, colon, breast, brain, head and neck, pancreas, prostate, bladder, kidney, liver, cervix and skin as well as gastric cancer, sarcoma, lymphoma, leukemia and multiple myeloma.

Issues in Nuclear, High Energy, Plasma, Particle, and Condensed Matter Physics: 2011 Edition

Superconductivity

For emerging energy saving technologies superconducting materials with superior performance are needed. Such materials can be developed by manipulating the "elementary building blocks" through nanostructuring. For superconductivity the "elementary blocks" are Cooper pair and fluxon (vortex). This book presents new ways how to modify superconductivity and vortex matter through nanostructuring and the use of nanoscale magnetic templates. The basic nano-effects, vortex and vortex-antivortex patterns, vortex dynamics, Josephson phenomena, critical currents, and interplay between superconductivity and ferromagnetism at the nanoscale are discussed. Potential applications of nanostructured superconductors are also presented in the book.

Pseudogap and Precursor Superconductivity Study of Zn doped YBCO Artech House

Magnetic and superconducting materials pervade every avenue of the technological world – from microelectronics and mass-data storage to medicine and heavy engineering. Both areas have experienced a recent revitalisation of interest due to the discovery of new materials, and the re-evaluation of a wide range of basic mechanisms and phenomena. This Concise Encyclopedia draws its material from the award-winning Encyclopedia of Materials and Engineering, and includes updates and revisions not available in the original set -- making it the ideal reference companion for materials scientists and engineers with an interest in magnetic and superconducting materials. Contains in excess of 130 articles, taken from the award-winning Encyclopedia of Materials: Science and Technology, including ScienceDirect updates not available in the original set Each article discusses one aspect of magnetic and superconducting materials and includes photographs, line drawings and tables to aid the understanding of the topic at hand Cross-referencing guides readers to articles covering subjects of related interest

Materials and Mechanisms of Superconductivity - High Temperature Superconductors Oxford University Press

Photonic and Electronic Properties of Fluoride Materials: Progress in Fluorine Science, the first volume in this new Elsevier series, provides an overview of the important optical, magnetic, and non-linear properties of fluoride materials. Beginning with a brief review of relevant synthesis methods from single crystals to nanopowders, this volume offers valuable insight for inorganic chemistry and materials science researchers. Edited and written by leaders in the field, this book explores the practical aspects of working with these materials, presenting a large number of examples from inorganic fluorides in which the type of bonding occurring between fluorine and transition metals (either d- or 4f-series) give rise to peculiar properties in many fundamental and applicative domains. This one-of-a-kind resource also includes several chapters covering functional organic fluorides used in nano-electronics, in particular in liquid crystal devices, in organic light-emitting diodes, or in organic dyes for sensitized solar cells. The book describes major advances and breakthroughs achieved by the use of fluoride materials in important domains such as superconductivity, luminescence, laser properties, multiferroism, transport properties, and more recently, in fluoro-perovskite for dye-sensitized solar cells and inorganic fluoride materials for NLO, and supports future development in these varied and key areas. The book is edited by Alain Tressaud, past chair and founder of the CNRS French Fluorine Network. Each book in the collection includes the work of highly-respected volume editors and contributors from both academia and industry to bring valuable and varied content to this active field. Provides unique coverage of the physical properties of fluoride materials for chemists and material scientists Begins with a brief review of relevant synthesis methods from single crystals to nanopowders Includes valuable information about functional organic fluorides used in nano-electronics, in particular in liquid crystal devices, in organic light-emitting diodes, or in organic dyes for sensitized solar cells

Mechanics and Physics of Structured Media BoD – Books on Demand

Treatise on Materials Science and Technology, Volume 14: Metallurgy of Superconducting Materials covers the practical use of metallurgy of superconducting materials. The book discusses the phenomenon of superconductivity; the theory of superconductors; the applications of superconductivity and the demands these applications make on materials' properties and requirements. The text also describes the metallurgy of niobium-titanium alloy conductors; the physical metallurgy of A15 compounds; and the electron microscopy of superconducting materials. The metallurgy of conductors made from A15 material, the properties required, as well as the development of superconductors for ac power transmission are considered. The book further tackles the metallurgy of niobium surfaces, and the effects of radiation on superconductors. Metallurgists, physicists, materials scientists, materials engineers, and graduate students studying superconductors will find the book invaluable.

Handbook of Superconductivity Academic Press

This completely updated second edition of an Artech House classic covers industrial applications and space and biomedical applications of magnetic sensors and magnetometers. With the advancement of smart grids, renewable energy resources, and electric vehicles, the importance of electric current sensors increased, and the book has been updated to reflect these changes. Integrated fluxgate single-chip magnetometers are presented. GMR sensors in the automotive market, especially for end-of-shaft angular sensors, are included, as well as Linear TMR sensors. Vertical Hall sensors and sensors with integrated ferromagnetic concentrators are two competing technologies, which both brought 3-axial single-chip Hall ICs, are considered. Digital fluxgate magnetometers for both satellite and ground-based applications are discussed. All-optical resonant magnetometes, based on the Coherent Population Trapping effect, has reached approval in space, and is covered in this new edition of the book. Whether you're an expert or new to the field, this unique resource offers you a thorough overview of the principles and design of magnetic sensors and magnetometers, as well as guidance in applying specific devices in the real world. The book covers both multi-channel and gradiometric magnetometer systems, special problems such as cross-talk and crossfield sensitivity, and comparisons between different sensors and magnetometers with respect to various application areas. Miniaturization and the use of new materials in magnetic sensors are also discussed. A comprehensive list of references to journal articles, books, proceedings and webpages helps you find additional information quickly.

Superconductivity in New Materials Elsevier

Here is a concise, tutorial overview of the exciting new field of high-temperature superconductivity. This authoritative textbook focuses on topics, experimental results, and theoretical issues that are likely to have lasting value and are readily understandable to upper-level undergraduates and others new to the field. Written primarily from an experimental point of view, the book reviews conventional superconductors and then presents the structure, normal state and superconducting properties, and applications of the new cuprate superconductors. An insightful analysis of critical currents in thin films and wires is included. The book will provide an excellent supplementary text for students taking their first solid state physics course. In addition, all those with a basic knowledge of solid state physics will find the book to be a useful introduction to the field. Serves as a concise, tutorial introduction to the field Requires very little solid state physics background Includes problem sets and references to key papers

Elements of Structures and Defects of Crystalline Materials Springer

The discoveries of new superconducting materials, most of them during the last 30 years, have served very much as the context for further developments in theory which continue to the present. In many of these cases, the observations of superconductivity in new materials were completely unexpected and therefore may be regarded as real discoveries. Even the most visible progress, which followed a search using, to some extent, conventional wisdom, was finally rather unexpected – the discovery of high-Tc superconductivity in copper oxides. This book presents superconductivity in this materials context and displays some of the underlying simplicity in the materials record that provided fuel for the theoretical developments. Not only is the phenomenon deeply interesting, the metallic systems where it plays out are as well, and superconductivity gives a very interesting window from which to view the nature of electrically conducting materials. The level is not advanced, yet allows the serious reader to access the current developments in the literature. Addresses in detail the exciting developments after 1980. Demonstrates that progress in superconductivity is to a large extent due to progress in materials synthesis and characterization. Gateway to the current developments in the literature.

High-Temperature Superconductivity Academic Press

In this thesis, the pseudogap and the precursor superconducting state, which are of great importance in clarifying the superconductivity mechanism in high-temperature cuprate superconductors, are investigated with a c-axis optical study in YBa2(Cu1-xZnx)3Oy. Testing was performed over a wide energy range with smaller temperature intervals for several Zn-substituted samples, as well as for several carrier-doping levels. A spectral weight (SW) analysis, in which the pseudogap behavior can be separated from the superconducting condensate with the SW transfer

to the high-energy region, revealed that the pseudogap is not the precursor of the superconductivity (carriers moving to the high-energy region with pseudogap opening never contribute to the superconducting condensation). Moreover, the high-energy transfer continues even below Tc for the Zn-substituted samples (in which we weaken the superconductivity), which gives evidence to the coexistence of the pseudogap and the superconducting gap below Tc. On the other hand, the analysis of optical conductivity revealed that a precursor state to superconductivity can be defined at temperatures much higher than Tc. The superconducting carrier density (ns) was calculated for each temperature (above and below Tc) and the results confirmed the existence of ns at temperatures above Tc. The observed real superconducting condensate (ns) above Tc puts a serious constraint on the theory for high- Tc superconductivity. A theory based on an inhomogeneous superconducting state, in which a microscopically phase-separated state in a doped Mott insulator can be observed, is the most plausible candidate. This theory can explain the existence of ns and the observed temperature range for the precursor superconducting state. The results obtained show that the pseudogap coexists with superconductivity below Tc and is not the precursor of superconductivity. On the other hand, it is also possible to define a precursor superconducting state that is different than the pseudogap. The temperature range and the observed superconducting condensate in this state can be explained with the help of the inhomogeneous superconducting state.

Concise Encyclopedia of Magnetic and Superconducting Materials Springer Science & Business Media
The field of superconductivity has tremendous potential for growth and further development in industrial applications. The subject continues to occupy physicists, chemists, and engineers interested in both the phenomena itself and possible financially viable industrial devices utilizing the physical concepts. For the past five years, within the publications of the American Physical Society, for example, 40%-60% of all articles submitted to major journals in the area of Solid State Physics have been on the subject of superconductivity, including the newer, extremely important subfield of high temperature superconductivity (high Tc). The present volume is the first handbook to address this field. It covers both "classic" superconductivity-related topics and high Tc. Numerous properties, including thermal, electrical, magnetic, mechanical, phase diagrams, and spectroscopic crystallographic structures are presented for many types of superconductors. Critical fields, critical currents, coherence lengths, penetration depths, and transition temperatures are tabulated. First handbook on Superconductivity Coherence lengths and depths are tabulated Crystallographic structures of over 100 superconductor types Main results of several theories are submitted Phase diagrams for synthesizing new superconductors are included
Inflammation and Cancer North Holland
Superconductivity in d- and f-Band Metals focuses on the establishment of systematics among d- and f-band metals, with emphasis towards developing a fundamental theory with predictive capability for these complex materials. This book examines the unique physical qualities of the d- and f-band metals that challenge our basic understanding of several general aspects of superconductivity. Organized into 59 chapters, this compilation of papers starts with an overview of the homogeneity in d- and f-band systems that offer the opportunity for relating superconductivity to the normal state microscopic parameters. This book then explores several topics, including superconductors, phonon effects, electronic structure, A-15 systematics, as well as disorder and transport. Other chapters discuss the interrelationships between superconductivity and magnetism. This text discusses as well the magnetic field dependent effects in the rare-earth ternary compounds. The final chapter deals with the complexity of the crystal structures. This book is a valuable resource for materials scientists and physicists.
Superconductivity Academic Press
In the last decades, superconducting devices have emerged as a promising platform for quantum technologies, including quantum sensing and quantum computing. Their key elements are Josephson junctions, which allow for coherent supercurrent tunneling between two weakly linked superconductors. If such a junction is extended in one direction to a long junction, the superconducting phase difference can vary in space and time and may allow for quantized phase windings that drive supercurrent vortices.