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KEY=INTERFACE - LOWERY WALLS

Protein-Nanoparticle Interactions

The Bio-Nano Interface

Springer Science & Business Media *In recent years, the fabrication of nanomaterials and exploration of their properties have attracted the attention of various scientific disciplines such as biology, physics, chemistry, and engineering. Although nanoparticulate systems are of significant interest in various scientific and technological areas, there is little known about the safety of these nanoscale objects. It has now been established that the surfaces of nanoparticles are immediately covered by biomolecules (e.g. proteins, ions, and enzymes) upon their entrance into a biological medium. This interaction with the biological medium modulates the surface of the nanoparticles, conferring a “biological identity” to their surfaces (referred to as a “corona”), which determines the subsequent cellular/tissue responses. The new interface between the nanoparticles and the biological medium/proteins, called “bio-nano interface,” has been very rarely studied in detail to date, though the interest in this topic is rapidly growing. In this book, the importance of the physicochemical characteristics of nanoparticles for the properties of the protein corona is discussed in detail, followed by comprehensive descriptions of the methods for assessing the protein-nanoparticle interactions. The advantages and limitations of available corona evaluation methods (e.g. spectroscopy methods, mass spectrometry, nuclear magnetic resonance, electron microscopy, X-ray crystallography, and differential centrifugal sedimentation) are examined in detail, followed by a discussion of the possibilities for enhancing the current methods and a call for new techniques. Moreover, the advantages and disadvantages of protein-nanoparticle interaction phenomena are explored and discussed, with a focus on the biological impacts.*

Proteomics as a Multifaceted Tool in Medicine and Environmental Assessment

Linköping University Electronic Press *Proteomics is evolving as a multi-faceted tool for addressing various biochemical and biomedical queries in the field of scientific research. This involves various stages, ranging from sample preparation to data analysis and biological interpretation. Sample preparation involves isolating proteins from the sample source, purifying and digesting them to initiate shotgun proteomics. Shotgun proteomics identifies proteins by bottom-up proteomic approaches where proteins are identified from the fragmentation spectra of their own peptides. Paper I: deals with the simplification of functional characterization for nanoparticles intended for use in biomedicine. Proteomics was constructive in differentiating and semi-quantifying the surface of protein corona. This could be beneficial in predicting the interactions between nanoparticles and a biological entity like the cell or a receptor protein and provide initial valuable information related to targeting, uptake and safety. Paper II: deals with understanding effects of TiO2 nanoparticles on endothelial cells. A combinatorial approach, involving transcriptomics and proteomics was used to identify aberrations in the permeability and integrity of endothelial cells and tissues. Our study also investigated the correlation of size and how they motivated a differential cellular response. In case of intravenous entry for nanoparticles in targeted drug delivery systems, endothelial cells are the first barrier encountered by these drug carriers. This evaluation involving endothelial cell response could be very instrumental during the designing of NP based drug delivery systems. Paper III: Pharmaceuticals and its metabolites could be very hazardous, especially if its disposal is not managed properly. Since water bodies are the ultimate sink, these chemicals could end up there, culminating in toxicity and other ‘mixture effects’ in combination with other factors. To evaluate the effects of the pharmaceutical, propranolol and climatic factors like low salinity conditions, a microcosm exposure was designed and shotgun proteomics helped understand its impact on mussel gills. In this study too, a combination of transcriptomics and proteomics unveiled molecular mechanisms altered in response to stressors, both individually and in combination. Paper IV: An interplay of various factors like EBF1 and PAX5 determines B-cell lineage and commitment. This might have been materialized by direct and transient proteinprotein interactions. A unique method called BioID helped screen relevant interactions in living cells by the application of a promiscuous biotin ligase enzyme capable of tagging proteins through biotinylation based on a proximity radius. Biotinylation of endogenous proteins enabled their selective isolation by exploiting the high affinity of biotin and streptavidin on streptavidin coated agarose beads, leading to their identification by mass spectrometry. The biotinylated proteins were potential candidate interactors of EBF1 and PAX5, which were later confirmed by sequencing techniques like ChIP-Seq, ATAC seq, and visualization techniques like proximity ligation assay (PLA).*

Magnetic Nanoparticles

MDPI *The present book covers all research areas related to magnetic nanoparticles, magnetic nanorods, and other magnetic nanospecies, their preparation, characterization, and various applications, specifically emphasizing biomedical applications. The chapters written by the leading experts cover different subareas of the science and technology related to various magnetic nanospecies—providing broad coverage of this multifaceted area and its applications. The different topics addressed in this book will be of great interest to the interdisciplinary community active in the area of nanoscience and nanotechnology. It is hoped that this collection and its various chapters will be important and beneficial for researchers and students working in various areas related to bionanotechnology, materials science, biosensor applications, medicine, and many others. Furthermore, this book is aimed at attracting young scientists and introducing them to this field, in addition to providing newcomers with an enormous collection of literature references.*

Cytotoxicity

BoD - Books on Demand *The book Cytotoxicity is aimed to be an essential reading to all medical students, biologists, biochemists and professionals involved in the field of toxicology. This book is a useful and ideal guide for novice researchers interested in learning research methods to study cytotoxic bioactive compounds. The parts of this book describe the replacement and different applications of the cytotoxic agents. All chapters are written by paramount experts in cytotoxicity research. This will hopefully stimulate more research initiatives, funding, and critical insight into the already increasing demand for cytotoxicity researches that have been evidenced worldwide.*

Surface Enhanced Raman Scattering: New Theoretical Approaches, Materials and Strategies

Frontiers Media SA

Springer Handbook of Nanotechnology

Springer Science & Business Media This major work has established itself as the definitive reference in the nanoscience and nanotechnology area in one volume. It presents nanostructures, micro/nanofabrication, and micro/nanodevices. Special emphasis is on scanning probe microscopy, nanotribology and nanomechanics, molecularly thick films, industrial applications and microdevice reliability, and on social aspects. Reflecting further developments, the new edition has grown from six to eight parts. The latest information is added to fields such as bionanotechnology, nanorobotics, and NEMS/MEMS reliability. This classic reference book is orchestrated by a highly experienced editor and written by a team of distinguished experts for those learning about the field of nanotechnology.

Nanotechnology Characterization Tools for Tissue Engineering and Medical Therapy

Springer Nature Ninth volume of a 40 volume series on nanoscience and nanotechnology, edited by the renowned scientist Challa S.S.R. Kumar. This handbook gives a comprehensive overview about Nanotechnology Characterization Tools for Tissue Engineering and Medical Therapy. Modern applications and state-of-the-art techniques are covered and make this volume an essential reading for research scientists in academia and industry.

Materiomics: Multiscale Mechanics of Biological Materials and Structures

Springer Science & Business Media Multiscale mechanics of hierarchical materials plays a crucial role in understanding and engineering biological and bioinspired materials and systems. The mechanical science of hierarchical tissues and cells in biological systems has recently emerged as an exciting area of research and provides enormous opportunities for innovative basic research and technological advancement. Such advances could enable us to provide engineered materials and structure with properties that resemble those of biological systems, in particular the ability to self-assemble, to self-repair, to adapt and evolve, and to provide multiple functions that can be controlled through external cues. This book presents material from leading researchers in the field of mechanical sciences of biological materials and structure, with the aim to introduce methods and applications to a wider range of engineers.

Nanotribology and Nanomechanics

An Introduction

Springer This textbook and comprehensive reference source and serves as a timely, practical introduction to the principles of nanotribology and nanomechanics. This 4th edition has been completely revised and updated, concentrating on the key measurement techniques, their applications, and theoretical modeling of interfaces. It provides condensed knowledge of the field from the mechanics and materials science perspectives to graduate students, research workers, and practicing engineers.

Bioremediation in Latin America

Current Research and Perspectives

Springer The book compiles an update information about the state of bioremediation in emerging Latin American countries. Some of the studied regions are sites that suffered decades of pollution by agrochemicals, heavy metals and industrial waste due to the lack of control by government regulations. Such is the case of Northern Argentina, where were illegally deposited over 30 tn of obsolete organochlorine pesticides in 1994. The content has focused in the use of native organisms (from bacteria to plants) as a viable solution to the problem of pollution, using low-cost and powerful techniques, socially well accepted and appropriate from the environmental point of view. In this context, levels of pesticide found in the Latin American population are informed. It was also displayed as a multidisciplinary approach based on concerns of a diverse group of researchers (biochemists, biologists, chemical engineers and geneticists) about a global problem, dealing with specific cases of study, with a view to project their findings to worldwide. In this regard, researchers provide their findings to regulatory sectors, whom could make appropriate decisions.

The Biophysics of Cell Membranes

Biological Consequences

Springer This volume focuses on the modulation of biological membranes by specific biophysical properties. The readers are introduced to emerging biophysical approaches that mimic specific states (like membrane lipid asymmetry, membrane curvature, lipid flip-flop, lipid phase separation) that are relevant to the functioning of biological membranes. The first chapter describes innovative methods to mimic the prevailing asymmetry in biological membranes by forming asymmetrical membranes made of monolayers with different compositions. One of the chapters illustrates how physical parameters, like curvature and elasticity, can affect and modulate the interactions between lipids and proteins. This volume also describes the sensitivity of certain ion channels to mechanical forces and it presents an analysis of how cell shape is determined by both the cytoskeleton and the lipid domains in the membrane. The last chapter provides evidence that liposomes can be used as a minimal cellular model to reconstitute processes related to the origin of life. Each topic covered in this volume is presented by leading experts in the field who are able to present clear, authoritative and up-to-date reviews. The novelty of the methods proposed and their potential for a deeper molecular description of membrane functioning are particularly relevant experts in the areas of biochemistry, biophysics and cell biology, while also presenting clear and thorough introductions, making the material suitable for students in these fields as well.

Power Management for Internet of Everything

CRC Press In this book, several advanced topics in the area of Power Management Analog and Mixed-Signal Circuits and Systems have been addressed. The fundamental aspects of these topics are discussed, and state-of-the-art developments are presented. The book covers subject areas like bio-sensors co-integration with nanotechnology, and for these CMOS circuits one popular application could be personalized medicine. Having seen the power assets for such technologies, and knowing what challenges these present for the circuits and systems designer, remote powering and sensors solutions are reviewed in the second chapter. The third chapter contains an industrial contribution on remote powering, presenting energy harvesting from the RF field to power a target wireless sensor network consumption. Having touched the idea of the low current consumption, μA or Nano-Amp range and their transient behaviours are also described. Digital and large-scale integrated circuits - seen from an academic point of view - is included in chapter five, and this same topic from an industrial point of view is given in the chapter thereafter. An additional topic on the hall sensor, applied in an automotive case study, is then also presented. Approaching the duty-cycling of active mode, oscillator for timers and system-level power management including the cloud are covered in the last chapters. Power Management for Internet of Everything targets post-graduate students and those persons active in industry, whom understand and can connect system design with system on chip (SoC) and mixed-signal design as broader set of circuits and systems. The topic of Internet of Things (IoT), ranging from data converters for sensor interfaces to radios and software application, is also addressed from the viewpoint of power and energy management. The contents ensures a good balance between academia and industry, combined with a judicious selection of distinguished international authors.

Bio/CMOS Interfaces and Co-Design

Springer Science & Business Media The application of CMOS circuits and ASIC VLSI systems to problems in medicine and system biology has led to the emergence of Bio/CMOS Interfaces and Co-Design as an exciting and rapidly growing area of research. The mutual inter-relationships between VLSI-CMOS design and the biophysics of molecules interfacing with silicon and/or onto metals has led to the emergence of the interdisciplinary engineering approach to Bio/CMOS interfaces. This new approach, facilitated by 3D circuit design and nanotechnology, has resulted in new concepts and applications for VLSI systems in the bio-world. This book offers an invaluable reference to the state-of-the-art in Bio/CMOS interfaces. It describes leading-edge research in the field of CMOS design and VLSI development for applications requiring integration of biological molecules onto the chip. It provides multidisciplinary content ranging from biochemistry to CMOS design in order to address Bio/CMOS interface co-design in bio-sensing applications.

Environmental Nanotechnology Volume 3

Springer Nature This third volume on environmental nanotechnology includes chapters dealing with topics such as nanoremediation, waste water purification, nanosensors, nanomedicine, and nanofiltration. It also highlights the safety aspects and risk assessment and management related to several toxins, as well as nanotechnology related solutions for these challenges. The book also discusses new nanomaterials from the nexus of environment, water, remediation and total environment.

Biophysics of Insect Flight

Springer Nature This book basically involves the study of flight parameters, wing beat frequency, moment of inertia, and wing movements for developing various aerodynamic forces which have been calculated. The book is intended for biologists, physicists, nanotechnologists, and aerospace engineers. Resilin, an elastic polymer (4 $[\lambda]$) which is present at the base of insect, plays a major role in Neurogenic and Myogenic insect flyers and influences the physiology of flight muscles. Leading edge vortex (LEV) is a special feature of insect flight. Insect wings have stalling angle above 60 degrees as compared to a man-made aeroplane stalling angle which is 16 degree. Reynolds number, the knowledge of LEV, and detailed study of moment of inertia help in developing flapping flexible wings for micro-aerial-vehicles. This book serves as an interface between biologists and engineers interested to develop biomimicking micro-aerial-vehicles. The contents of this book is useful to researchers and professionals alike.

Nanopore Technology

Methods and Protocols

Humana This detailed collection explores techniques involved in the main strategies of nanopore sensing, such as translocation, analyte trapping, and interactions with external binding sites. Opening with a section on nanopore design and nanopore production, the book continues with parts devoted to various biological nanopores, nanopore engineering, and their uses in single molecule sensing, computational methods to study intrinsic nanopore behavior, characterizing the specific translocation activity of a vesicle particle through a nanopore, as well as the use of the technique droplet interface bilayer (DIB) in nanopore and membrane biophysical studies. Written for the highly successful Methods in Molecular Biology series, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and practical, Nanopore Technology: Methods and Protocols, with its focus on nanopore technology and biomolecule characterization, will hold the interest of the biophysicists, biochemists, bioengineers, and molecular biologists who are working toward further understanding this key field of research.

5th International Conference on Nanotechnologies and Biomedical Engineering

Proceedings of ICNBME-2021, November 3–5, 2021, Chisinau, Moldova

Springer Nature

Biomimetics -- Materials, Structures and Processes

Examples, Ideas and Case Studies

Springer Science & Business Media The book presents an outline of current activities in the field of biomimetics and integrates a variety of applications comprising biophysics, surface sciences, architecture and medicine. Biomimetics as innovation method is characterised by interdisciplinary information transfer from the life sciences to technical application fields aiming at increased performance, functionality and energy efficiency. The contributions of the book relate to the research areas: - Materials and structures in nanotechnology and biomaterials - Biomimetic approaches to develop new forms, construction principles and design methods in architecture - Information and dynamics in automation, neuroinformatics and biomechanics Readers will be informed about the latest research approaches and results in biomimetics with examples ranging from bionic nano-membranes to function-targeted design of tribological surfaces and the translation of natural auditory coding strategies.

Catalyzing Inquiry at the Interface of Computing and Biology

National Academies Press Advances in computer science and technology and in biology over the last several years have opened up the possibility for computing to help answer fundamental questions in biology and for biology to help with new approaches to computing. Making the most of the research opportunities at the interface of computing and biology requires the active participation of people from both fields. While past attempts have been made in this direction, circumstances today appear to be much more favorable for progress. To help take advantage of these opportunities, this study was requested of the NRC by the National Science Foundation, the Department of Defense, the National Institutes of Health, and the Department of Energy. The report provides the basis for establishing cross-disciplinary collaboration between biology and computing including an analysis of potential impediments and strategies for overcoming them. The report also presents a wealth of examples that should encourage students in the biological sciences to look for ways to enable them to be more effective users of computing in their studies.

Nanoelectronic Materials

Fundamentals and Applications

Springer This book presents synthesis techniques for the preparation of low-dimensional nanomaterials including 0D (quantum dots), 1D (nanowires, nanotubes) and 2D (thin films, few layers), as well as their potential applications in nanoelectronic systems. It focuses on the size effects involved in the transition from bulk materials to nanomaterials; the electronic properties of nanoscale devices; and different classes of nanomaterials from microelectronics to nanoelectronics, to molecular electronics. Furthermore, it demonstrates the structural stability, physical, chemical, magnetic, optical, electrical, thermal, electronic and mechanical properties of the nanomaterials. Subsequent chapters address their characterization, fabrication techniques from lab-scale to mass production, and functionality. In turn, the book considers the environmental impact of nanotechnology and novel applications in the mechanical industries, energy harvesting, clean energy, manufacturing materials, electronics, transistors, health and medical therapy. In closing, it addresses the combination of biological systems with nanoelectronics and highlights examples of nanoelectronic–cell interfaces and other advanced medical applications. The book answers the following questions: • What is different at the nanoscale? • What is new about nanoscience? • What are nanomaterials (NMs)? • What are the fundamental issues in nanomaterials? • Where are nanomaterials found? • What nanomaterials exist in nature? • What is the importance of NMs in our lives? • Why so much interest in nanomaterials? • What is at nanoscale in nanomaterials? • What is graphene? • Are pure low-dimensional systems interesting and worth pursuing? • Are nanotechnology products currently available? • What are sensors? • How can Artificial Intelligence (AI) and nanotechnology work together? • What are the recent advances in nanoelectronic materials? • What are the latest applications of NMs?

Optics and Spectroscopy for Fluid Characterization

MDPI This book is a printed edition of the Special Issue "Optics and Spectroscopy for Fluid Characterization" that was published in Applied Sciences

Journal of the Royal Society, Interface

Nanoparticle–Protein Corona

Biophysics to Biology

Royal Society of Chemistry Nanoparticles have numerous biomedical applications including drug delivery, bone implants and imaging. A protein corona is formed when proteins existing in a biological system cover the nanoparticle surface. The formation of a nanoparticle–protein corona, changes the behaviour of the nanoparticle, resulting in new biological characteristics and influencing the circulation lifetime, accumulation, toxicity, cellular uptake and agglomeration. This book provides a detailed understanding of nanoparticle–protein corona formation, its biological significance and the factors that govern the formation of coronas. It also explains the impact of nanoparticle–protein interactions on biological assays, ecotoxicity studies and proteomics research. It will be of interest to researchers studying the application of nanoparticles as well as toxicologists and pharmaceutical chemists.

Scanning Probe Microscopy in Nanoscience and Nanotechnology 3

Springer Science & Business Media This book presents the physical and technical foundation of the state of the art in applied scanning probe techniques. It constitutes a timely and comprehensive overview of SPM applications. The chapters in this volume relate to scanning probe microscopy techniques, characterization of various materials and structures and typical industrial applications, including topographic and dynamical surface studies of thin-film semiconductors, polymers, paper, ceramics, and magnetic and biological materials. The chapters are written by leading researchers and application scientists from all over the world and from various industries to provide a broader perspective.

Bio-nanoimaging

Protein Misfolding and Aggregation

Academic Press Bio-Nanoimaging: Protein Misfolding & Aggregation provides a unique introduction to both novel and established nanoimaging techniques for visualization and characterization of misfolded and aggregated protein species. The book is divided into three sections covering: - Nanotechnology and nanoimaging technology, including cryoelectron microscopy of beta(2)-microglobulin, studying amyloidogenesis by FRET; and scanning tunneling microscopy of protein deposits - Polymorphisms of protein misfolded and aggregated species, including fibrillar polymorphism, amyloid-like protofibrils, and insulin oligomers - Polymorphisms of misfolding and aggregation processes, including multiple pathways of lysozyme aggregation, misfolded intermediate of a PDZ domain, and micelle formation by human islet amyloid polypeptide Protein misfolding and aggregation is a fast-growing frontier in molecular medicine and protein chemistry. Related disorders include cataracts, arthritis, cystic fibrosis, late-onset diabetes mellitus, and numerous neurodegenerative diseases like Alzheimer's and Parkinson's. Nanoimaging technology has proved crucial in understanding protein-misfolding pathologies and in potential drug design aimed at the inhibition or reversal of protein aggregation. Using these technologies, researchers can monitor the aggregation process, visualize protein aggregates and analyze their properties. Provides practical examples of nanoimaging research from leading molecular biology, cell biology, protein chemistry, biotechnology, genetics, and pharmaceutical labs Includes over 200 color images to illustrate the power of various nanoimaging technologies Focuses on nanoimaging techniques applied to protein misfolding and aggregation in molecular medicine

Introduction to Fluorescence Sensing

Springer Fluorescence is the most popular technique in chemical and biological sensing and this book provides systematic knowledge of basic principles in the design of fluorescence sensing and imaging techniques together with critical analysis of recent developments. Its ultimate sensitivity, high temporal and spatial resolution and versatility enables high resolution imaging within living cells. It develops rapidly in the directions of constructing new molecular recognition units, new fluorescence reporters and in improving sensitivity of response, up to the detection of single molecules. Its application areas range from the control of industrial processes to environmental monitoring and clinical diagnostics. Being a guide for students and young researchers, it also addresses professionals involved in basic and applied research. Making a strong link between education, research and product development, this book discusses prospects for future progress.

Introduction to Tribology

John Wiley & Sons A fully updated version of the popular Introduction to Tribology, the second edition of this leading tribology text introduces the major developments in the understanding and interpretation of friction, wear and lubrication. Considerations of friction and wear have been fully revised to include recent analysis and data work, and friction mechanisms have been reappraised in light of current developments. In this edition, the breakthroughs in tribology at the nano- and micro- level as well as recent developments in nanotechnology and magnetic storage technologies are introduced. A new chapter on the emerging field of green tribology and biomimetics is included. Introduces the topic of tribology from a mechanical engineering, mechanics and materials science points of view Newly updated chapter covers both the underlying theory and the current applications of tribology to industry Updated write-up on nanotribology and nanotechnology and introduction of a new chapter on green tribology and biomimetics

Handbook of Bioelectronics

Directly Interfacing Electronics and Biological Systems

Cambridge University Press *This wide-ranging summary of bioelectronics provides the state of the art in electronics integrated and interfaced with biological systems in one single book. It is a perfect reference for those involved in developing future distributed diagnostic devices, from smart bio-phones that will monitor our health status to new electronic devices serving our bodies and embedded in our clothes or under our skin. All chapters are written by pioneers and authorities in the key branches of bioelectronics and provide examples of real-world applications and step-by-step design details. Through expert guidance, you will learn how to design complex circuits whilst cutting design time and cost and avoiding mistakes, misunderstandings, and pitfalls. An exhaustive set of recently developed devices is also covered, providing the implementation details and inspiration for innovating new solutions and devices. This all-inclusive reference is ideal for researchers in electronics, bio/nanotechnology, and applied physics, as well as circuit and system-level designers in industry.*

Principles and Applications of Tribology

John Wiley & Sons *This fully updated Second Edition provides the reader with the solid understanding of tribology which is essential to engineers involved in the design of, and ensuring the reliability of, machine parts and systems. It moves from basic theory to practice, examining tribology from the integrated viewpoint of mechanical engineering, mechanics, and materials science. It offers detailed coverage of the mechanisms of material wear, friction, and all of the major lubrication techniques - liquids, solids, and gases - and examines a wide range of both traditional and state-of-the-art applications. For this edition, the author has included updates on friction, wear and lubrication, as well as completely revised material including the latest breakthroughs in tribology at the nano- and micro- level and a revised introduction to nanotechnology. Also included is a new chapter on the emerging field of green tribology and biomimetics.*

Biophysics and Nanotechnology of Ion Channels

CRC Press *This book provides a comprehensive review of the biophysics and nanotechnology of ion channels. It details the biological and physiological entities of ion channels in cells and addresses various physical perspectives of ion channel structures and functions. Naturally inbuilt and artificial applicable nanotechnologies of ion channels are modelled and explored. It discusses various methods that can be utilized toward understanding ion channel-based cellular diseases. Physical, biochemical, biomedical, and bioinformatics techniques are taken into consideration to enable the development of strategies to address therapeutic drug discovery and delivery. This book will be of interest to advanced undergraduate and graduate students in biophysics and related biomedical sciences in addition to researchers in the field and industry. Features: Provides a stimulating introduction to the structures and functions of ion channels of biological cell membranes and discusses the biophysics of ion channels in condensed matter state and physiological condition Addresses natural processes and nanotechnology opportunities for their purposeful manipulation Lays the groundwork for vitally important medical advances Mohammad Ashrafuzzaman, a biophysicist and condensed matter scientist, is passionate about investigating biological and biochemical processes utilizing the principles and techniques of physics. He is an associate professor at King Saud University's Biochemistry Department of College of Science, Riyadh, Saudi Arabia, the co-founder of MDT Canada Inc., and the founder of Child Life Development Institute, Edmonton, Canada. He also authored Nanoscale Biophysics of the Cell and Membrane Biophysics.*

Drying Technologies for Biotechnology and Pharmaceutical Applications

John Wiley & Sons *A comprehensive source of information about modern drying technologies that uniquely focus on the processing of pharmaceuticals and biologicals Drying technologies are an indispensable production step in the pharmaceutical industry and the knowledge of drying technologies and applications is absolutely essential for current drug product development. This book focuses on the application of various drying technologies to the processing of pharmaceuticals and biologicals. It offers a complete overview of innovative as well as standard drying technologies, and addresses the issues of why drying is required and what the critical considerations are for implementing this process operation during drug product development. Drying Technologies for Biotechnology and Pharmaceutical Applications discusses the state-of-the-art of established drying technologies like freeze- and spray- drying and highlights limitations that need to be overcome to achieve the future state of pharmaceutical manufacturing. The book also describes promising next generation drying technologies, which are currently used in fields outside of pharmaceuticals, and how they can be implemented and adapted for future use in the pharmaceutical industry. In addition, it deals with the generation of synergistic effects (e.g. by applying process analytical technology) and provides an outlook toward future developments. -Presents a full technical overview of well established standard drying methods alongside various other drying technologies, possible improvements, limitations, synergies, and future directions -Outlines different drying technologies from an application-oriented point of view and with consideration of real world challenges in the field of drug product development -Edited by renowned experts from the pharmaceutical industry and assembled by leading experts from industry and academia Drying Technologies for Biotechnology and Pharmaceutical Applications is an important book for pharma engineers, process engineers, chemical engineers, and others who work in related industries.*

Micro and Nano Techniques for the Handling of Biological Samples

CRC Press *Several micro- and nanomanipulation techniques have emerged in recent decades thanks to advances in micro- and nanofabrication. For instance, the atomic force microscope (AFM) uses a nano-sized tip to image, push, pull, cut, and indent biological material in air, liquid, or vacuum. Using micro- and nanofabrication techniques, scientists can make manipulation tools, such as microgrippers and nanotweezers, on the same length scale as the biological samples. Micro and Nano Techniques for the Handling of Biological Samples reviews the different techniques available to manipulate and integrate biological materials in a controlled manner, either by sliding them along a surface (2-D manipulation), or by gripping and moving them to a new position (3-D manipulation). The advantages and drawbacks are mentioned together with examples that reflect the state-of-the-art in manipulation techniques for biological samples. Thanks to the advances in micro- and nanomanipulation techniques, the integration of biomaterials with physical transducers has been possible, giving rise to new and highly sensitive biosensing devices. Although great progress has been made, challenges are still present. To understand the complex interactions between and inside biological samples, scientists will always be working on improving technologies to manipulate, transport, sort, and integrate samples in different environments. Balanced between simplicity for the beginner and hardcore theory for the more advanced readers, this book is the ideal launching point for sharpening the scientific tools required to address these challenges.*

Biomateriomics

Springer Science & Business Media *Biomateriomics is the holistic study of biological material systems. While such systems are undoubtedly complex, we frequently encounter similar components -- universal building blocks and hierarchical structure motifs -- which result in a diverse set of functionalities. Similar to the way music or language arises from a limited set of music notes and words, we exploit the relationships between form and function in a meaningful way by recognizing the similarities between Beethoven and bone, or Shakespeare and silk. Through the investigation of material properties, examining fundamental links between processes, structures, and properties at multiple scales and their interactions, materiomics explains system functionality from the level of building blocks. Biomateriomics specifically focuses the analysis of the role of materials in the context of biological processes, the transfer of biological material principles towards biomimetic and bioinspired applications, and the study of interfaces between living and non-living systems. The challenges of biological materials are vast, but the convergence of biology, mathematics and engineering as well as computational and experimental techniques have resulted in the toolset necessary to describe complex material systems, from nano to macro. Applying biomateriomics can unlock Nature's secret to high performance materials such as spider silk, bone, and nacre, and elucidate the progression and diagnosis or the treatment of diseases. Similarly, it contributes to develop a de novo understanding of biological material processes and to the potential of exploiting novel concepts in innovation, material synthesis and design.*

Modulating Glial Cells Phenotype: New Findings and Therapies

Frontiers Media SA

Coherent Multidimensional Spectroscopy

Springer This book will fulfill the needs of time-domain spectroscopists who wish to deepen their understanding of both the theoretical and experimental features of this cutting-edge spectroscopy technique. Coherent Multidimensional Spectroscopy (CMDS) is a state-of-the-art technique with applications in a variety of subjects like chemistry, molecular physics, biochemistry, biophysics, and material science. Due to dramatic advancements of ultrafast laser technologies, diverse multidimensional spectroscopic methods utilizing combinations of THz, IR, visible, UV, and X-ray radiation sources have been developed and used to study real time dynamics of small molecules in solutions, proteins and nucleic acids in condensed phases and membranes, single and multiple excitons in functional materials like semiconductors, quantum dots, and solar cells, photo-excited states in light-harvesting complexes, ions in battery electrolytes, electronic and conformational changes in charge or proton transfer systems, and excess electrons and protons in water and biological systems.

Advanced Materials and Technologies for Micro/Nano-Devices, Sensors and Actuators

Springer Science & Business Media A NATO Advanced Research Workshop (ARW) entitled "Advanced Materials and Technologies for Micro/Nano Devices, Sensors and Actuators" was held in St. Petersburg, Russia, from June 29 to July 2, 2009. The main goal of the Workshop was to examine (at a fundamental level) the very complex scientific issues that pertain to the use of micro- and nano-electromechanical systems (MEMS and NEMS), devices and technologies in next generation commercial and defense-related applications. Micro- and nano-electromechanical systems represent rather broad and diverse technological areas, such as optical systems (micromirrors, waveguides, optical sensors, integrated subsystems), life sciences and lab equipment (micropumps, membranes, lab-on-chip, membranes, microfluidics), sensors (bio-sensors, chemical sensors, gas-phase sensors, sensors integrated with electronics) and RF applications for signal transmission (variable capacitors, tunable filters and antennas, switches, resonators). From a scientific viewpoint, this is a very multi-disciplinary field, including micro- and nano-mechanics (such as stresses in structural materials), electronic effects (e. g. charge transfer), general electrostatics, materials science, surface chemistry, interface science, (nano)tribology, and optics. It is obvious that in order to overcome the problems surrounding next-generation MEMS/NEMS devices and applications it is necessary to tackle them from different angles: theoreticians need to speak with mechanical engineers, and device engineers and modelers to listen to surface physicists. It was therefore one of the main objectives of the workshop to bring together a multidisciplinary team of distinguished researchers.

Nanoscience and Nanotechnology in Foods and Beverages

CRC Press Potential applications of nanotechnology in food industry include: encapsulation and delivery of substances in targeted sites, increasing flavor, introducing antibacterial nanoparticles into food, enhancing shelf life, sensing contamination, improved food storage, tracking, tracing, and brand protection. This book provides a basic understanding of the nanoscience and nanotechnology and their applications to different food industry sectors, covering both benefits and drawbacks using nanotechnology in food processing and discussing the development of an international regulatory framework.

Fluorescence of Supermolecules, Polymers, and Nanosystems

Springer Science & Business Media This, the fourth volume in the Springer series on fluorescence, focuses on the fluorescence of nanosystems, polymers and supermolecules, as well as the development and application of fluorescent probes. Aimed at researchers in organic and physical chemistry and in material sciences, emphasis is placed on the fluorescence of artificial and biological nanosystems; single molecule fluorescence and the luminescence of polymers; and micro- and nanoparticles and nanotubes.

Membrane Biomechanics

Academic Press Membrane Biomechanics, Volume 86, the latest release in the Current Topics in Membranes series, highlights new advances in the field, with this new volume presenting interesting chapters on Lipid bilayers: phase behavior and mechanics, Molecular mechanisms of cell membrane structure modification by omega-3 fatty acids, Mechanical properties of magnetoliposomes, Mechanosensitive ion channels and membrane tension, From cell membrane to the nuclear membrane through modulation of cytoskeleton, Endothelial stiffness in dyslipidemia and aging, Vascular smooth muscle stiffness in aging and vascular disease, Mechanobiology of macrovesicle release and activation, Interplay of membrane cholesterol and substrate on vascular smooth muscle mechanics, and more. Provides the authority and expertise of leading contributors from an international board of authors. Presents the latest release in the Current Topics in Membranes series. Includes the latest information on Membrane Biomechanics.

Sushi

Food for the Eye, the Body and the Soul

Springer Science & Business Media "It is clear that serious research, as well as much imagination, went into every page. It has become my new 'go-to' bible when I need a shot of inspiration." Ken Oringer, internationally renowned and award-winning chef Clio Restaurant, Uni Sashimi Bar, Boston "Congratulations on writing such an aesthetically beautiful, informative and inspiring book. ... I shall not hesitate to recommend your book to those colleagues, who like me, are fascinated by Sushi and who will surely be captivated, like me, turning every page." Dr. Ian C. Forster, April, 2011 ••• In recent decades, sushi has gone from being a rather exotic dish, eaten by relatively few outside of Japan, to a regular meal for many across the world. It is quickly gathering the attention of chefs and nutritionists everywhere. It has even made its way into numerous home kitchens where people have patiently honed the specialized craft required to prepare it. Few have been more attuned to this remarkable transition than Ole G. Mouritsen, an esteemed Danish scientist and amateur chef who has had a lifelong fascination with sushi's central role in Japanese culinary culture. Sushi for the eye, the body, and the soul is a unique melange of a book. In it, Mouritsen discusses the cultural history of sushi then uses his scientific prowess to deconstruct and explain the complex chemistry of its many subtle and sharp taste sensations. He also offers insights from years of honing his own craft as a sushi chef, detailing how to choose and prepare raw ingredients, how to decide which tools and techniques to use, and how to arrange and present various dishes. Sushi is irresistible for both its simplicity and the hypnotic performance-art aspects that go into its preparation. With clear prose and straightforward instructions, Mouritsen looks at every facet of sushi in a book that is as accessible as it is informative, as useful as it is fun.