

mössbauer spectroscopy and transition metal chemistry fundamentals and application 1st edition

[#Mössbauer spectroscopy](#) [#transition metal chemistry](#) [#Mössbauer applications](#) [#inorganic chemistry spectroscopy](#) [#solid state chemistry](#)

Explore the core principles of Mössbauer spectroscopy and its vital role in understanding transition metal chemistry. This comprehensive 1st edition delves into both the fundamentals and diverse applications, offering essential insights for students and researchers in inorganic and solid state chemistry.

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Mössbauer Spectroscopy and Transition Metal Chemistry

Two decades have passed since the original discovery of recoilless nuclear gamma resonance by Rudolf Mossbauer; the spectroscopic method based on this resonance effect - referred to as Mossbauer spectroscopy - has developed into a powerful tool in solid-state research. The users are chemists, physicists, biologists, geologists, and scientists from other disciplines, and the spectrum of problems amenable to this method has become extraordinarily broad. In the present volume we have confined ourselves to applications of Mossbauer spectroscopy to the area of transition elements. We hope that the book will be useful not only to non-Mossbauer specialists with problem-Oriented activities in the chemistry and physics of transition elements, but also to those actively working in the field of Mossbauer spectroscopy on systems (compounds as well as alloys) of transition elements. The first five chapters are directed to introducing the reader who is not familiar with the technique to the principles of the recoilless nuclear resonance effect, the hyperfine interactions between nuclei and electronic properties such as electric and magnetic fields, some essential aspects about measurements, and the evaluation of Mossbauer spectra. Chapter 6 deals with the interpretation of Mossbauer parameters of iron compounds. Here we have placed emphasis on the information about the electronic structure, in correlation with quantum chemical methods, because of its importance for chemical bonding and magnetic properties.

Mössbauer Spectroscopy and Transition Metal Chemistry

concentrates on teaching techniques using as much theory as needed. application of the techniques to many problems of materials characterization. Mössbauer spectroscopy is a profound analytical method which has nevertheless continued to develop. The authors now present a state-of-the art book which consists of two parts. The first part details the fundamentals of Mössbauer spectroscopy and

is based on a book published in 1978 in the Springer series 'Inorganic Chemistry Concepts' by P. Gülich, R. Link and A.X. Trautwein. The second part covers useful practical aspects of measurements, and the application of the techniques to many problems of materials characterization. The update includes the use of synchrotron radiation and many instructive and illustrative examples in fields such as solid state chemistry, biology and physics, materials and the geosciences, as well as industrial applications. Special chapters on magnetic relaxation phenomena (S. Morup) and computation of hyperfine interaction parameters (F. Neese) are also included. The book concentrates on teaching the technique using theory as much as needed and as little as possible. The reader will learn the fundamentals of the technique and how to apply it to many problems of materials characterization. Transition metal chemistry, studied on the basis of the most widely used Mössbauer isotopes, will be in the foreground.

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Spectroscopy in Inorganic Chemistry

Spectroscopy in Inorganic Chemistry, Volume I describes the innovations in various spectroscopic methods that are particularly effective in inorganic chemistry studies. This volume contains nine chapters; each chapter discusses a specific spectroscopic method, their fundamental principles, methods, instrumentation, advantages disadvantages, and application. Chapter 1 covers some of the general principles and experiments that have been used in the recording and interpretation of crystal spectra of molecules that contain transition-metal ions. Chapter 2 illustrates the application of spectroscopic techniques to the photochemistry of small inorganic molecules, non-transition-metal compounds, and transition-metal complexes. The remaining chapters examine several spectroscopic methods, such as matrix isolation, mass, soft X-ray, and Mössbauer spectroscopies, high-resolution NMR, and nuclear quadrupole resonance, with a particular emphasis on their effective application in inorganic chemistry studies. This book will be of great benefit to inorganic chemists, spectroscopists, and inorganic chemistry teachers and students.

Magnetic Spinel

Magnetic spinels including ferrites are insulating magnetic oxides and chalcogenides with strong coupling to microwave frequencies and low eddy current losses making them indispensable for applications in wireless communications. The 13 chapters and preface of this book discuss other potential applications of magnetic spinels along with various methods used for their synthesis and their varied properties resulting from substituting different metal ions at the A and B sites. These applications include ferrofluids, anticorrosion coatings, absorber coatings for photothermal conversion, biomedicine, and environmental applications such as oxidation of volatile organic compounds and removal of arsenic and heavy metals from water. Emphasis is placed on structure-property correlations and on the nature of magnetism in spinels and their nanoparticles with current information provided for future research.

Contrast Agents for MRI

As a practical reference guide for designing and performing experiments, this book focuses on the five most common classes of contrast agents for MRI, namely gadolinium complexes, chemical exchange

saturation transfer agents, iron oxide nanoparticles, manganese complexes and fluorine contrast agents. It describes how to characterize and evaluate them and for each class, a description of the theory behind their mechanisms is discussed briefly to orient the new reader. Detailed subchapters discuss the different physical chemistry methods used to characterize them in terms of their efficacy, safety and in vivo behavior. Important consideration is also given to the different physical properties that affect the performance of the contrast agents. The editors and contributors are at the forefront of research in the field of MRI contrast agents and this unique, cutting edge book is a timely addition to the literature in this area.

Mossbauer Spectroscopy

Mössbauer Spectroscopy Unique and comprehensive overview of versatile applications of Mössbauer spectroscopy in chemistry and material sciences Mössbauer Spectroscopy provides a comprehensive overview of relevant applications of this physical analysis method in chemistry and material sciences. The book shows the versatility of Mössbauer spectroscopy in finding useful information on electronic structure, structural insights, and solid-state effects of chemical systems. A wide range of chemical applications and applied concepts are covered as well as numerous examples, selected from recent literature. To aid in reader comprehension and accessibility, contents are well-structured and divided in different sections covering energy, catalysis, coordination chemistry, spin crossover, sensing, photomagnetism. Edited by prominent scientists in the field and authored by a group of international experts, Mössbauer Spectroscopy covers sample topics such as: Li-ion batteries, catalysts, fuel cells, Fe based silicides and iron phosphates containing minerals Gold clusters and gold mixed valence complexes Molecule based magnets, photoswitchable spin crossover coordination polymers and molecular sensors for meat freshness control With comprehensive coverage of the developments in the technique, Mössbauer Spectroscopy is a beneficial resource for researchers, professionals, and academics in chemistry related fields, such as material science, sustainable environment, and molecular electronics. It can be used by newcomers as well as for educational purposes at the master and PhD levels.

Handbook of Solid State Chemistry, 6 Volume Set

This most comprehensive and unrivaled compendium in the field provides an up-to-date account of the chemistry of solids, nanoparticles and hybrid materials. Following a valuable introductory chapter reviewing important synthesis techniques, the handbook presents a series of contributions by about 150 international leading experts -- the "Who's Who" of solid state science. Clearly structured, in six volumes it collates the knowledge available on solid state chemistry, starting from the synthesis, and modern methods of structure determination. Understanding and measuring the physical properties of bulk solids and the theoretical basis of modern computational treatments of solids are given ample space, as are such modern trends as nanoparticles, surface properties and heterogeneous catalysis. Emphasis is placed throughout not only on the design and structure of solids but also on practical applications of these novel materials in real chemical situations.

Surfaces and Interfaces of Metal Oxide Thin Films, Multilayers, Nanoparticles and Nano-composites

This book provides a general overview and current state of the art of different types of metal oxide nanomaterials, either in nanoparticles or thin film structure. It covers from the development and optimization of different nanofabrication/synthesis techniques for nanostructures which are currently the attention of the research community, the study of the structure and interactions by different characterization techniques of heterostructured materials and the final impact in different applications such as nanotherapy, data storage, super magnets, high-frequency devices. The book's 13 chapters provide deep insight into the intriguing science of oxide materials and include contributions on novel technologies to fabricate nanomaterials with a broad range of functional properties (semiconducting, magnetic, ferroelectric, thermoelectric, optical, flexible and mechanical). This book is intended to the experts for consolidation of their knowledge but also for students who aim to learn and get basics of nanostructured metal oxides in diverse forms.

Nuclear and Radiochemistry

This handbook gives a complete and concise description of the up-to-date knowledge of nuclear and radiochemistry and applications in the various fields of science. It is based on teaching courses and on research for over 40 years. The book is addressed to any researcher wishing sound knowledge

about the properties of matter, be it a chemist, a physicist, a medical doctor, a mineralogist or a biologist. They will all find it a valuable source of information about the principles and applications of nuclear and radiochemistry. Research in radiochemistry includes: Study of radioactive matter in nature, investigation of radioactive transmutations by chemical methods, chemistry of radioelements etc. Applications include: Radionuclides in geo- and cosmochemistry, dating by nuclear methods, radioanalysis, Mössbauer spectroscopy and related methods, behaviour of natural and man-made radionuclides in the environment, dosimetry and radiation protection. All subjects are presented clearly and comprehensibly, and in logical sequence. Detailed derivations of equations are avoided and relevant information is compiled in tables. The recent edition of the multi-coloured Karlsruhe 'Chart of the Nuclides' is included. Clearly a standard work by an author with extensive experience in research and teaching.

Molecular Spectroscopy—Experiment and Theory

This book reviews various aspects of molecular spectroscopy and its application in materials science, chemistry, physics, medicine, the arts and the earth sciences. Written by an international group of recognized experts, it examines how complementary applications of diverse spectroscopic methods can be used to study the structure and properties of different materials. The chapters cover the whole spectrum of topics related to theoretical and computational methods, as well as the practical application of spectroscopic techniques to study the structure and dynamics of molecular systems, solid-state crystalline and amorphous materials, surfaces and interfaces, and biological systems. As such, the book offers an invaluable resource for all researchers and postgraduate students interested in the latest developments in the theory, experimentation, measurement and application of various advanced spectroscopic methods for the study of materials.

Mossbauer Spectroscopy

Mossbauer spectroscopy has proved itself a versatile technique, finding applications in diverse areas of science and industry. Starting from physics and chemistry it spread into biochemistry, mineralogy, biochemistry, corrosion science, geochemistry and archaeology, with applications in industrial and scientific research. The author aims to help advanced university students, professionals and research workers who ask the question "what's in it for us?". After a concise account of experimental techniques, he emphasizes those applications in which there are few, if any, alternative ways of obtaining the same information about electron fields and the nuclei. He explains areas of industrial interest, including the important applications related to tin and iron on which there is much activity in research and development, and interprets the extension of Mossbauer techniques to main group, transitional and other suitable elements. Attention is paid to factors which may lead to misinterpretation of spectra and another chapter covers the complexities of interpreting emission spectra. Discusses the appearance of Mossbauer spectroscopy in biochemistry, mineralogy, biochemistry, corrosion science, geochemistry and archaeology, with applications in industrial and scientific research. Emphasizes the applications in which there are few, if any, alternative ways of obtaining the same information about electron fields and the nuclei. Attention is paid to the complexities of interpreting emission spectra and the factors which may lead to misinterpretation of spectra.

Remote Compositional Analysis

Comprehensive overview of the spectroscopic, mineralogical, and geochemical techniques used in planetary remote sensing.

Spin States in Biochemistry and Inorganic Chemistry

It has long been recognized that metal spin states play a central role in the reactivity of important biomolecules, in industrial catalysis and in spin crossover compounds. As the fields of inorganic chemistry and catalysis move towards the use of cheap, non-toxic first row transition metals, it is essential to understand the important role of spin states in influencing molecular structure, bonding and reactivity. Spin States in Biochemistry and Inorganic Chemistry provides a complete picture on the importance of spin states for reactivity in biochemistry and inorganic chemistry, presenting both theoretical and experimental perspectives. The successes and pitfalls of theoretical methods such as DFT, ligand-field theory and coupled cluster theory are discussed, and these methods are applied in studies throughout the book. Important spectroscopic techniques to determine spin states in transition metal complexes and proteins are explained, and the use of NMR for the analysis of

spin densities is described. Topics covered include: DFT and ab initio wavefunction approaches to spin states Experimental techniques for determining spin states Molecular discovery in spin crossover Multiple spin state scenarios in organometallic reactivity and gas phase reactions Transition-metal complexes involving redox non-innocent ligands Polynuclear iron sulfur clusters Molecular magnetism NMR analysis of spin densities This book is a valuable reference for researchers working in bioinorganic and inorganic chemistry, computational chemistry, organometallic chemistry, catalysis, spin-crossover materials, materials science, biophysics and pharmaceutical chemistry.

The Rudolf Mössbauer Story

The “Rudolf Mössbauer Story” recounts the history of the discovery of the “Mössbauer Effect” in 1958 by Rudolf Mössbauer as a graduate student of Heinz Maier-Leibnitz for which he received the Nobel Prize in 1961 when he was 32 years old. The development of numerous applications of the Mössbauer Effect in many fields of sciences, such as physics, chemistry, biology and medicine is reviewed by experts who contributed to this wide spread research. In 1978 Mössbauer focused his research interest on a new field “Neutrino Oscillations” and later on the study of the properties of the neutrinos emitted by the sun.

Mechanical Properties in Progressive Mechanically Processed Metallic Materials

The demands on innovative materials given by the ever-increasing requirements of contemporary industry require the use of high-performance engineering materials. The properties of materials and alloys are a result of their structures, which can primarily be affected by the preparation/production process. However, the production of materials featuring high levels of the required properties without the necessity to use costly alloying elements or time- and money-demanding heat treatment technologies typically used to enhance the mechanical properties of metallic materials (especially specific strength) still remains a challenge. The introduction of thermomechanical treatment represented a breakthrough in grain refinement, consequently leading to significant improvement of the mechanical properties of metallic materials. Contrary to conventional production technologies, the main advantage of such treatment is the possibility to precisely control structural phenomena that affect the final mechanical and utility properties. Thermomechanical treatment can only decrease the grain size to the scale of microns. However, further research devoted to pushing materials' performance beyond the limits led to the introduction of severe plastic deformation (SPD) methods providing producers with the ability to acquire ultra-fine-grained and nanoscaled metallic materials with superior mechanical properties. SPD methods can be performed with the help of conventional forming equipment; however, many newly designed processes have also been introduced.

Spectral Methods in Transition Metal Complexes

Spectral Methods in Transition Metal Complexes provides a conceptual understanding on how to interpret the optical UV-vis, vibrational EPR, and NMR spectroscopy of transition metal complexes. Metal complexes have broad applications across chemistry in the areas of drug discovery, such as anticancer drugs, sensors, special materials for specific requirements, and catalysis, so a thorough knowledge in preparation and characterization of metal complexes, while niche, is critical. Accessible to both the seasoned researcher and the graduate student alike, this book provides readers with a single source of content that addresses spectral methods in transition metal complexes. Provides readers with a single reference on metal complexes and coordination compounds Contains more than 100 figures, tables, and illustrations to aid in the retention of key concepts Authored by a scientist with nearly 40 years of experience in research and instruction

Nuclear and Radiochemistry

Nuclear and Radiochemistry The leading resource for anyone looking for an accessible and authoritative introduction to nuclear and radiochemistry In the newly revised Fourth Edition of Nuclear and Radiochemistry: Fundamentals and Applications, distinguished chemist Jens-Volker Kratz delivers a two-volume handbook that has become the gold standard in teaching and learning nuclear and radiochemistry. The books cover the theory and fundamentals of the subject before moving on the technical side of nuclear chemistry, with coverage of nuclear energy, nuclear reactors, and radionuclides in the life sciences. This latest edition discusses the details and impact of the Chernobyl and Fukushima nuclear disasters, as well as new research facilities, including FAIR and HIM. It also incorporates new methods for target preparation and new processes for nuclear fuel recycling, like

EURO-GANEX. Finally, the volumes extensively cover environmental technological advances and the effects of radioactivity on the environment. Readers will also find: An accessible and thorough introduction to the fundamental concepts of nuclear physics and chemistry, including atomic processes, classical mechanics, relativistic mechanics, and the Heisenberg Uncertainty Principle Comprehensive explorations of radioactivity in nature, radioelements, radioisotopes and their atomic masses, and other physical properties of nuclei Practical discussions of the nuclear force, nuclear structure, decay modes, radioactive decay kinetics, and nuclear radiation In-depth examinations of the statistical considerations relevant to radioactivity measurements Written for practicing nuclear chemists and atomic physicists, Nuclear and Radiochemistry: Fundamentals and Applications is also an indispensable resource for nuclear physicians, power engineers, and professionals working in the nuclear industry.

Principles and Practices of Molecular Properties

A comprehensive yet accessible exploration of quantum chemical methods for the determination of molecular properties of spectroscopic relevance Molecular properties can be probed both through experiment and simulation. This book bridges these two worlds, connecting the experimentalist's macroscopic view of responses of the electromagnetic field to the theoretician's microscopic description of the molecular responses. Comprehensive in scope, it also offers conceptual illustrations of molecular response theory by means of time-dependent simulations of simple systems. This important resource in physical chemistry offers: A journey in electrodynamics from the molecular microscopic perspective to the conventional macroscopic viewpoint The construction of Hamiltonians that are appropriate for the quantum mechanical description of molecular properties Time- and frequency-domain perspectives of light-matter interactions and molecular responses of both electrons and nuclei An introduction to approximate state response theory that serves as an everyday tool for computational chemists A unified presentation of prominent molecular properties Principles and Practices of Molecular Properties: Theory, Modeling and Simulations is written by noted experts in the field. It is a guide for graduate students, postdoctoral researchers and professionals in academia and industry alike, providing a set of keys to the research literature.

Nuclear and Radiochemistry, 2 Volume Set

The third edition of this classic in the field is completely updated and revised with approximately 30% new content so as to include the latest developments. The handbook and ready reference comprehensively covers nuclear and radiochemistry in a well-structured and readily accessible manner, dealing with the theory and fundamentals in the first half, followed by chapters devoted to such specific topics as nuclear energy and reactors, radiotracers, and radionuclides in the life sciences. The result is a valuable resource for both newcomers as well as established scientists in the field.

Analytical Geomicrobiology

A comprehensive handbook outlining state-of-the-art analytical techniques used in geomicrobiology, for advanced students, researchers and professional scientists.

Mossbauer Spectroscopy and Its Chemical Applications

This book describes most recent progress in the properties, synthesis, characterization, modelling, and applications of nanomaterials and nanodevices. It begins with the review of the modelling of the structural, electronic and optical properties of low dimensional and nanoscale semiconductors, methodology of synthesis, and characterization of quantum dots and nanowires, with special attention towards Dirac materials, whose electrical conduction and sensing properties far exceed those of silicon-based materials, making them strong competitors. The contributed reviews presented in this book touch on broader issues associated with the environment, as well as energy production and storage, while highlighting important achievements in materials pertinent to the fields of biology and medicine, exhibiting an outstanding confluence of basic physical science with vital human endeavor. The subjects treated in this book are attractive to the broader readership of graduate and advanced undergraduate students in physics, chemistry, biology, and medicine, as well as in electrical, chemical, biological, and mechanical engineering. Seasoned researchers and experts from the semiconductor/device industry also greatly benefit from the book's treatment of cutting-edge application studies.

Progress in Nanoscale and Low-Dimensional Materials and Devices

This volume on iron-sulfur proteins includes chapters that describe the initial discovery of iron-sulfur proteins in the 1960s to elucidation of the roles of iron sulfur clusters as prosthetic groups of enzymes, such as the citric acid cycle enzyme, aconitase, and numerous other proteins, ranging from nitrogenase to DNA repair proteins. The capacity of iron sulfur clusters to accept and delocalize single electrons is explained by basic chemical principles, which illustrate why iron sulfur proteins are uniquely suitable for electron transport and other activities. Techniques used for detection and stabilization of iron-sulfur clusters, including EPR and Mossbauer spectroscopies, are discussed because they are important for characterizing unrecognized and elusive iron sulfur proteins. Recent insights into how nitrogenase works have arisen from multiple advances, described here, including studies of high-resolution crystal structures.

Characterization, Properties and Applications

The intent of this book is to provide readers with a comprehensive view of application of advanced nuclear analytical techniques for metallomics and metalloproteomics, both areas emerging as scientific hot topics in bioanalytical and inorganic chemistry and biochemistry. Metallomics and metalloproteomics study is not only for chemists involved in nuclear techniques and speciation, it also be important for environmental, nutritional and clinical researcher and drug developer. This authoritative book sets out to emphasize and describe the superiority of nuclear analytical techniques and the importance of metallomics and metalloproteomics study in the multidisciplinary research field. Analytical chemists and scientists working on bioanalytical and inorganic chemistry and biochemistry of metals; or on metabolic or environmental related speciation studies will find this book an invaluable reference point.

Mössbauer Spectroscopy and Its Chemical Applications

Concise overview of synthesis and characterization of single molecule magnets Molecular magnetism is explored as an alternative to conventional solid-state magnetism as the basis for ultrahigh-density memory materials with extremely fast processing speeds. In particular single-molecule magnets (SMM) are in the focus of current research, both because of their intrinsic magnetization properties, as well as because of their potential use in molecular spintronic devices. SMMs are fascinating objects on the example of which one can explain many concepts. Single-Molecule Magnets: Molecular Architectures and Building Blocks for Spintronics starts with a general introduction to single-molecule magnets (SMM), which helps readers to understand the evolution of the field and its future. The following chapters deal with the current synthetic methods leading to SMMs, their magnetic properties and their characterization by methods such as high-field electron paramagnetic resonance, paramagnetic nuclear magnetic resonance, and magnetic circular dichroism. The book closes with an overview of radical-bridged SMMs, which have shown application potential as building blocks for high-density memories. Covers a hot topic – single-molecule magnetism is one of the fastest growing research fields in inorganic chemistry and materials science Provides researchers and newcomers to the field with a solid foundation for their further work Single-Molecule Magnets: Molecular Architectures and Building Blocks for Spintronics will appeal to inorganic chemists, materials scientists, molecular physicists, and electronics engineers interested in the rapidly growing field of study.

Nuclear Analytical Techniques for Metallomics and Metalloproteomics

"One impressive and compressive book. . . . This review would have to be book size to do full justice to all the insights in this volume." —Journal of Metals Online Fully updated and expanded to reflect recent advances, this Fifth Edition of the classic text provides students and professional chemists with a comprehensive introduction to the principles and general properties of organometallic compounds, as well as including practical information on reaction mechanisms and detailed descriptions of contemporary applications. With increased focus on organic synthesis applications, nanoparticle science, and green chemistry, the Fifth Edition brings this vital resource up to date. New to the Fifth Edition: Chapters have been updated with relevant examples in the field, modern trends, and new applications; the organic applications chapter has been completely rewritten New end-of-chapter problems, along with their solutions Coverage enhanced with developments in nanoparticle science Increased focus on green chemistry An unparalleled pedagogic resource as well as a valuable working reference for professional chemists, with comprehensive coverage and up-to-date information, students and researchers in organic and organometallic chemistry will turn to The Organometallic Chemistry of the Transition Metals, Fifth Edition for the critical information they need on organometallic compounds, their preparation, and their use in synthesis.

Single-Molecule Magnets

There are many mononuclear iron containing enzymes in nature that utilize molecular oxygen and transfer one or both oxygen atoms of O₂ to substrates. These enzymes catalyze many processes including the biosynthesis of hormones, the metabolism of drugs, DNA and RNA base repair and, the biosynthesis of antibiotics. Therefore, mononuclear iron containing enzymes are important intermediates in bioprocesses and have great potential in the commercial biosynthesis of specific products since they often catalyze reactions regioselectively or stereospecifically. Understanding their mechanism and function is important and will assist in searches for commercial exploitation. In recent years, advances in experimental as well as theoretical methodologies have made it possible to study the mechanism and function of these enzymes and much information on their properties has been gained. This book highlighting recent developments in the field is, therefore, a timely addition to the literature and will interest a broad readership in the fields of biochemistry, inorganic chemistry and computational chemistry. The Editors, leaders in the field of nonheme and heme iron containing monooxygenases, have filled the book with topical review chapters by leaders in the various sub-disciplines.

Applications of Mössbauer Spectroscopy

This text provides a general background as a course module in the area of inorganic reaction mechanisms, suitable for advanced undergraduate and postgraduate study and/or research. The topic has important research applications in the metallurgical industry and is of interest in the science of biochemistry, biology, organic, inorganic and bioinorganic chemistry. In addition to coverage of substitution reactions in four-, five- and six-coordinate complexes, the book contains further chapters devoted to isomerization and racemization reactions, to the general field of redox reactions, and to the reactions of coordinated ligands. It is relevant in other fields such as organic, bioinorganic and biological chemistry, providing a bridge to organic reaction mechanisms. The book also contains a chapter on the kinetic background to the subject with many illustrative examples which should prove useful to those beginning research. Provides a general background as a course module in the area of inorganic reaction mechanisms, which has important research applications in the metallurgical industry. Contains further chapters devoted to isomerization and racemization reactions, to the general field of redox reactions, and to the reactions of coordinated ligands.

The Organometallic Chemistry of the Transition Metals

The series Structure and Bonding publishes critical reviews on topics of research concerned with chemical structure and bonding. The scope of the series spans the entire Periodic Table and addresses structure and bonding issues associated with all of the elements. It also focuses attention on new and developing areas of modern structural and theoretical chemistry such as nanostructures, molecular electronics, designed molecular solids, surfaces, metal clusters and supramolecular structures. Physical and spectroscopic techniques used to determine, examine and model structures fall within the purview of Structure and Bonding to the extent that the focus is on the scientific results obtained and not on specialist information concerning the techniques themselves. Issues associated with the development of bonding models and generalizations that illuminate the reactivity pathways and rates of chemical processes are also relevant. The individual volumes in the series are thematic. The goal of each volume is to give the reader, whether at a university or in industry, a comprehensive overview of an area where new insights are emerging that are of interest to a larger scientific audience. Thus each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5 to 10 years should be presented using selected examples to illustrate the principles discussed. A description of the physical basis of the experimental techniques that have been used to provide the primary data may also be appropriate, if it has not been covered in detail elsewhere. The coverage need not be exhaustive in data, but should rather be conceptual, concentrating on the new principles being developed that will allow the reader, who is not a specialist in the area covered, to understand the data presented. Discussion of possible future research directions in the area is welcomed. Review articles for the individual volumes are invited by the volume editors. Readership: research scientists at universities or in industry, graduate students. Special offer For all customers who have a standing order to the print version of Structure and Bonding, we offer free access to the electronic volumes of the Series published in the current year via SpringerLink.

Iron-containing Enzymes

This textbook introduces students and experienced chemists to a rapidly growing interdisciplinary subject. It incorporates a thorough revision of the earlier edition, and includes all new developments.

Reaction Mechanisms of Metal Complexes

Includes information on modern, state-of-the-art & widely applied techniques. * Covers fundamental concepts & timely applications of the methodology in the field. * Illustrates modern procedures for collecting & processing electronic spectroscopic & structural data. * Includes case studies written by key people in the field showing application in important & topical areas of inorganic spectroscopy & electronic structure.

Nitrosyl Complexes in Inorganic Chemistry, Biochemistry and Medicine I

In recent years mineralogy has developed even stronger links with solid-state chemistry and physics and these developments have been accompanied by a trend towards further quantification in the theoretical as well as the experimental aspects of the subject. The importance of solid-state chemistry to mineralogy was reflected in a symposium held at the 1982 Annual Congress of The Royal Society of Chemistry at which the original versions of most of the contributions to this book were presented. The meeting brought together chemists, geologists and mineralogists all of whom were interested in the application of modern spectroscopic techniques to the study of bonding in minerals. The interdisciplinary nature of the symposium enabled a beneficial exchange of information from the various fields and it was felt that a book presenting reviews of the key areas of the subject would be a useful addition to both the chemical and mineralogical literature. The field of study which is commonly termed the 'physics and chemistry of minerals' has itself developed very rapidly over recent years. Such rapid development has resulted in many chemists, geologists, geochemists and mineralogists being less familiar than they might wish with the techniques currently available. Central to this field is an understanding of chemical bonding or 'electronic structure' in minerals which has been developed both theoretically and by the use of spectroscopic techniques.

Principles and Applications of Organotransition Metal Chemistry

Celebrating Volume 100: Thirty years ago Springer-Verlag together with a distinguished Board of Editors started the series Structure and Bonding. Initially the series was set up to publish reviews from different fields of modern inorganic chemistry, chemical physics and biochemistry, where the general subject of chemical bonding involves a metal and a small number of associated atoms. Three years ago the aims of the series was refined to span the entire periodic table and address structure and bonding issues wherever they may be relevant. Not only the traditional areas of chemical bonding will be dealt with but also nanostructures, molecular electronics, supramolecular structure, surfaces and clusters. With these aims in mind it is noteworthy that Volume 100 effectively reinforces and illustrates these ideals and is titled Pi-Electron Magnetism from Molecules to Magnetic Materials.

Inorganic Electronic Structure and Spectroscopy, Methodology

Jennifer Marx untersucht die aktiven Zentren der R2-Proteine aus *Escherichia coli*, *Saccharopolyspora erythraea* und *Geobacillus kaustophilus* und diskutiert die spektroskopischen Unterschiede der Ia, Ic und der R2-artigen Gruppe der Ribonukleotidreduktasen. Sie zeigt, dass sich deren Schwingungseigenschaften bei der nuklearen inelastischen Streuung (NIS) in Abhängigkeit von den gebundenen Metallen unterscheiden. Außerdem können die für die unterschiedliche Metallbesetzung empfindlichen Bereiche der partiellen vibronischen Zustandsdichte von Eisen identifiziert werden. Um die Schwingungseigenschaften im niederfrequenten Bereich besser zu verstehen, berechnet die Autorin ein Modell des gesamten Proteins in Wasser.

Chemical Bonding and Spectroscopy in Mineral Chemistry

Electrochromic devices have a number of important commercial applications, for instance in displays, as optical shutters, and as modulators for mirrors, windows, and sun-glasses. Electrochromism - Fundamentals and Applications is the first in-depth treatise on the topic. Written by leading scientists in the field, it is a state-of-the-art account of all aspects of electrochromism, presented at a level accessible to chemists, physicists, materials scientists and engineers. Both the physical and chemical background of electrochromic phenomena are described and a comprehensive survey of both organic and inorganic compounds and systems is given. Special emphasis is placed on providing detailed,

hands-on information on applications and potential uses of electrochromic systems. This book is essential reading for scientists active in the field and for anyone wishing to enter the field. An extensive list of carefully chosen references rounds off this valuable reference source.

Electron Magnetism

THE textbook on organometallic chemistry. Comprehensive and up-to-date, the German original is already a classic, making this third completely revised and updated English edition a must for graduate students and lecturers in chemistry, inorganic chemists, chemists working with/on organometallics, bioinorganic chemists, complex chemists, and libraries. Over one third of the chapters have been expanded to incorporate developments since the previous editions, while the chapter on organometallic catalysis in synthesis and production appears for the first time in this form. From the reviews of the first English editions: 'The selection of material and the order of its presentation is first class ... Students and their instructors will find this book extraordinarily easy to use and extraordinarily useful.' -Chemistry in Britain 'Elschenbroich and Salzer have written the textbook of choice for graduate or senior-level courses that place an equal emphasis on main group element and transition metal organometallic chemistry. ... this book can be unequivocally recommended to any teacher or student of organometallic chemistry.' - Angewandte Chemie International Edition 'The breadth and depth of coverage are outstanding, and the excitement of synthetic organometallic chemistry comes across very strongly.' - Journal of the American Chemical Society

Dimetallzentren in Proteinen

Electrochromism