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**Modern Methods in Solid-state NMR** - Paul Hodgkinson - 2018-04-05

Solid-state NMR covers an enormous range of material types and experimental techniques. Although the basic instrumentation and techniques of solids NMR are readily accessible, there can be significant barriers, even for existing experts, to exploring the bewildering array of more sophisticated techniques. In this unique volume, a range of experts in different areas of modern solid-state NMR explain about their area of expertise, emphasising the “practical
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**Solid State NMR** - Klaus
Müller - 2021-09-07
Solid State NMR A thorough
and comprehensive textbook
covering the theoretical
background, experimental
approaches, and major
applications of solid-state
NMR spectroscopy Nuclear
Magnetic Resonance (NMR)
spectroscopy is a powerful
non-destructive technique
capable of providing
information about the
molecular structure and
dynamics of molecules.
Alongside solution-state NMR,
a well-established technique
to study chemical structures
and investigate physico-
chemical properties of
molecules in solutions, solid-
state NMR (SSNMR) offers
many exciting possibilities for
the analysis of solid and soft
materials across scientific
fields. SSNMR shows unique
capabilities for a detailed
investigation of structural and
dynamic properties of
materials over wide space and
introduction to the historical
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increasing in disciplines such
as chemistry, physics, and
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Solid State NMR: Principles,
Methods, and Applications
offers a systematic
introduction to the theory,
methodological concepts, and
major experimental methods
of SSMR spectroscopy.
Exploring the unique potential
of SSNMR for the structural
and dynamic characterization
of soft and either amorphous
or crystalline solid materials,
this comprehensive textbook
provides foundational
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developments of SSNMR,
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pharmaceuticals, polymers,
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presentation of the subject,
this textbook: Includes a brief
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NMR spectroscopy Provides
helpful illustrations to explain
the various SSNMR concepts
and methods Features
accessible descriptive text
with self-consistent use of
quantum mechanics Covers
the experimental aspects of
SSNMR spectroscopy and in
particular a description of
many useful pulse sequences
Contains references to
relevant literature Solid State
NMR: Principles, Methods,
and Applications is the ideal
textbook for university
courses on SSNMR, advanced
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spectroscopists, chemists, and
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materials.

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NMR spectroscopy Nuclear
Magnetic Resonance (NMR)
Exploring the unique potential non-destructive technique capable of providing information about the molecular structure and dynamics of molecules. Alongside solution-state NMR, a well-established technique to study chemical structures and investigate physico-chemical properties of molecules in solutions, solid-state NMR (SSNMR) offers many exciting possibilities for the analysis of solid and soft materials across scientific fields. SSNMR shows unique capabilities for a detailed investigation of structural and dynamic properties of materials over wide space and time ranges. For this reason, and thanks to significant advances in the past several years, the application of SSNMR to materials is rapidly increasing in disciplines such as chemistry, physics, and materials and life sciences. Solid State NMR: Principles, Methods, and Applications offers a systematic introduction to the theory, methodological concepts, and major experimental methods of SSMR spectroscopy. Of SSNMR for the structural and dynamic characterization of soft and either amorphous or crystalline solid materials, this comprehensive textbook provides foundational knowledge and recent developments of SSNMR, covering physical and theoretical background, experimental methods, and applications to pharmaceuticals, polymers, inorganic and hybrid materials, liquid crystals, and model membranes. Written by two expert authors to ensure a clear and consistent presentation of the subject, this textbook: Includes a brief introduction to the historical aspects and broad theoretical background of solid-state NMR spectroscopy Provides helpful illustrations to explain the various SSNMR concepts and methods Features accessible descriptive text with self-consistent use of quantum mechanics Covers the experimental aspects of SSNMR spectroscopy and in particular a description of many useful pulse sequences Contains references to
Selected methods and applications of Solid-State NMR are featured in three chapters. The first one treats the recoupling of dipolar interactions in solids, which are averaged by fast sample rotation. Following an introduction to effective Hamiltonians and Floquet theory, different types of experiment such as rotary resonance, dipolar chemical shift correlation spectroscopy, rotational resonance and multipulse recoupling are treated in the powerful Floquet formalism. In the second chapter, the different approaches to line narrowing of quadrupolar nuclei are reviewed in a consistent formulation of double resonance (DaR) and dynamic angle spinning (DAS). Practical aspects of probe design are considered as well as advanced 2D experiments, sensitivity enhancement techniques, and spinning sideband manipulations. The use of such techniques dramatically increases the number of nuclei which can be probed in high resolution.

Solid-State NMR IV
Methods and Applications of Solid-State NMR

2011-12-13

Solid-State NMR is a branch of Nuclear Magnetic Resonance which is presently experiencing a phase of strongly increasing popularity. The most striking evidence is the large number of contributions from Solid-State Resonance at NMR meetings, approaching that of liquid state resonance. Important progress can be observed in the areas of methodological developments and applications to organic and inorganic matter. One volume devoted to more or less one of each of these areas has been published in the preceding three issues. This volume can be considered an addendum to this series.

NMR: Principles, Methods, and Applications is the ideal textbook for university courses on SSNMR, advanced spectroscopies, and a valuable single-volume reference for spectroscopists, chemists, and researchers in the field of materials.

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In polymer science and technology, the advanced development of various new polymer materials with excellent properties and functions is desirable. For this purpose it is necessary to determine the exact relationship between physical properties and molecular structure-dynamics with powerful techniques. One such technique is solid state NMR. Recently, high resolution NMR studies of solids have been realized by using advanced pulse and mechanical techniques, which has resulted in a variety of structural and dynamical information on polymer systems. Solid state NMR has provided characteristic information which cannot be
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Features of this book: • Contains an up-to-date and comprehensive account of solid state NMR of polymers by leading researchers in the field • Provides a compilation of solid state NMR of polymers, which makes it an ideal reference book for both NMR researchers and general polymer scientists. This book will be of interest to the NMR community, and will be invaluable for both the beginner and the expert.

**Solid State NMR of Polymers** - T. Asakura - 1998-08-03

In polymer science and technology, the advanced development of various new excellent properties and functions is desirable. For this purpose it is necessary to determine the exact relationship between physical properties and molecular structure-dynamics with powerful techniques. One such technique is solid state NMR. Recently, high resolution NMR studies of solids have been realized by using advanced pulse and mechanical techniques, which has resulted in a variety of structural and dynamical information on polymer systems. Solid state NMR has provided characteristic information which cannot be obtained by other spectroscopic methods. This book is divided into two parts. The first part covers the principles of NMR, important NMR parameters such as chemical shifts, relaxation times, dipolar interactions, quadrupolar interactions, pulse techniques and new NMR methods. In the second part, applications of NMR to a variety of polymer systems in the solid state are described.

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Multidimensional Solid-State NMR and Polymers - Klaus Schmidt-Rohr - 2012-12-02

NMR spectroscopy is the most valuable and versatile analytical tool in chemistry. While excellent monographs exist on high-resolution NMR in liquids and solids, this is the first book to address multidimensional solid-state NMR. Multidimensional techniques enable researchers to obtain detailed information about the structure, dynamics, orientation, and phase separation of solids, which provides the basis of a better understanding of materials properties on the molecular level. Dramatic progress—much of it pioneered by the authors—has been achieved in this area, especially in synthetic polymers. Solid-state NMR now favorably competes with well-established techniques, such as light, x-ray, or neutron scattering, electron microscopy, and dielectric and mechanical relaxation. The application of multidimensional solid-state NMR inevitably involves use of concepts from different fields of science. This book also provides the first comprehensive treatment of both the new experimental techniques and the theoretical concepts needed in more complex data analysis. The text addresses spectroscopists and polymer scientists by treating the subject on different levels; descriptive, technical, and mathematical approaches are used when appropriate. It presents an overview of new developments with numerous experimental examples and illustrations, which will appeal to readers interested in both the information content as...
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This book describes the appropriate. It presents an overview of new developments with numerous experimental examples and illustrations, which will appeal to readers interested in both the information content as well as the potential of solid-state NMR. The book also contains many previously unpublished details that will be appreciated by those who want to perform the experiments. The techniques described are applicable not only to the study of synthetic polymers but to numerous problems in solid-state physics, chemistry, materials science, and biophysics. Key Features * Presents original theories and new perspectives on scattering techniques * Provides a systematic treatment of the whole subject * Gives readers access to previously unpublished material * Includes extensive illustrations

**Solid-State NMR: Applications in Biomembrane Structure** - Frances Separovic - 2020-12-03

methodology and applications of solid-state NMR spectroscopy to studies of membrane proteins, membrane-active peptides and model biological membranes. As well as structural studies it contains coverage of membrane interactions and molecular motions. Advances in biological solid-state NMR are very pertinent with high-field developments seeing applications in biological membranes and whole cells. Many of the chapter authors and contributors are world-class experts and leaders in the development and application of biological solid-state NMR. Key Features
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Solid State NMR Studies of Biopolymers - Anne E. McDermott - 2012-12-19
The content of this volume has been added toMagRes (formerly Encyclopedia of MagneticResonance) - the ultimate online resource for NMR and MRI. The field of solid state NMR of biological samples [ssNMR] has blossomed in the past 5-10 years, and a cohesive overview of the technology is needed for new practitioners in industry and academia. This title provides an overview of Solid State NMR methods for studying structure dynamics and ligand-binding.
selection of articles from overview of RF pulse sequences for various applications, including not only a systematic catalog but also a discussion of theoretical tools for analysis of pulse sequences. Practical examples of biochemical applications are included, along with a detailed discussion of the many aspects of sample preparation and handling that make spectroscopy on solid proteins successful. About EMR Handbooks / eMagRes Handbooks The Encyclopedia of Magnetic Resonance (up to 2012) and eMagRes (from 2013 onward) publish a wide range of online articles on all aspects of magnetic resonance in physics, chemistry, biology and medicine. The existence of this large number of articles, written by experts in various fields, is enabling the publication of a series of EMR Handbooks / eMagRes Handbooks on specific areas of NMR and MRI. The chapters of each of these handbooks will comprise a carefully chosen eMagRes. In consultation with the eMagRes Editorial Board, the EMR Handbooks / eMagRes Handbooks are coherently planned in advance by specially selected Editors, and new articles are written (together with updates of some already existing articles) to give appropriate complete coverage. The handbooks are intended to be of value and interest to research students, postdoctoral fellows and other researchers learning about the scientific area in question and undertaking relevant experiments, whether in academia or industry. Have the content of this Handbook and the complete content of eMagRes at your fingertips! Visit: ahref="http://www.wileyonlinelibrary.com/ref/eMagRes" www.wileyonlinelibrary.com/ref/eMagRes/a View other eMagRes publications ahref="http://onlinelibrary.wiley.com/book/10.1002/9780470034590/homepage/emagres_publications.htm" target="_blank"here/a
Solid State NMR Studies of Biopolymers - Anne E. McDermott - 2012-12-19
The content of this volume has been added to eMagRes (formerly Encyclopedia of Magnetic Resonance) - the online resource for NMR and MRI/a. The field of solid state NMR of biological samples [ssNMR] has blossomed in the past 5-10 years, and a cohesive overview of the technology is needed for new practitioners in industry and academia. This title provides an overview of Solid State NMR methods for studying structure dynamics and ligand-binding in biopolymers, and offers an overview of RF pulse sequences for various applications, including not only a systematic catalog but also a discussion of theoretical tools for analysis and examples of biochemical applications are included, along with a detailed discussion of the many aspects of sample preparation and handling that make spectroscopy on solid proteins successful.

About EMR Handbooks / eMagRes Handbooks
The Encyclopedia of Magnetic Resonance (up to 2012) and eMagRes (from 2013 onward) publish a wide range of online articles on all aspects of magnetic resonance in physics, chemistry, biology and medicine. The existence of this large number of articles, written by experts in various fields, is enabling the publication of a series of EMR Handbooks / eMagRes Handbooks on specific areas of NMR and MRI. The chapters of each of these handbooks will comprise a carefully chosen selection of articles from eMagRes. In consultation with the eMagRes Editorial Board, the EMR Handbooks / eMagRes Handbooks are coherently planned in advance by specially-selected Editors.
Solid State NMR: Methods and applications of solid-state NMR - Bernhard Blümich - 1994

New Techniques in Solid-State NMR - Oleg N. Antzutkin - 2004-12-10
With contributions by numerous experts

Modern Methods in Solid-state NMR - Paul Hodgkinson - 2018-04-09
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**Solid State NMR Spectroscopy** - Melinda J. Duer - 2008-04-15
This book is for those familiar with solution-state NMR who are encountering solid-state NMR for the first time. It understanding and applications of solid-state NMR with a rigorous but readable approach, making it easy for someone who merely wishes to gain an overall impression of the subject without details. This dual requirement is met through careful construction of the material within each chapter. The book is divided into two parts: "Fundamentals" and "Further Applications." The section on Fundamentals contains relatively long chapters that deal with the basic theory and practice of solid-state NMR. The essential differences and extra scope of solid-state NMR over solution-state is dealt with in an introductory chapter. The basic techniques that all chapters rely on are collected into a second chapter to avoid unnecessary repetition later. Remaining chapters in the "Fundamentals" part deal with the major areas of solid-state NMR which all solid-state NMR spectroscopists should know about. Each begins with an overview of the topic that puts the chapter
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NMR Methods for Characterization of Synthetic and Natural Polymers - Toshikazu Miyoshi
- 2019-07-29
Since the introduction of FT-NMR spectroscopy around five decades ago, NMR has achieved significant advances in hardware and methodologies, accompanied with the enhancement of spectral resolution and signal sensitivity. Rapid developments in the polymers field mean that accurate and quantitative characterization of polymer structures and dynamics is the keystone for precisely regulating and controlling the physical and chemical properties of the polymer. This book specifically focuses on NMR investigation of complex polymers for the polymer community as well as NMR spectroscopists, and will push the development of both fields. It covers the latest advances, for example high field DNP and ultrafast MAS methodologies, and show how these novel NMR methods characterize various synthetic and natural polymers.

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Over the past decade, a myriad of techniques have shown that solid-state nuclear magnetic resonance (NMR) can be used in a broad spectrum of applications with exceptionally impressive results. Solid-state NMR results can yield high-resolution details on the structure and function of many important biological solids, including viruses, fibril-forming molecules, and molecules embedded in the cell membrane. Filling a void in the current literature, NMR Spectroscopy of Biological Solids examines all the recent developments, implementation, and polymers for the polymer community as well as NMR spectroscopists, and will push the development of both fields. It covers the latest advances, for example high field DNP and ultrafast MAS methodologies, and show how these novel NMR methods characterize various synthetic and natural polymers.

**NMR Spectroscopy of Biological Solids** - A. Ramamoorthy - 2005-09-22

The book emphasizes how these techniques can be used to realize the structure of non-crystalline systems of any size. It explains how these isotropic and anisotropic couplings interactions are used to determine atomic-level structures of biological molecules in a non-soluble state and extrapolate the three-dimensional structure of membrane proteins using magic-angle spinning (MAS). The book also focuses on the use of multidimensional solid-state NMR methods in the study of aligned systems to provide basic information about the mechanisms of action of a variety of biologically active molecules. Addressing principles, methods, and applications, this book provides a critical selection of solid-state NMR methods for solving a wide range of practical problems that arise in both academic and industrial research of biomolecules in the solid state.
book emphasizes how these Biological Solids is a forward-thinking resource for students and researchers in analytical chemistry, bioengineering, material sciences, and structural genomics.

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and nuclear relaxation in solids, including dynamics of materials Different materials, diamagnetic and paramagnetic, from metals and metal clusters to amorphous composites The methodology of collection and interpretations of solid-state NMR data, including strategies and criteria for structural characterizations of different materials Practical examples of multinuclear NMR and relaxation experiments as well as interpretations of data obtained Numerous solid-state NMR experiments performed for various materials to evaluate their structure and dynamics Written in clear and simple language, this book includes clear illustrations, numerous examples, and detailed bibliographies. It an excellent reference not only for young and experienced researchers, but also for students interested in a future in materials science.

Solid-State NMR in Materials Science - Vladimir
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**Solid-State NMR** - David C. Apperley - 2012-06-10
The power of nuclear magnetic resonance, NMR, for characterizing molecules dissolved in solution is widely acknowledged and NMR
how NMR can be usefully of undergraduate chemistry degrees. However, the application of NMR to the solid state is much less well appreciated. This text sets out the fundamental principles of solid-state NMR, explaining how NMR in solids differs from that in solution, showing how the various interactions of NMR can be manipulated to yield high-resolution spectra and to give information on local structure and dynamics in solids. This book aims to take some of the mystique out of solid-state NMR by providing a comprehensible discussion of the methodology, including the basic concepts and a practical guide to implementation of the experiments. A basic knowledge of solution-state NMR is assumed and is only briefly covered. The text is intended for those in academia and industry expecting to use solid-state NMR in their research and looking for an accessible introduction to the field. It will also be valuable for non-experts interested in learning applied to solid systems. Detailed mathematical treatments are delayed to a chapter at the mid-point of the text and can be skipped. Introductions to experiments and numerical simulations are provided to help link NMR results to experimental practice. The different aspects of solid-state NMR, from basic pulse-and-acquire experiments to sophisticated techniques for the measurement of anisotropy information are presented. Examples illustrate the wide variety of applications of the technique and its complementarity to other solid-state characterization techniques such as X-ray diffraction. Various aspects of NMR crystallography are covered as are topics of motion in solids.

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The power of nuclear magnetic resonance, NMR, for characterizing molecules dissolved in solution is widely acknowledged and NMR forms an essential component
applied to solid systems. However, the application of NMR to the solid state is much less well appreciated. This text sets out the fundamental principles of solid-state NMR, explaining how NMR in solids differs from that in solution, showing how the various interactions of NMR can be manipulated to yield high-resolution spectra and to give information on local structure and dynamics in solids. This book aims to take some of the mystique out of solid-state NMR by providing a comprehensible discussion of the methodology, including the basic concepts and a practical guide to implementation of the experiments. A basic knowledge of solution-state NMR is assumed and is only briefly covered. The text is intended for those in academia and industry expecting to use solid-state NMR in their research and looking for an accessible introduction to the field. It will also be valuable for non-experts interested in learning how NMR can be usefully

Detailed mathematical treatments are delayed to a chapter at the mid-point of the text and can be skipped. Introductions to experiments and numerical simulations are provided to help link NMR results to experimental practice. The different aspects of solid-state NMR, from basic pulse-and-acquire experiments to sophisticated techniques for the measurement of anisotropy information are presented. Examples illustrate the wide variety of applications of the technique and its complementarity to other solid-state characterization techniques such as X-ray diffraction. Various aspects of NMR crystallography are covered as are topics of motion in solids.

**NMR Spectroscopy of Biological Solids** - A. Ramamoorthy - 2005-09-22
Over the past decade, a myriad of techniques have shown that solid-state nuclear magnetic resonance (NMR) can be used in a broad spectrum of applications with
study of aligned systems to results. Solid-state NMR results can yield high-resolution details on the structure and function of many important biological solids, including viruses, fibril-forming molecules, and molecules embedded in the cell membrane. Filling a void in the current literature, NMR Spectroscopy of Biological Solids examines all the recent developments, implementation, and interpretation of solid-state NMR experiments and the advantages of applying them to biological systems. The book emphasizes how these techniques can be used to realize the structure of non-crystalline systems of any size. It explains how these isotropic and anisotropic couplings interactions are used to determine atomic-level structures of biological molecules in a non-soluble state and extrapolate the three-dimensional structure of membrane proteins using magic-angle spinning (MAS). The book also focuses on the use of multidimensional solid-state NMR methods in the

provide basic information about the mechanisms of action of a variety of biologically active molecules. Addressing principles, methods, and applications, this book provides a critical selection of solid-state NMR methods for solving a wide range of practical problems that arise in both academic and industrial research of biomolecules in the solid state. NMR Spectroscopy of Biological Solids is a forward-thinking resource for students and researchers in analytical chemistry, bioengineering, material sciences, and structural genomics.

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Introduction to Solid-State NMR Spectroscopy - Melinda J. Duer - 2005-07-29

Introduction to Solid State NMR Spectroscopy is written for undergraduate and graduate students of chemistry, either taking a course in advanced or solid-state nuclear magnetic resonance spectroscopy or undertaking research projects where solid-state NMR is likely to be a major investigative technique. It will also serve as a practical introduction in industry, where the techniques can provide new or
complementary information to supplement other investigative techniques. By covering solid-state NMR spectroscopy in a clear, straightforward and approachable way with detailed descriptions of the major solid-state NMR experiments focusing on what the experiments do and what they tell the researcher, this book will serve as an ideal introduction to the subject. These descriptions are backed up by separate mathematical explanations for those who wish to gain a more sophisticated quantitative understanding of the phenomena. With additional coverage of the practical implementation of solid-state NMR experiments integrated into the discussion, this book will be essential reading for all those using, or about to use, solid-state NMR spectroscopy. Dr Melinda Duer is a senior lecturer in the Department of Chemistry at the University of Cambridge, Cambridge, UK.

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**Development of Solid-state NMR Methods for Distance Measurements in Biomolecules** - Yan Li - 1995

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Techniques of solid state nuclear magnetic resonance (NMR) spectroscopy are constantly being extended to a more diverse range of materials, pressing into

range of nuclides including some previously considered too intractable to provide usable results. At the same time, new developments in both hardware and software are being introduced and refined. This book covers the most important of these new developments. With sections addressed to non-specialist researchers (providing accessible answers to the most common questions about the theory and practice of NMR asked by novices) as well as a more specialised and up-to-date treatment of the most important areas of inorganic materials research to which NMR has application, this book should be useful to NMR users whatever their level of expertise and whatever inorganic materials they wish to study.


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**Solid State NMR** - Bernhard Blümich - 1994

**Solid-State NMR IV Methods and Applications of Solid-State NMR** - B. Blümich - 2012-12-06

Solid-State NMR is a branch of Nuclear Magnetic Resonance which is presently experiencing a phase of strongly increasing popularity. The most striking evidence is the large number of contributions from Solid-State Resonance at NMR meetings, approaching that of liquid state resonance. Important progress can be observed in the areas of methodological developments and applications to organic and inorganic matter. One volume devoted to more or less one of each of these areas has been published in the preceding three issues. This volume can be considered an addendum to this series. Selected methods and applications of Solid-State NMR are featured in three chapters. The first one treats the recoupling of dipolar interactions in solids, which are averaged by fast sample
Solid-State NMR IV
Methods and Applications

Blümich - 2012-12-06

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there is great demand for a shift correlation spectroscopy, rotational resonance and multipulse recoupling are treated in the powerful Floquet formalism. In the second chapter, the different approaches to line narrowing of quadrupolar nuclei are reviewed in a consistent formulation of double resonance (DaR) and dynamic angle spinning (DAS). Practical aspects of probe design are considered as well as advanced 2D experiments, sensitivity enhancement techniques, and spinning sideband manipulations. The use of such techniques dramatically increases the number of nuclei which can be probed in high resolution NMR spectroscopy. The final chapter describes new experimental approaches and results of structural studies of noncrystalline solids.

**Protein-protein Complexes**  
- Martin Zacharias - 2010

Given the immense progress achieved in elucidating protein-protein complex structures and in the field of protein interaction modeling, book that gives interested researchers/students a comprehensive overview of the field. This book does just that. It focuses on what can be learned about protein-protein interactions from the analysis of protein-protein complex structures and interfaces. What are the driving forces for protein-protein association? How can we extract the mechanism of specific recognition from studying protein-protein interfaces? How can this knowledge be used to predict and design protein-protein interactions (interaction regions and complex structures)? What methods are currently employed to design protein-protein interactions, and how can we influence protein-protein interactions by mutagenesis and small-molecule drugs or peptide mimetics? The book consists of about 15 review chapters, written by experts, on the characterization of protein-protein interfaces, structure determination of protein complexes (by NMR and X-ray), theory of protein-
driving forces for protein-protein interfaces, bioinformatics methods to predict interaction regions, and prediction of protein-protein complex structures (docking and homology modeling of complexes, etc.) and design of protein-protein interactions. It serves as a bridge between studying/analyzing protein-protein complex structures (interfaces), predicting interactions, and influencing/designing interactions.

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**Solid-State NMR I Methods**
- B. Blümich - 2012-12-06
1. A.-R. Grimmer, Berlin, FRG; B. Blümich, Aachen, FRG: Introduction to Solid-State NMR
2. F. Laupretre, Paris, France: High-Resolution 13C NMR Investigations of Local Dynamics in Bulk Polymers at Temperatures Below and Above the Glass-Transition Temperature
3. D. Raftery, Philadelphia, PA; B.F. Chmelka, Santa Barbara, CA: Xenon NMR Spectroscopy
4. G. Fleischer, Leipzig, FRG; F. Fujara, Mainz, FRG: NMR as a Generalized Incoherent Scattering Experiment

**Advances in Biological Solid-State NMR**
- Frances Separovic - 2014
Advances in Biological NMR brings the reader up to date with chapters from international leaders of this growing field, covering the most recent developments in the methodology and applications of solid state NMR to studies of membrane interactions and molecular motions.

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**Development of MAS Solid State NMR Methods for Structural and Dynamical Characterization of Biomolecules** - Veniamin Shevelkov - 2008

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**Current Developments in Solid State NMR Spectroscopy** - Norbert Müller - 2003-01-31

This book presents some of the latest developments in solid state NMR with potential applications in both materials and biological science. The main emphasis is on a strong link between theory and experiment via numerical simulation of NMR spectra which play a pivotal role in the design and development of pulse schemes in solid state NMR. The papers focus on non-biological topics of solid state NMR spectroscopy making the book useful for scientists and advanced students in chemistry, physics, and materials science striving for deeper understanding of this topic and its application potential. Three invited reviews focus on developments in solid state NMR of quadrupolar nuclei, which are of high interest in areas like materials science and heterogeneous catalysis.
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**Spectroscopic Analyses** - Eram Sharmin - 2017-12-06

The book presents developments and applications of these methods, such as NMR, mass, and others, including their applications in pharmaceutical and biomedical analyses. The book is divided into two sections. The first section covers spectroscopic methods, their applications, and their significance as characterization tools; the second section is dedicated to the applications of spectrophotometric methods in pharmaceutical and biomedical analyses. This book would be useful for students, scholars, and scientists engaged in synthesis, analyses, and applications of materials/polymers.
Solid-State NMR is a branch of Nuclear Magnetic Resonance which is presently experiencing a phase of strongly increasing popularity. The most striking evidence is the large number of contributions from Solid-State Resonance at NMR meetings, approaching that of liquid state resonance.

Important progress can be observed in three areas: Methodological developments, applications to inorganic matter, and applications to organic matter. These developments are intended to be captured in three volumes in this series, each of them being devoted to more or less one of these areas. The present volume on Solid-State NMR III is devoted mainly to organic matter. The recent developments of deuteron NMR and their applications are reviewed in the first chapter. Crosspolarization, MAS, and dynamic angle spinning are being explored for enhancement of information and sensitivity. In addition to the analysis of classical relaxation times and modern 2D spectra, detailed dynamic information becomes accessible from investigations of the relaxation time anisotropies. The second chapter examines cross-polarization in static and rotating solids under conditions of spin diffusion and thermal motion. The underlying dipole-dipole interaction is further exploited by the techniques described in the third chapter for studies of polymer-polymer miscibility. Short range techniques are discriminated from long-range techniques based on spin diffusion. The use of these techniques is illustrated by a case study of PMMAJPVF blends. The last chapter addresses novel methods and applications of two-dimensional exchange NMR for investigations of relative molecular orientations, polymer morphology, molecular dynamics, and macroscopic molecular order.
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NMR Methods for Characterization of Synthetic and Natural
Since the introduction of FT-NMR spectroscopy around five decades ago, NMR has achieved significant advances in hardware and methodologies, accompanied with the enhancement of spectral resolution and signal sensitivity. Rapid developments in the polymers field mean that accurate and quantitative characterization of polymer structures and dynamics is the keystone for precisely regulating and controlling the physical and chemical properties of the polymer. This book specifically focuses on NMR investigation of complex polymers for the polymer community as well as NMR spectroscopists, and will push the development of both fields. It covers the latest advances, for example high field DNP and ultrafast MAS methodologies, and show how these novel NMR methods characterize various synthetic and natural polymers.
Solid state NMR is rapidly emerging as a universally applicable method for the characterization of ordered structures that cannot be studied with solution methods or diffraction techniques. This proceedings -; from a recent international workshop - captures an image of the latest developments and future directions for solid state NMR in biological research, particularly on membrane proteins. Detailed information on how hormones or drugs bind to their membrane receptor targets is needed, e.g. for rational drug design. Higher fields are bringing clear improvements, and the power of solid state NMR techniques for studying amorphous and membrane associated peptides, proteins and complexes is shown by examples of applications at ultra-high fields. Progress in protein expression, experimental design and data analysis are also presented by leaders in these research areas.
Solid-State NMR in Zeolite Catalysis - Jun Xu -
2019-05-11
Solid-State NMR Characterization of Heterogeneous Catalysts and Catalytic Reactions provides a comprehensive account of state-of-the-art solid-state NMR techniques and the application of these techniques in heterogeneous catalysts and related catalytic reactions. It includes an introduction to the basic theory of solid-state NMR and various frequently used techniques. Special emphasis is placed on characterizing the framework and pore structure, active site, guest-host interaction, and synthesis mechanisms of heterogeneous catalysts using multinuclear one- and two-dimensional solid-sate NMR spectroscopy. Additionally, various in-situ solid-state NMR techniques and their applications in investigation of the mechanism of industrially important catalytic reactions are also discussed. Both the fundamentals and the latest research results are covered, making the book suitable as a reference guide for both experienced researchers in and newcomers to this field.

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**High Resolution Solid-State NMR of Silicate and Zeolites** - Gunter Engelhardt - 1987

Covers the dramatic developments in the past decade in the applications of high-resolution NMR to the study of solid materials such as inorganic silicates, aluminosilicates, and in particular, zeolites. Also covers a variety of NMR methods, including conventional FT NMR techniques, used to investigate sorbate-sorbent interactions and the structure of adsorbed molecules. Gives the subject and a concise survey of basic principles and methods of high-resolution solid-state NMR. Then covers $^{29}$Si NMR of silicate solutions; general aspects of $^{29}$Si and $^{27}$Al NMR of the silicate and aluminosilicate framework; application of $^{29}$Si and $^{27}$Al NMR to silicates, aluminosilicates, and zeolites; NMR studies of nuclei other than $^{29}$Si and $^{27}$Al in zeolites and non-zeolitic silicates; high-resolution studies of adsorbed molecules, and much more.

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**Solid State NMR of Polymers** - L.J. Mathias - 1991-10-31

The chapters in this collection are from papers which were presented at a symposium on solid-state NMR of polymers. A two-part program on available NMR techniques applicable to solid polymer analysis was presented at the 3rd Chemical Congress of North American held in Toronto, Ontario, June 5-10,1988. The program was

Polymer Chemistry with support provided by the Division of its Industrial Sponsors, and the Donors of the Petroleum Research Fund administered by the American Chemical Society. Co-organizers included Professor Colin Fyfe of the University of British Columbia (Vancouver, Canada), Professor Hans Spiess of the Max Planck Institut fur Polymerforschung (Mainz, West Germany), and myself. The full-day tutorial, which was free to registered attendees, covered the range of topics. The purpose of the tutorial was to provide a basic introduction to the field so that newcomers to its present and future applications could develop sufficient understanding to learn effectively from the subsequent symposium. The first talk attempted to give listeners a feel for the way a novice spectroscopist can learn to use the various NMR techniques to explore his own areas of interest. Simple experiments can provide unique information about solid polymers that can be
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The Characterization of
special issues related to NMR

Means of Solid-state NMR Methods - Ildong Daniel Shin - 1992

NMR Spectroscopy in Liquids and Solids - Vladimir I. Bakhmutov - 2015-04-10
NMR Spectroscopy in Liquids and Solids provides an introduction of the general concepts behind Nuclear Magnetic Resonance (NMR) and its applications, including how to perform adequate NMR experiments and interpret data collected in liquids and solids to characterize molecule systems in terms of their structure and dynamics. The book is composed of ten chapters. The first three chapters consider the theoretical basis of NMR spectroscopy, the theory of NMR relaxation, and the practice of relaxation measurements. The middle chapters discuss the general aspects of molecular dynamics and their relationships to NMR, NMR spectroscopy and relaxation studies in solutions, and in solutions. The remaining chapters introduce general principles and strategies involved in solid-state NMR studies, provide examples of applications of relaxation for the determination of molecular dynamics in diamagnetic solids, and discuss special issues related to solid state NMR— including NMR relaxation in paramagnetic solids. All chapters are accompanied by references and recommended literature for further reading. Many practical examples of multinuclear NMR and relaxation experiments and their interpretations are also presented. The book is ideal for scientists new to NMR, students, and investigators working in the areas of chemistry, biochemistry, biology, pharmaceutical sciences, or materials science.
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**Current Developments in Solid State NMR Spectroscopy** - Norbert Müller - 2013-04-17

Why to apply solid-state NMR? - By now, we should have learned that NMR is mainly used for the study of molecules in solution, while x-ray diffraction is the method of choice for solids. Based on this fact, the two recent 'NMR-Nobelprizes' went indeed into the liquid phase: my own one eleven years ago, and particularly the most recent one to Kurt Wuthrich. His prize is beyond any doubts very well justified. His
of choice for solids. Based on study of biomolecules in solution, in their native (or almost native) environment is truly monumental. We all will profit from it indirectly when one of our future diseases will be cured with better drugs, based on the insightful knowledge gained through liquid-state NMR. Two fields of NMR are still left out of the Nobel Prize game: magnetic resonance imaging (MRI) and solid-state NMR. The disrespect for MRI in Stockholm is particularly difficult to understand; but this is not a subject to be discussed at the present place. Solid-state NMR is the third of the three great fields of NMR, powerful already today and very promising for the near future.

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**Solid State NMR Methods**
Biophysical Techniques in Drug Discovery - Angeles Canales - 2017-11-14
Biophysical techniques are used in many key stages of the drug discovery process including in screening for new receptor ligands, in characterising drug mechanisms, and in validating data from biochemical and cellular assays. This book provides an overview of the biophysical methods applied in drug discovery today, including traditional techniques and newer developments. Perspectives from academia and industry across a spectrum of techniques are brought together in a single volume. Small and biotherapeutic approaches are covered and strengths and limitations of each technique are presented. Case studies illustrate the application of each technique in real applied examples.


Finally, the book covers recent developments in areas such as electron microscopy with discussions of their possible impact on future drug discovery. This is a go-to volume for biophysicists, analytical chemists and medicinal chemists providing a broad overview of techniques of contemporary interest in drug discovery.

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NMR in Glycoscience and Glycotechnology - Koichi Kato - 2017-05-15
This volume focuses on solution and solid-state NMR of carbohydrates, glycoproteins, glyco-technologies, biomass and related topics. It is estimated that at least 80% of all proteins are glycoproteins. Because of the complexity, heterogeneity and flexibility of the sugar chains, the structural biology approaches for glycoconjugates have been generally avoided. NMR established for structural analyses of proteins and nucleic acids, cannot be simply applied to this complex class of biomolecules. Nonetheless, recently developed NMR techniques for carbohydrates open the door to conformational studies of a variety of sugar chains of biological interest. NMR studies on glycans will have significant impact on the development of vaccines, adjuvants, therapeutics, biomarkers and on biomass regeneration. In this volume, the Editors have collected the most up-to-date NMR applications from experts in the field of carbohydrate NMR spectroscopy. Timely and useful, not only for NMR specialists, it will appeal to researchers in the general field of structural biology, biochemistry and biophysics, molecular and cellular biology and material science.

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