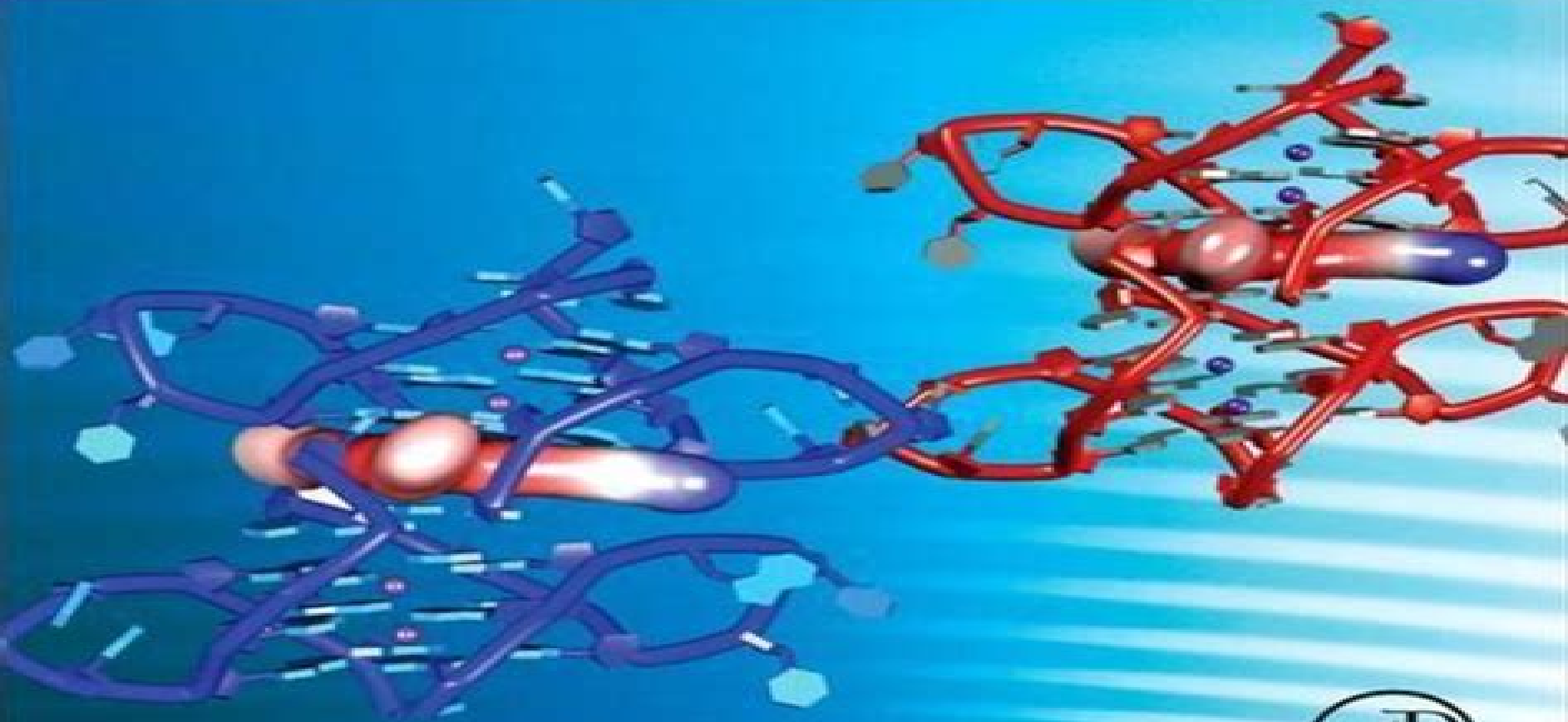


THERAPEUTIC APPLICATIONS OF QUADRUPLEX NUCLEIC ACIDS



STEPHEN NEIDLE



Therapeutic Applications Of Quadruplex Nucleic Acids

Jens Müller, Bernhard Lippert



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Therapeutic Applications of Quadruplex Nucleic Acids Stephen Neidle, 2011-09-19 Therapeutic applications of quadruplex nucleic acids provides a single comprehensive survey that describes and assesses recent advances in quadruplex therapeutics and targeting strategies It also covers the underlying fundamentals of such topics as quadruplex structure small molecule recognition biological roles of genomic quadruplexes and quadruplex informatics P 4 of cover *Handbook of Chemical Biology of Nucleic Acids* Naoki Sugimoto, 2023-07-29 This handbook is the first to comprehensively cover nucleic acids from fundamentals to recent advances and applications It is divided into 10 sections where authors present not only basic knowledge but also recent research Each section consists of extensive review chapters covering the chemistry biology and biophysics of nucleic acids as well as their applications in molecular medicine biotechnology and nanotechnology All sections within this book are Physical Chemistry of Nucleic Acids Section Editor Prof Roland Winter Structural Chemistry of Nucleic Acids Section Editor Prof Janez Plavec Organic Chemistry of Nucleic Acids Section Editor Prof Piet Herdewijn Ligand Chemistry of Nucleic Acids Section Editor Prof Marie Paule Teulade Fichou Nucleic Acids and Gene Expression Section Editor Prof Cynthia Burrows Analytical Methods and Applications of Nucleic Acids Section Editor Prof Chaoyong Yang Nanotechnology and Nanomaterial Biology of Nucleic Acids Section Editor Prof Zhen Xi Nucleic Acids Therapeutics Section Editor Prof Katherine Seley Radtke Biotechnology and Synthetic Biology of Nucleic Acids Section Editor Prof Eriks Rozners Functional Nucleic Acids Section Editor Prof Keith R Fox The handbook is edited by outstanding leaders with contributions written by international renowned experts It is a valuable resource not only for researchers but also graduate students working in areas related to nucleic acids who would like to learn more about their important role and potential applications

G-quadruplex and Microorganisms Sara N. Richter, 2019-08-19 G quadruplexes G4s are nucleic acids secondary structures that form in DNA or RNA guanine G rich strands In recent years the presence of G4s in microorganisms has attracted increasing interest In prokaryotes G4 sequences have been reported in several human pathogens Bacterial enzymes able to process G4s have been identified In viruses G4s have been suggested to be involved in key steps of the viral life cycle They have been associated with the human immunodeficiency virus HIV herpes simplex virus 1 HSV 1 human papilloma virus swine pseudorabies virus and other viruses genomes New evidence shows the presence of G4s in parasitic protozoa such as the causative agent of malaria G4 binding proteins and mRNA G4s have been implicated in the regulation of microorganisms genome replication and translation G4 ligands have been developed and tested both as tools to study the complexity of G4 mediated mechanisms in the viral life cycle and as therapeutic agents Moreover new techniques to study G4 folding and their interactions with proteins have been developed This Special Issue will focus on G4s present in microorganisms addressing all the above aspects

Biomedical Applications of Acridines Jan Ježek, Jan Hlaváček, Jaroslav Šebestík, 2017-08-15 This book describes applications of acridines for the treatment of various

neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease and various prion diseases and discusses the potential of acridines in neuro regenerative medicine. Using modern data mining software it presents structures of acridines with nucleic acids and proteins and compares them with the native structures. Furthermore, the book presents modern methods of acridine synthesis, comparing them with the most useful conventional methods. Acridines interact with both nucleic acids and proteins and, due to their direct interactions with various enzymes, they can be suitable for the treatment of neurodegenerative diseases, inflammation, immunological disorders and protozoal diseases. The characteristic spectral properties of acridines can be employed in labeling proteins, nucleic acids, lipids and even cells and their compartments. Moreover, they can be applied in photodynamic therapy.

Interplay between Metal Ions and Nucleic Acids Astrid Sigel, Helmut Sigel, Roland KO Sigel, 2012-01-02. *Interplay between Metal Ions and Nucleic Acids* provides in an authoritative and timely manner in 12 stimulating chapters written by 24 internationally recognized experts from 8 nations and supported by nearly 1500 references, about 20 tables and 125 illustrations, many in color, a most up to date view on metal ion/nucleic acid interactions, the characterization of which is covered in solution and in the solid state. The volume concentrates on modern developments encompassing topics in the wide range from G-quadruplexes via DNAzymes, catalysis at the DNA scaffold and metal-mediated base pairs to peptide-nucleic acids (PNAs), being thus of relevance e.g. for chemistry and nanotechnology but also for molecular biology and genetic diagnostics.

Medicinal Chemistry Approaches to Personalized Medicine Karen Lackey, Bruce Roth, 2013-11-22. Edited by two renowned medicinal chemists who have pioneered the development of personalized therapies in their respective fields, this authoritative analysis of what is already possible is the first of its kind and the only one to focus on drug development issues. Numerous case studies from the first generation of personalized drugs are presented, highlighting the challenges and opportunities for pharmaceutical development. While the majority of these examples are taken from the field of cancer treatment, other key emerging areas such as neurosciences and inflammation are also covered. With its careful balance of current and future approaches, this handbook is a prime knowledge source for every drug developer and one that will remain up to date for some time to come. From the content: Discovery of Predictive Biomarkers for Anticancer Drugs; Discovery and Development of Vemurafenib; Targeting Basal Cell Carcinoma G-Quadruplexes as Therapeutic Targets in Cancer; From Human Genetics to Drug Candidates: An Industrial Perspective on LRRK2 Inhibition as a Treatment for Parkinson's Disease; Therapeutic Potential of Kinases in Asthma; DNA Damage Repair Pathways and Synthetic Lethality; Medicinal Chemistry in the Context of the Human Genome and many more.

Electrochemical Immunosensors and Aptasensors Paolo Ugo, Ligia M. Moretto, 2018-03-23. This book is a printed edition of the Special Issue *Electrochemical Immunosensors and Aptasensors* that was published in *Chemosensors*.

Innovations in Biomolecular Modeling and Simulations Tamar Schlick, 2012-05-24. The chemical and biological sciences face unprecedented opportunities in the 21st century. A confluence of factors from parallel universes

advances in experimental techniques in biomolecular structure determination progress in theoretical modeling and simulation for large biological systems and breakthroughs in computer technology has opened new avenues of opportunity as never before Now experimental data can be interpreted and further analysed by modeling and predictions from any approach can be tested and advanced through companion methodologies and technologies This two volume set describes innovations in biomolecular modeling and simulation in both the algorithmic and application fronts With contributions from experts in the field the books describe progress and innovation in areas including simulation algorithms for dynamics and enhanced configurational sampling force field development implicit solvation models coarse grained models quantum mechanical simulations protein folding DNA polymerase mechanisms nucleic acid complexes and simulations RNA structure analysis and design and other important topics in structural biology modeling The books are aimed at graduate students and experts in structural biology and chemistry and the emphasis is on reporting innovative new approaches rather than providing comprehensive reviews on each subject

Modern Avenues in Metal-Nucleic Acid Chemistry Jens Müller, Bernhard Lippert, 2023-04-24 Volume 25 entitled *Modern Avenues in Metal Nucleic Acid Chemistry* of the series *Metal Ions in Life Sciences MILS* provides a timely overview of selected relevant developments in a field which previously had a pronounced focus on fundamental chemistry aspects such as coordination principles structural chemistry and consequences for biological processes and disease related medicinal issues More recently also as a consequence of the advent of supramolecular chemistry advancements in nanochemistry and new bio analytical methods novel aspects of this field have emerged MILS 25 gives a state of the art account on the present state of research in this field addressing among others porous materials non covalent interactions stimuli responsive bioconjugates DNA templated metal arrays and nanoclusters genotyping guanine quadruplexes and riboswitches It consists of 15 comprehensive chapters with over 1600 citations 160 figures 90 of them in color with key contributions from 40 international experts from Europe Asia and America It is an essential resource for scientists from numerous disciplines ranging from materials science to biochemistry by way of classical chemistry and physics It offers an update on nucleic acid metal complex bioconjugates and their applications It provides an insight into coordination polymers involving nucleic acid components It covers a wide range of nucleic acids from DNA duplexes triplexes and quadruplexes to RNA

Chemistry and Biology of Non-canonical Nucleic Acids Naoki Sugimoto, 2021-03-16 Discover the fundamentals and intricacies of a subject at the interface of chemistry and biology with this authoritative resource *Chemistry and Biology of Non canonical Nucleic Acids* delivers a comprehensive treatment of the chemistry and biology of non canonical nucleic acids including their history structures stabilities properties and functions You ll learn about the role of these vital compounds in transcription translation regulation telomeres helicases cancers neurodegenerative diseases therapeutic applications nanotechnology and more An ideal resource for graduate students researchers in physical organic analytical and inorganic chemistry will learn about uncommon nucleic acids become the common non canonical nucleic acids

that fascinate and engage academics and professionals in private industry Split into 15 chapters covering a wide range of aspects of non canonical nucleic acids the book explains why these compounds exist at the forefront of a new research revolution at the intersection of chemistry and biology Chemistry and Biology of Non canonical Nucleic Acids also covers a broad range of topics critical to understanding these versatile and omnipresent chemicals including A discussion of the dynamic regulation of biosystems by nucleic acids with non canonical structures The role played by nucleic acid structures in neurodegenerative diseases and various cancers An exploration of the future outlook for the chemistry and biology of non canonical nucleic acids An introduction to the history of canonical and non canonical structures of nucleic acids An analysis of the physicochemical properties of non canonical nucleic acids Perfect for biochemists materials scientists and bioengineers Chemistry and Biology of Non canonical Nucleic Acids will also earn a place in the libraries of medicinal and pharmaceutical chemists who wish to improve their understanding of life processes and the role that non canonical nucleic acids play in them

Nucleic Acid Biology and its Application in Human Diseases Subhrangsu Chatterjee, Samit Chattopadhyay, 2023-05-30 This book reviews the structure function relationship of nucleic acids their role in the pathophysiology of the diseases and as therapeutic targets for human diseases The chapters discuss the role of nucleic acids in inflammatory diseases neurodegenerative diseases and cancer The book also describes recent advancements in nucleic acid based therapy the application of nucleic acids in diagnostics in the development of nano carriers logic gates and sensors It explores the use of nucleic acids RNA and DNA as a unique and multifunctional platform for numerous applications including therapeutics diagnostics nanodevices and materials It further examines the role of DNA methylation histone modifiers and readers chromatin remodelers microRNAs and other components of chromatin in the progression of cancer The book also discusses the applications of nucleic acid as a vaccine and as a gene editing tool It also provides an overview of the clinical trials using genome editing platforms for disease treatment and the challenges in implementing the editing technology Finally the book elucidates a representative description of challenges associated with nucleic acid mediated therapy

Telomeres Carole Saintome, 2024-06-12 Telomeres are specialized DNA protein structures that protect the ends of chromosomes to maintain their integrity They are chromosome sentinels This book written by multiple authors presents current knowledge and the most recent discoveries relating to telomeres The first chapters describe telomere structures DNA and proteins organization dynamics and replication in a range of organisms including ciliates yeast and mammals The following chapters cover mechanisms that maintain telomere length involving telomerase and Alternative Lengthening Telomeres ALT mechanisms Interestingly telomeres are transcribed into repetitive RNA called TERRA Telomeric repeat containing RNA the state of the art regarding mammalian telomere transcripts is presented here Two chapters are dedicated to the description of how telomere biology impacts the development of cancer and how their disfunctions induce telomeropathies telomere biology disorders Finally the book ends with a chapter presenting telomere and telomerase

targeting agents as potential anticancer agents a promising therapeutic approach

Transcriptome Profiling Mohammad Ajmal Ali, Joongku Lee, 2022-10-07 Transcriptome Profiling Progress and Prospects assists readers in assessing and interpreting a large number of genes up to and including an entire genome It provides key insights into the latest tools and techniques used in transcriptomics and its relevant topics which can reveal a global snapshot of the complete RNA component of a cell at a given time This snapshot in turn enables the distinction between different cell types different disease states and different time points during development Transcriptome analysis has been a key area of biological inquiry for decades The next generation sequencing technologies have revolutionized transcriptomics by providing opportunities for multidimensional examinations of cellular transcriptomes in which high throughput expression data are obtained at a single base resolution Transcriptome analysis has evolved from the detection of single RNA molecules to large scale gene expression profiling and genome annotation initiatives Written by a team of global experts key topics in Transcriptome Profiling include transcriptome characterization expression analysis of transcripts transcriptome and gene regulation transcriptome profiling and human health medicinal plants transcriptomics transcriptomics and genetic engineering transcriptomics in agriculture and phylotranscriptomics Presents recent development in the tools and techniques in transcriptomic characterization Integrates expression analysis of transcripts and gene regulation Includes the application of transcriptomics in human health genetic engineering and agriculture

Advances in Bionanomaterials II Stefano Piotto, Simona Concilio, Lucia Sessa, Federico Rossi, 2020-05-29 This book presents multidisciplinary research focusing on the analysis synthesis and design of bio and nanomaterials Merging biophysics biochemistry and bioengineering perspectives it discusses the basic properties of materials and their interaction with biological systems the development of new medical devices such as implantable systems and new algorithms and methods for modeling the mechanical physical and biological properties of biomaterials The book gathers the proceedings of the 3rd International Conference on Bio and Nanomaterials held on September 29 October 3 2019 on an MSC cruise ship navigating the Mediterranean Sea It particularly highlights Horizon 2020 projects covering topics such as novel synthetic strategies for nanomaterials the implementation of bio and smart materials for pharmacological and medical purposes as well as environmental applications Intended for a broad audience of academics and professionals it offers a comprehensive and timely snapshot of the field of biomaterials In addition to a set of innovative theories together with the necessary practical tools for their implementation it also addresses the current challenges in the field fostering new discussions and possible future collaborations between diverse groups

Catalytically Active Nucleic Acids Harald Seitz, Frank Stahl, Johanna-Gabriela Walter, 2019-09-30 This volume reviews numerous reaction mechanisms and applications of nucleic acids with catalytic activity Written by an interdisciplinary team of authors it provides an essential overview of these acids fundamental aspects while also addressing associated methodologies such as nucleic acid enzyme engineering peroxidase mimicking DNazymes and Aptazymes After the discovery

of natural ribozymes RNA molecules that mediate the cleavage and formation of phosphodiester bonds and the formation of peptide bonds numerous artificial ribozymes with altered catalytic activities were produced by in vitro and in vivo selection Unlike ribozymes DNAzymes do not occur in nature Although the catalytic activity of nucleic acid enzymes is usually much slower than that of proteins nucleic acid enzymes with comparable catalytic activity have been obtained using stringent selection processes The key advantages of these enzymes they are e g smaller easier to produce and purify than proteins and can withstand denaturation e g by heat Over the last few years the number of publications on the applications of enzymatic nucleic acids has grown steadily Summarizing the fundamentals and applications of these acids this book will not only be an excellent resource for experts in the field but will also guide young researchers just starting out in this significant area

Nucleic Acid Nanotheranostics Marco Filice, Jesús Ruiz-Cabello, 2019-02-26 Nucleic Acid Nanotheranostics Biomedical Applications offers a comprehensive overview of improvements and new trends in fabrication of nanostructures as theranostic multifunctional carriers in gene therapy With a strong focus on medical applications comprising diagnosis therapy and imaging the book also examines gene therapy in an individual patient's cells or tissues to treat genetic diseases Sections cover Biomedical and Diagnostic applications of Nucleic Acids Biologic and Synthetic Advanced Nanostructures for nucleic acid delivery and important considerations of nanomedicine This book is a valuable guide for materials scientists physicians chemists and engineers but is also ideal for clinicians wishing to expand their knowledge Provides a unique source of knowledge theoretical as well as practical on nanotheranostic materials for gene therapy at all levels and related scientific areas Covers the pros and cons related to viral and nanomaterial based delivery of nucleic acids in terms of biosafety carrier selection synthesis and bioimaging Presents the only book to include an analysis of nanoformulations approved for clinical use

The Alkali Metal Ions: Their Role for Life Astrid Sigel, Helmut Sigel, Roland K. O. Sigel, 2016-02-09 MILS 16 provides an up to date review of the impact of alkali metal ions on life Their bioinorganic chemistry and analytical determination the solid state structures of bio ligand complexes and the properties of alkali metal ions in solution in the context of all kinds of biologically relevant ligands are covered this includes proteins enzymes and nucleic acids G quadruplexes Minerals containing sodium Na and potassium K are abundant in the Earth's crust making Na and K easily available In contrast the alkali elements lithium Li rubidium and cesium are rare and the radioactive francium occurs only in traces Since the intra and extracellular as well as the compartmental concentrations of Na and K differ significantly homeostasis and active transport of these ions are important this involves transporters carriers and pore forming ion channel proteins Systems like Na K ATPases H K ATPases or Na H antiporters are thoroughly discussed The role of K in photosynthesis and the role of Na in charging the battery of life are pointed out Also the relationships between alkali metal ions and diseases e g Parkinson or traumatic brain injury are covered and the relevance of Li salts in medicine pharmacology and mechanism is reviewed This and more is treated in an authoritative and timely manner in the 16 stimulating chapters of

Volume 16 The Alkali Metal Ions Their Role for Life which are written by 44 internationally recognized experts from 12 nations The impact of this vibrant research area is manifested in nearly 3000 references over 30 tables and more than 150 illustrations two thirds in color MILS 16 also provides excellent information for teaching Astrid Sigel Helmut Sigel and Roland K O Sigel have long standing interests in Biological Inorganic Chemistry Their research focuses on metal ion interactions with nucleotides and nucleic acids and on related topics They edited previously 44 volumes in the series Metal Ions in Biological Systems

RNA Structure and Function Jan Barciszewski, 2023-11-03 This book focuses on the current status of our understanding of RNA a key biological molecule The various RNAs covered are messenger RNA ribosomal RNA transfer RNA noncoding RNAs modified nucleosides and RNA enzymes The different chapters detail methods to investigate RNA structure and function the chemistry of modified RNAs and the latest advances in our understanding of the vast array of biological processes in which RNA is involved RNA in one form or another touches almost everything in a cell RNA has both structural and catalytic properties RNA fulfills a broad range of functions These molecules are no longer seen as passive elements transferring the genetic information from DNA into proteins but regulate the activity of genes during development cellular differentiation and changing environments RNAs are involved in various aspects of cell physiology and disease development Discoveries of RNA with unexpected diverse functions in healthy and diseased cells such as the role of RNA as both the source and countermeasure to cancer or severe viral infection stimulate new trends passion and solutions for molecular medicine In this book fundamental questions about the biochemical and genetic importance of RNA how mRNAs are generated and used to produce proteins how noncoding and catalytic RNAs mediate key cellular processes how to determine RNA structure and how to apply RNA in treatment of diseases This book is an essential resource for researches in academia and industry contributing to the development of new RNA therapeutics The book is geared toward scientists from the graduate level on up and particularly appeals to active investigators in RNA biology molecular biology and biochemistry

Peptide And Protein Engineering For Biotechnological And Therapeutic Applications Pierre Rousselot-pailley, Olga Iranzo, 2023-01-06 Peptides and proteins are crucial biomolecules in life The manifold functions they carry out range from molecular recognition and signaling to catalysis and immune response However the native systems are limited to a reduced toolbox of chemical functionalities as well as tridimensional structures Widening these toolboxes could pave the way to engineer peptides and proteins with enhanced properties compared to their native counterparts and or with structures and functions unprecedented in Nature Advances in the chemical and biological synthesis of peptides and proteins in computational tools in molecular biology and in high throughput screening methods are making this realm possible This book aims to give an overview of the last developments in the field of peptide and protein engineering It comprises a collection of chapters that span from the production of simple non proteinogenic building blocks and peptidic scaffolds of different sizes and structures to more complex systems including peptide based nanomaterials enzymes and artificial metalloenzymes

Different strategies are described where chemical and biological tools have been developed and combined to attain the desired properties and sought functionalities. The diverse systems described in this book highlight the progress in this important field and represent the starting points for the development of functional biomolecules, biomaterials and hybrid systems capable of addressing key societal challenges of our times in relevant areas such as health, environment and energy.

Nanopatterning and Nanoscale Devices for Biological Applications Seila Šelimović, 2017-12-19. Nanoscale techniques and devices have had an explosive influence on research in life sciences and bioengineering. Reflecting this influence, *Nanopatterning and Nanoscale Devices for Biological Applications* provides valuable insight into the latest developments in nanoscale technologies for the study of biological systems. Written and edited by experts in the field, this first of its kind collection of topics covers device fabrication methods targeting the substrate on the nanoscale through surface modification. It explores the generation of nanostructured biointerfaces and bioelectronics elements, examines microfluidically generated droplets as reactors enabling nanoscale sample preparation and analysis, gives an overview of key biosensors and integrated devices with nanoscale functionalities, and discusses the biological applications of nanoscale devices including a review of nanotechnology in tissue engineering. Readers gain a deep understanding of the cutting edge applications of nanotechnologies in biological engineering and learn how to apply the relevant scientific concepts to their own research. *Nanopatterning and Nanoscale Devices for Biological Applications* is the definitive reference for researchers in engineering, biology and biomedicine and for anyone exploring the newest trends in this innovative field.

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Table of Contents Therapeutic Applications Of Quadruplex Nucleic Acids

1. Understanding the eBook Therapeutic Applications Of Quadruplex Nucleic Acids
 - The Rise of Digital Reading Therapeutic Applications Of Quadruplex Nucleic Acids
 - Advantages of eBooks Over Traditional Books
2. Identifying Therapeutic Applications Of Quadruplex Nucleic Acids
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Therapeutic Applications Of Quadruplex Nucleic Acids
 - User-Friendly Interface
4. Exploring eBook Recommendations from Therapeutic Applications Of Quadruplex Nucleic Acids
 - Personalized Recommendations
 - Therapeutic Applications Of Quadruplex Nucleic Acids User Reviews and Ratings
 - Therapeutic Applications Of Quadruplex Nucleic Acids and Bestseller Lists
5. Accessing Therapeutic Applications Of Quadruplex Nucleic Acids Free and Paid eBooks
 - Therapeutic Applications Of Quadruplex Nucleic Acids Public Domain eBooks
 - Therapeutic Applications Of Quadruplex Nucleic Acids eBook Subscription Services
 - Therapeutic Applications Of Quadruplex Nucleic Acids Budget-Friendly Options
6. Navigating Therapeutic Applications Of Quadruplex Nucleic Acids eBook Formats
 - ePub, PDF, MOBI, and More
 - Therapeutic Applications Of Quadruplex Nucleic Acids Compatibility with Devices
 - Therapeutic Applications Of Quadruplex Nucleic Acids Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Therapeutic Applications Of Quadruplex Nucleic Acids
 - Highlighting and Note-Taking Therapeutic Applications Of Quadruplex Nucleic Acids
 - Interactive Elements Therapeutic Applications Of Quadruplex Nucleic Acids

8. Staying Engaged with Therapeutic Applications Of Quadruplex Nucleic Acids
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Therapeutic Applications Of Quadruplex Nucleic Acids
9. Balancing eBooks and Physical Books Therapeutic Applications Of Quadruplex Nucleic Acids
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Therapeutic Applications Of Quadruplex Nucleic Acids
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Therapeutic Applications Of Quadruplex Nucleic Acids
 - Setting Reading Goals Therapeutic Applications Of Quadruplex Nucleic Acids
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Therapeutic Applications Of Quadruplex Nucleic Acids
 - Fact-Checking eBook Content of Therapeutic Applications Of Quadruplex Nucleic Acids
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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