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NMR

APPLICATIONS IN BIOPOLYMERS

Edited by
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Nmr Applications In Biopolymers

Marco Cascella

A decorative graphic consisting of a red circular shape with a white center, partially obscured by a white horizontal bar.

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NMR Applications in Biopolymers John W. Finley, Siegfried J. Schmidt, A.S. Serianni, 2012-10-20 Elucidating the structures of biopolymers as they exist in nature has long been a goal of biochemists and biologists. Understanding how these substances interact with themselves, other solutes, and solvents can provide useful insights into many areas of biochemistry, agriculture, food science, and medicine. Knowledge of the structure of a protein or complex carbohydrate in its native form provides guidelines for the chemical or genetic modifications often desired to optimize these compounds to specific needs and applications. For example, in the pharmaceutical industry, structure-function relationships involving biopolymers are studied routinely as a means to design new drugs and improve their efficacies. The tools to conduct structure investigations of biopolymers at the molecular level are limited in number. Historically, X-ray crystallography has been the most attractive method to conduct studies of this type. However, X-ray methods can only be applied to highly ordered crystalline materials, thus obviating studies of solution dynamics that are often critical to attaining a global understanding of biopolymer behavior. In recent years, nuclear magnetic resonance (NMR) spectroscopy has evolved to become a powerful tool to probe the structures of biopolymers in solution and in the solid state. NMR provides a means to study the dynamics of polymers in solution and to examine the effects of solute, solvent, and other factors on polymer behavior. With the development of 2D and 3D forms of NMR spectroscopy, it is now possible to assess the solution conformations of small proteins, oligonucleotides, and oligosaccharides.

NMR Applications in Biopolymers John W. Finley, Siegfried J. Schmidt, A.S. Serianni, 2012-12-06 Elucidating the structures of biopolymers as they exist in nature has long been a goal of biochemists and biologists. Understanding how these substances interact with themselves, other solutes, and solvents can provide useful insights into many areas of biochemistry, agriculture, food science, and medicine. Knowledge of the structure of a protein or complex carbohydrate in its native form provides guidelines for the chemical or genetic modifications often desired to optimize these compounds to specific needs and applications. For example, in the pharmaceutical industry, structure-function relationships involving biopolymers are studied routinely as a means to design new drugs and improve their efficacies. The tools to conduct structure investigations of biopolymers at the molecular level are limited in number. Historically, X-ray crystallography has been the most attractive method to conduct studies of this type. However, X-ray methods can only be applied to highly ordered crystalline materials, thus obviating studies of solution dynamics that are often critical to attaining a global understanding of biopolymer behavior. In recent years, nuclear magnetic resonance (NMR) spectroscopy has evolved to become a powerful tool to probe the structures of biopolymers in solution and in the solid state. NMR provides a means to study the dynamics of polymers in solution and to examine the effects of solute, solvent, and other factors on polymer behavior. With the development of 2D and 3D forms of NMR spectroscopy, it is now possible to assess the solution conformations of small proteins, oligonucleotides, and oligosaccharides.

Solid State NMR Spectroscopy for Biopolymers Hazime Saitô, Isao

Ando, Akira Naito, 2006-08-05 Biopolymers are polymeric materials of biological origin including globular membrane and fibrous proteins polypeptides nucleic acids polysaccharides lipids etc and their assembly although preference to respective subjects may be different among readers who are more interested in their biological significance or industrial and or medical applications Nevertheless characterizing or revealing their secondary structure and dynamics may be an equally very important and useful issue for both kinds of readers Special interest in revealing the 3D structure of globular proteins nucleic acids and peptides was aroused in relation to the currently active Structural Biology X ray crystallography and multidimensional solution NMR spectroscopy have proved to be the standard and indispensable means for this purpose There remain however several limitations to this end if one intends to expand its scope further This is because these approaches are not always straightforward to characterize fibrous or membrane proteins owing to extreme difficulty in crystallization in the former and insufficient spectral resolution due to sparing solubility or increased effective molecular mass in the presence of surrounding lipid bilayers in the latter

Solid State NMR Studies of Biopolymers Anne E. McDermott, Tatyana Polenova, 2012-12-19 The content of this volume has been added to eMagRes formerly Encyclopedia of Magnetic Resonance 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 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 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

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Applications of NMR Spectroscopy Atta-ur-Rahman, M. Iqbal Choudhary, 2016-11-22 Applications

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Handbook of Biopolymer-Based Materials Sabu Thomas, Dominique Durand, Christophe Chassenieux, P. Jyotishkumar, 2013-04-16 This first systematic scientific reference in the area of micro and nanostructured biopolymer systems discusses in two volumes the morphology structure dynamics properties and applications of all important biopolymers as well as their blends composites interpenetrating networks and gels Selected leading researchers from industry academia government and private research institutions around the globe comprehensively review recent accomplishments in the field They examine the current state of the art new challenges and opportunities discussing all the synthetic routes to the generation of both micro and nano morphologies as well as the synthesis characterization and application of porous biopolymers An outstanding resource for anyone involved in the field of eco friendly biomaterials for advanced technologies

Nuclear Magnetic Resonance G A Webb, 2007-10-31 As a spectroscopic method Nuclear Magnetic Resonance NMR has seen spectacular growth over the past two decades both as a technique and in its applications Today the applications of NMR span a wide range of scientific disciplines from physics to biology to medicine Each volume of Nuclear Magnetic Resonance comprises a combination of annual and biennial reports which together provide comprehensive of the literature on this topic This Specialist Periodical Report reflects the growing volume of published work involving NMR techniques and applications in particular NMR of natural macromolecules which is covered in two reports NMR of Proteins and Acids and NMR of Carbohydrates Lipids and Membranes For those wanting to become rapidly acquainted with specific areas of NMR this title provides unrivalled scope of coverage Seasoned practitioners of NMR will find this an invaluable source of current methods and applications Specialist Periodical Reports provide systematic and detailed review coverage in major areas of chemical research Compiled by teams of leading authorities in the relevant subject areas the series creates a unique service for the active research chemist with regular in depth accounts of progress in particular fields of chemistry Subject coverage within different volumes of a given title is similar and publication is on an annual or biennial basis

Biopolymer Engineering Wujie Zhang, 2025-08-10 This book introduces engineering students and practitioners to biopolymers which are polymers derived partially or entirely from biobased renewable raw materials and or are biodegradable Biopolymers have unique properties such as biocompatibility making them valuable in diverse industries Both natural and synthetic biopolymers have been widely used across various fields including for biomedical food and environmental applications The book explains the fundamentals of biopolymer engineering and how biosynthetic and

biochemical pathways enable the design and manufacturing of biopolymers. It then describes their properties and applications in the food industry, biomedicine, and environmental engineering. The book can serve as a textbook for engineering students including those in bioengineering, materials science, and engineering, and biochemical engineering, and as a reference for professionals who are looking to refresh their knowledge in the field.

Industrial Applications of Marine Biopolymers Parappurath Narayanan Sudha, 2017-07-06. *Industrial Applications of Marine Biopolymers* presents different classes of marine biopolymers and their industrial applications, demonstrating the precious value of ocean resources to society. This timely volume discusses the exceedingly useful polymers derived from these materials that are biodegradable, biocompatible, and at times water soluble. Direct use or chemically modified forms of such biomaterials have many chemical sites making them suitable for varied types of industrial applications. In addition, this book also addresses current global challenges of conservation, including extended drought conditions and the need for improved agricultural methods, together with new bio-medical developments. It is suitable for anyone who has an interest in the industrial applications of biopolymers.

Current Catalog National Library of Medicine (U.S.), 1992. Structural Studies on Nucleic acids and Other Biopolymers J. Duchesne, 2012-12-02. *Physico-chemical Properties of Nucleic Acids Volume II* basically deals with the structural studies on nucleic acids and other biopolymers. This volume gives much emphasis on conformational changes using spectroscopic techniques and also on methods of thermodynamics and hydrodynamics. Volume II begins with Chapter 10 as continuation of Volume I and discusses the infrared and Raman spectroscopy of nucleic acids and polynucleotides. Chapter 11 delves further into the topic of infrared and Raman spectra, particularly the vibrations in the base residues. This volume also highlights the topic of RNA, where the structure of viral RNA and nuclear magnetic resonance studies of transfer RNAs in solution are covered. The last two chapters discuss the concept of thermodynamic and hydrodynamic properties of conformation transitions and changes. This volume caters to both students and researchers in various fields of science such as biology, chemistry, molecular biology, biophysics, and microbiology.

Nuclear Magnetic Resonance in Modern Technology G.E. Maciel, 2012-12-06. This volume represents the primary lectures of the NATO Advanced Study Institute (ASI) on Nuclear Magnetic Resonance in Modern Technology, which was held at Sarigerme Park near the Dalaman Airport on the southern Aegean shore of Turkey from August 23 to September 4, 1992. As indicated in the title, this ASI was aimed at examining, displaying, and perhaps influencing the role of nuclear magnetic resonance (NMR) in modern technological activity. The lectures summarized in this volume and the numerous short contributed talks and posters were primarily aimed at the question: What is NMR doing in support of modern technology? During the main discussion periods and the numerous small scheduled meetings of specific interest groups, this same topic was also addressed along with questions like: What could or should NMR be doing in support of modern technology? With this kind of subject orientation, the organizers attempted to include a large participation at the ASI from scientists and engineers from diverse private industries in which NMR does or

perhaps should play a substantial role in supporting or optimizing technology Perhaps because of a combination of worldwide industrial contractions and residual corporate nervousness regarding the then recent Gulf War which caused a one year postponement of this ASI the participation from private industry was numerically disappointing We hope that this book will serve to bring the role of NMR in modern industry to the attention of numerous industrial scientists and engineers who were unable to attend the AS *Advanced Biophysical Techniques for Polysaccharides Characterization* Nirmal

Mazumder,2024-06-14 *Advanced Biophysical Techniques for Polysaccharides Characterization* offers a detailed insight into the cutting edge techniques available for the identification quantification characterization and structural analysis of polysaccharides A wide range of techniques are covered including scanning electron microscopy SEM atomic force microscopy AFM optical microscopy non linear optical microscopy and spectroscopic techniques like Fourier transform Infrared FTIR X ray diffraction light scattering and nuclear magnetic resonance NMR Dynamic Nuclear Polarization and TEM techniques are also considered Various polysaccharides are investigated along with their applications across a range of industries Each chapter offers a detailed description of the techniques before delving into case studies covering the latest advances This book provides a one stop solution to the latest advanced microscopic and spectroscopic techniques for investigating a range of important polysaccharides and is an ideal reference for researchers in the field of biophysics molecular biology biochemistry pharmaceuticals food chemistry and related areas Covers a range of biophysical techniques for polysaccharide analysis including NMR Dynamic Nuclear Polarization mass spectrometry approaches X ray diffraction light scattering and TEM techniques Investigates an array of polysaccharides such as glycogen xanthan hyaluronan and more Includes an introduction to the sources types and benefits of polysaccharide Considers applications of polysaccharides in various industries including biomedicine pharmaceuticals and the food industry Oil Extraction and Analysis D. L.

Luthria,2019-06-07 This book contains papers from the symposium Critical Issues Current and Emerging Technologies for Determination of Crude Fat Content in Food Feed and Seeds held in 2003 at the AOCS Annual Meeting in Kansas City Missouri The topics covered give a broad perspective of the challenges and issues of the value added enhanced products This book w *Handbook of Food Analytical Chemistry, Volume 1* Ronald E. Wrolstad,Terry E. Acree,Eric A. Decker,Michael H. Penner,David S. Reid,Steven J. Schwartz,Charles F. Shoemaker,Denise M. Smith,Peter Sporns,2005-09-16 Emphasizing effective state of the art methodology and written by recognized experts in the field the Handbook of Food Analytical Chemistry is an indispensable reference for food scientists and technologists to enable successful analysis Provides detailed reports on experimental procedures Includes sections on background theory and troubleshooting Emphasizes effective state of the art methodology written by recognized experts in the field Includes detailed instructions with annotated advisory comments key references with annotation time considerations and anticipated results *National Library of Medicine Current Catalog* National Library of Medicine (U.S.),1992 **Solid State NMR Studies of Biopolymers** Anne E.

McDermott, Tatyana Polenova, 2010-09-20 The content of this volume has been added to eMagRes formerly Encyclopedia of Magnetic Resonance 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 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 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 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 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 www.wileyonlinelibrary.com/ref/eMagRes View other eMagRes publications here *Biochemistry: Fundamentals and Bioenergetics* Meera Yadav, Hardeo Singh Yadav, 2021-10-29 Biochemistry Fundamentals and Bioenergetics presents information about the basic and applied aspects of the chemistry of living organisms The textbook covers the scope and importance of biochemistry the latest physical techniques to determine biomolecular structure detailed classification structure and function of biomolecules such as carbohydrates lipids amino acids proteins nucleic acids vitamins enzymes and hormones Readers will also learn about processes central to energy metabolism including photosynthesis and respiration oxidative phosphorylation DNA replication transcription and translation recombinant DNA technology Key Features logical approach to biochemistry with several examples 10 organized chapters on biochemistry fundamentals and metabolism focus on biomolecules and biochemical processes references for further reading [Biomedical Applications of Peptide-, Glyco- and Glycopeptide Dendrimers, and Analogous Dendrimeric Structures](#) Jaroslav Sebestik, Milan Reinis, Jan Jezek, 2012-12-13 Dendrimers are repeatedly branched and roughly spherical large molecules They can be used in various medical applications such as anticancer polymeric nanomedicines and nanocarriers gene carriers and vectors in gene delivery contrast agents for molecular imaging and vaccines against infectious diseases and cancer The highly branched multivalent nature and

molecular architecture of dendrimers make them ideal tools for a variety of tissue engineering applications This book describes different categories of dendrimers their biomedical and physico chemical applications as well as convergent and divergent syntheses click chemistry and ligation strategies It is a rich source of information for researchers in biochemistry and pharmacology working on drug development as well as for organic chemists who are engaged in synthesis of dendrimers

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