

Defects and Defect Processes in Nonmetallic Solids

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Defects And Defect Processes In Nonmetallic Solids

Noriaki Itoh



Defects And Defect Processes In Nonmetallic Solids:

Defects and Defect Processes in Nonmetallic Solids W. Hayes, A. M. Stoneham, 2012-02-10 This extensive survey covers defects in nonmetals emphasizing point defects and point defect processes It encompasses electronic vibrational and optical properties of defective solids plus dislocations and grain boundaries 1985 edition **Defect Processes Induced By Electronic Excitation In Insulators** Noriaki Itoh, 1989-11-01 Contents Overview of Defect Processes Induced by Electronic Excitation in Insulators N Itoh Excitonic Mechanism of Defect Formation in Alkali Halides as Spontaneous Symmetry Breaking Y Kayanuma Luminescence and Self Trapping of Excitons in Alkali Halides H Nishimura Time Resolved Studies of Photochemistry in Alkali Halides M Hirai Cascade Excitation Spectroscopy for Recombination Induced Defect Production in Halide Crystals K Tanimura Atomic Processes Induced by Electron Excitation at Surfaces N Itoh Readership Condensed matter physicists Keywords Materials Modification Electronic Excitation Color Centers Defect Formation Sputtering Excitons Self Trapped Excitons Polarons Luminescence Radiation Damage Semiconductor Physics Karl W. Böer, Udo W. Pohl, 2023-02-02 This handbook gives a complete and detailed survey of the field of semiconductor physics It addresses every fundamental principle the most important research topics and results as well as conventional and emerging new areas of application Additionally it provides all essential reference material on crystalline bulk low dimensional and amorphous semiconductors including valuable data on their optical transport and dynamic properties This updated and extended second edition includes essential coverage of rapidly advancing areas in semiconductor physics such as topological insulators quantum optics magnetic nanostructures and spintronic systems Richly illustrated and authored by a duo of internationally acclaimed experts in solar energy and semiconductor physics this handbook delivers in depth treatment of the field reflecting a combined experience spanning several decades as both researchers and educators Offering a unique perspective on many issues Semiconductor Physics is an invaluable reference for physicists materials scientists and engineers throughout academia and industry The Inorganic Chemistry of Materials Paul J. van der Put, 2013-06-29 P J van der Put offers students an original introduction to materials chemistry that integrates the full range of inorganic chemistry Technologists who need specific chemical facts to manipulate matter will also find this work invaluable as an easy to use reference The text includes practical subjects of immediate use for materials such as bonding morphogenesis and design that more orthodox materials science volumes often leave out Fundamentals of Solid State Engineering Manijeh Razeghi, 2018-08-21 Provides a multidisciplinary introduction to quantum mechanics solid state physics advanced devices and fabrication Covers wide range of topics in the same style and in the same notation Most up to date developments in semiconductor physics and nano engineering Mathematical derivations are carried through in detail with emphasis on clarity Timely application areas such as biophotonics bioelectronics Materials Processing Handbook Joanna R. Groza, James F. Shackelford, 2007-03-28 The field of materials science and engineering is rapidly evolving into a science of its own While traditional literature in this area often

concentrates primarily on property and structure the Materials Processing Handbook provides a much needed examination from the materials processing perspective This unique focus reflects the changing comple

Nonlinear Spectroscopy of Solids Baldassare di Bartolo, 2013-11-21 This report presents an account of the course Nonlinear Spectroscopy of Solids Advances and Applications held in Erice Italy from June 16 to 30 1993 This meeting was organized by the International School of Atomic and Molecular Spectroscopy of the Ettore Majorana Centre for Scientific Culture The purpose of this course was to present and discuss physical models mathematical formalisms experimental techniques and applications relevant to the subject of nonlinear spectroscopy of solid state materials The universal availability and application of lasers in spectroscopy has led to the widespread observation of nonlinear effects in the spectroscopy of materials Nonlinear spectroscopy encompasses many physical phenomena which have their origin in the monochromaticity spectral brightness coherence power density and tunability of laser sources Conventional spectroscopy assumes a linear dependence between the applied electromagnetic field and the induced polarization of atoms and molecules The validity of this assumption rests on the fact that even the most powerful conventional sources of light produce a light intensity which is not strong enough to equalize the rate of stimulated emission and that of the experimentally observed decay A different situation may arise when laser light sources are used particularly pulsed lasers The use of such light sources can make the probability of induced emission comparable to or even greater than the probability of the observed decay in such cases the nonlinearity of the response of the system is revealed by the experimental data and new properties not detectable by conventional spectroscopy will emerge

The Physics and Chemistry of Solids Stephen Elliott, 1998-09-16 Taking an original imaginative approach to the subject Stephen Elliott's book is one of the first to bridge the gap between solid state physics and chemistry Considerable thought has gone into the structure and content of this book with the first four chapters covering the properties of atoms in solids and the remaining four concentrating on the behaviour of electrons in materials Fundamental principles are covered together with the very latest developments such as combinatorial library synthesis mesoporous materials fullerenes and nanotubes optical localization and the experimental observation of fractional electronic charge Clearly written and richly illustrated The Physics and Chemistry of Solids will be of great interest to Physicists Chemists Material Scientists and Engineers

Advances in the Crystallographic and Microstructural Analysis of Charge Density Wave Modulated Crystals F.W. Boswell, J. Craig Bennett, 2012-12-06 Modulated crystals have been intensively investigated over the past several years and it is now evident that an understanding of their crystallography and microstructure is fundamental to the elucidation of the physical properties and phase transitions in these materials This book brings together for the first time the crystallographic descriptions and experimental methods for the structural and microstructural analysis of modulated crystals as described by well known researchers in the various areas The emphasis is on charge density wave modulations and the detailed analysis of the prototypical NbTe₄ TaTe₄ system gives practical applications of the methods Scanning Tunnelling

Microscopy is a new technique providing significant new insights into atomic scale details of the modulations structures and a chapter on this method is included

Properties Of Perovskites And Other Oxides Tom W Kool, Karl Alex

Muller, 2010-05-07 This collection of reprints allows the reader to chart the course of Muller's scientific development from his early papers in the late 1950s all the way to high temperature superconductivity in 1985 A particular highlight is Muller's work on the Jahn Teller effect written in 1967 and appearing only as an article in a conference proceedings is a gem Other treasures include the reviews on structural phase transitions from 1981 and 1991 respectively that are otherwise only obtainable in specialist books Contemporary Physics In this book some 50 papers published by K A Muller as author or co author over several decades amplified by more recent work mainly by T W Kool with collaborators are reproduced The main subject is Electron Paramagnetic Resonance EPR applied to the study of perovskites and other oxides with related subjects This wealth of papers is organized into eleven chapters each with an introductory text written in the light of current understanding The contributions of the first editor on structural phase transitions have been immense and because K A Muller and J C Fayet have published a review paper on the subject the latter is reproduced in chapter VII Not related to EPR is a part of chapter VIII on the dipolar and quantum paraelectric behavior with dielectric studies In chapter X two papers proving the existence of Fermi glasses are reproduced The year 1986 bears some significance early in this year the paper by Bednorz and Muller on the possible observation of superconductivity was published This resulted in a substantial shift in the paradigm of condensed matter physics to which the present first editor has contributed scientifically with others and which will be reviewed in a second volume

Optical Properties of Excited States in Solids Baldassare di Bartolo, 2012-12-06

This book presents an account of the course Optical Properties of Excited States in Solids held in Erice Italy from June 16 to 30 1991 This meeting was organized by the International School of Atomic and Molecular Spectroscopy of the Ettore Majorana Centre for Scientific Culture The purpose of this course was to present physical models mathematical formalisms and experimental techniques relevant to the optical properties of excited states in solids Some active physical species such as ions or radicals could survive indefinitely if they were completely isolated in space Other active species such as excited molecular and solid state systems are inherently unstable even in isolation due to the spontaneous mechanisms that may convert their excitation energies into radiation or heat Physical parameters that may be used to characterize these excited systems are the localization or delocalization and the coherence or incoherence of their state excitations In solids the excited states whether they are localized as for impurities in insulators or delocalized as they may occur in semiconductors are relevant in several regards Their de excitation is extremely sensitive to the nature of the excitations of the systems and a study of the de excitation processes can yield a variety of information For example the excited states may represent the initial condition of the onset of such processes as Stokes shifted emission hot luminescence symmetry dependent Jahn Teller and scattering processes tunneling processes energy transfer to like and unlike centers superradiance coherent radiation and

excited state absorption **Laser Ablation** John C. Miller, 2013-11-09 Laser Ablation provides a broad picture of the current understanding of laser ablation and its many applications from the views of key contributors to the field Discussed are in detail the electronic processes in laser ablation of semiconductors and insulators the post ionization of laser desorbed biomolecules Fourier transform mass spectroscopy the interaction of laser radiation with organic polymers laser ablation and optical surface damage laser desorption ablation with laser detection and laser ablation of superconducting thin films

Introduction to Solid State Ionics C. S. Sunandana, 2015-11-11 Introduction to Solid State Ionics Phenomenology and Applications presents a pedagogical graduate level treatment of the science and technology of superionic conductors also known as fast ion conductors or solid electrolytes Suitable for physics materials science and engineering researchers and students the text emphasizes basic physics and Solid State Chemistry and its Applications Anthony R. West, 2022-04-06 SOLID STATE CHEMISTRY AND ITS APPLICATIONS A comprehensive treatment of solid state chemistry complete with supplementary material and full colour illustrations from a leading expert in the field Solid State Chemistry and its Applications Second Edition delivers an advanced version of West's classic text in solid state chemistry expanding on the undergraduate Student Edition to present a comprehensive treatment of solid state chemistry suitable for advanced students and researchers The book provides the reader with an up to date account of essential topics in solid state chemistry and recent developments in this rapidly developing field of inorganic chemistry Significant updates and new content in this second edition include A more extensive overview of important families of inorganic solids including spinels perovskites pyrochlores garnets Ruddlesden Popper phases and many more New methods to synthesise inorganic solids including sol gel methods combustion synthesis atomic layer deposition spray pyrolysis and microwave techniques Advances in electron microscopy X ray and electron spectroscopies New developments in electrical properties of materials including high T_c superconductivity lithium batteries solid oxide fuel cells and smart windows Recent developments in optical properties including fibre optics solar cells and transparent conducting oxides Advances in magnetic properties including magnetoresistance and multiferroic materials Homogeneous and heterogeneous ceramics characterization using impedance spectroscopy Thermoelectric materials MXenes low dimensional structures memristors and many other functional materials Expanded coverage of glass including metallic and fluoride glasses cement and concrete geopolymers refractories and structural ceramics Overview of binary oxides of all the elements their structures properties and applications Featuring full color illustrations throughout readers will also benefit from online supplementary materials including access to CrystalMaker software and over 100 interactive crystal structure models Perfect for advanced students seeking a detailed treatment of solid state chemistry this new edition of Solid State Chemistry and its Applications will also earn a place as a desk reference in the libraries of experienced researchers in chemistry crystallography physics and materials science **Phonon Physics The Cutting Edge** , 1995-12-13 The first two volumes in this series published twenty years ago contained chapters devoted

to anharmonic properties of solids ab initio calculations of phonons in metals and insulators and surface phonons In the intervening years each of these important areas of lattice dynamics has undergone significant developments This volume is therefore concerned with reviewing the current status of these areas Chapter one deals with the path integral quantum Monte Carlo method as a numerical simulation approach and looks at how this has been applied successfully to the determination of low temperature thermodynamic properties of anharmonic crystals and to certain dynamical properties as well Chapter two is concerned with the calculation of static and dynamic properties of anharmonic crystals in the quantum regime Chapter three discusses intrinsic anharmonic localized modes that have been intensively studied recently Two topics ab initio calculations of phonons in metals and surface phonons are dealt with in the next chapter The remaining two chapters are devoted to topics that have not been treated in previous volumes One is phonon transport and the second is phonons in disordered crystals The work described in the six chapters of this volume testifies to the continuing vitality of the field of dynamical properties of solids nearly a century after its founding

Materials Modification by Electronic Excitation
Noriaki Itoh, Marshall Stoneham, 2001 Electronic excitation is a means to change materials properties This book analyses the important features of the changes induced by electronic excitation identifies what is critical and provides a basis from which materials modification can be developed successfully Electronic excitation by lasers or electron beams can change the properties of materials In the last few years there has been a mix of basic science of new laser and electron beam tools and of new needs from microelectronics photonics and nanotechnology This book extends and synthesises the science addressing ideas like energy localisation and charge localisation with detailed comparisons of experiment and theory It also identifies the ways this understanding links to technological needs like selective removal of material controlled changes altering the balance between process steps and possibilities of quantum control This book will be of particular interest to research workers in physics chemistry electronic engineering and materials science

Ion Beams in Nanoscience and Technology
Ragnar Hellborg, Harry J. Whitlow, Yanwen Zhang, 2009-11-09 Energetic ion beam irradiation is the basis of a wide plethora of powerful research and fabrication techniques for materials characterisation and processing on a nanometre scale Materials with tailored optical magnetic and electrical properties can be fabricated by synthesis of nanocrystals by ion implantation focused ion beams can be used to machine away and deposit material on a scale of nanometres and the scattering of energetic ions is a unique and quantitative tool for process development in high speed electronics and 3 D nanostructures with extreme aspect ratios for tissue engineering and nano fluidics lab on a chip may be machined using proton beams This book will benefit practitioners researchers and graduate students working in the field of ion beams and application and more generally everyone concerned with the broad field of nanoscience and technology

The Surface Science of Metal Oxides
Victor E. Henrich, P. A. Cox, 1994 Publisher Description

Insulating Materials For Optoelectronics: New Developments
Fernando Agullo-lopez, Carmen N Afonso, William M Yen, David Levy, O F Schirmer, Reiner Vianden, L E Bausa, A Kling, M F Da

Silva, Thomas Gog, Hans Donnerberg, Carolina Medrano, M P De Micheli, Yu N Korkishko, P Bassi, Paolo Mazzoldi, Giancarlo C Righini, Peter D Townsend, Ernesto Dieguez, P Olmos, 1995-11-07 This review volume presents new developments in the preparation physical characterization and applications of insulating materials for Optoelectronics Insulators occupy a leading position as laser and optical amplifier hosts electrooptic and acoustooptic modulators frequency doublers and optical parametric oscillators photorefractive devices and radiator detectors These applications rely heavily on the development of advanced techniques for the preparation of both bulk and waveguide structures the adequate knowledge of the microscopic behaviour defects impurities and a thorough understanding of their response to electromagnetic fields All these topics relating basic physicochemical aspects and applied performance are authoritatively discussed in the book **Physics and Chemistry of Luminescent Materials** C. R. Ronda, Lauren E. Shea, Alok M. Srivastava, 2000

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