Biological Fluid-Surface Interactions in Detection and Medical Devices

Michael Thompson, Christophe Blaszykowski, Sonia Sheikh, Cesar Rodriguez-Emmenegger and Andres Santos Pereira

Synopsis

With development of implants and in vivo detection devices comes the complication of the interaction between the materials used in the devices and biological fluids. This book examines these interactions causing fouling in biosensors and the serious issue of thrombus formation. The chemistry of surface-protein and surface-cell interactions is of great importance and the expert contributors are providing a comprehensive look at the physical chemistry of the implant surface and the fouling problem. The aim is to provide an important addition to the literature suitable for professional researchers in academia and industry and postgraduate students.

Brief Contents

- Relevant Aspects of Surface Physical Chemistry
- The Substrate-biological Macro-molecule Interaction
- The Substrate-cell Interaction
- Biological Consequences of the Blood-surface Interaction
- Coatings and Strategies re the Avoidance of Fouling from Bio-fluids
- A New Look at the Physical Chemistry of Biocompatibility and Anti-fouling
- The Future
- Subject Index

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Compendium of Terminology and Nomenclature of Properties in Clinical Laboratory Sciences
Recommendations 2015
Georges Férard, René Dybkaer and Xavier Fuentes-Arderiu

Synopsis
There has been significant expansion and development in clinical laboratories sciences since the previous edition of this book was published in 1995. Some new disciplines have appeared and the interrelationships between different disciplines within clinical laboratory sciences demand a common structure and language for data exchange in the laboratory and with the clinicians. It is of prime importance to standardise laboratory reports for reliable exchange of patient examination data without loss of meaning or accuracy. For that, it is important to promote the unified format developed by IUPAC and IFCC. This book groups and updates the recommendations and will be appropriate for laboratory scientists, medical professionals and students in this area.

Brief Contents
- History of recommendations on properties and units in clinical laboratory sciences
- Definitions of some disciplines applied in the clinical laboratory
- Conventions and instructions for use
- Fundamental concepts in communication of clinical laboratory data
- Principles and practice of kinds-of-quantity and units
- Requesting, generating, and transmitting clinical laboratory data
- Choice and use of kinds-of-quantity for different examination purposes
- Kinds-of-quantity of dimension one: SI unit 1

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Fast NMR Data Acquisition
Beyond the Fourier Transform
Edited by Mehdi Mobli and Jeffrey Hoch

Synopsis
This book will provide a definitive reference source on all modern signal processing methods applied in the field of NMR spectroscopy. The authors will provide a complete survey of the fundamentals supported by examples of modern applications of non-Fourier methods of spectrum analysis in NMR spectroscopy. Key material will include: an introduction to nD FT-NMR; spectroscopic methods of speeding up data acquisition; high resolution from short data records; and non-uniform sampling: deterministic sampling and non-deterministic sampling. The book will be essential reading for NMR spectroscopists and analytical chemists working in industry and academia.

Brief Contents
- Introduction to nD FT-NMR
- Spectroscopic methods of speeding up data acquisition
- High resolution from short data records
- Non-uniform sampling: deterministic sampling
- Non-uniform sampling: non-deterministic sampling.
Gas Phase NMR
Edited by Karol Jackowski and Michał Jaszuński

Synopsis
This book covers the recent NMR studies with the application of gaseous molecules. It comprehensively covers all aspects of the area, with particular emphasis on new multinuclear experiments that deliver spectral parameters of isolated molecules and provides the most accurate values of nuclear magnetic shielding, isotropic spin-spin coupling and relaxation times, advanced, precise and correct theoretical descriptions of spectral parameters of molecules and the application of gas-phase NMR measurements to chemical analysis and medicine. Aimed at graduates and researchers in analytical chemistry and researching the applications of NMR in medicine, this book is presenting the connections of sophisticated experiments with the theory of magnetic parameters and the exploration of new methods in practice.

Brief Contents
• Fundamental intramolecular and intermolecular information from NMR in the gas phase
• Obtaining gas-phase NMR parameters from molecular beam and high-resolution microwave spectroscopy
• Measurements of magnetic shielding
• Gas phase NMR for the study of chemical reactions: kinetics and product identification
• 17O and 33S NMR spectra of small molecules in the gas phase
• Accurate nonrelativistic calculations of NMR shielding constants
• Rovibrational and temperature effects in theoretical studies of NMR parameters
Green and Sustainable Medicinal Chemistry

Methods, Tools and Strategies for the 21st Century Pharmaceutical Industry

Edited by Louise Summerton, Helen F Sneddon, Leonie C Jones and James H Clark

Synopsis

Addressing current challenges with the best in modern green chemical technologies and sustainability thinking in pharmaceutical manufacturing, this book is an invaluable reference for chemists across academia and industry wanting to further their knowledge and understanding of this important topic. Divided into two sections, the book first gives an overview of the key green chemistry tools, guidance and considerations aimed at developing greener processes, before moving on to looking at cutting-edge synthetic methodologies.

Brief Contents

- Green and Sustainable Chemistry
- Tools for Facilitating More Sustainable Medicinal Chemistry
- Renewable Solvent Selection in Medicinal Chemistry
- Beyond Mass Based Metrics: Evaluating the Greenness of Your Reaction
- The Importance of Elemental Sustainability and Critical Element Recovery for the Pharmaceutical Industry
- Presence, Fate and Risks of Pharmaceuticals in the Environment
- Benign By Design
- From Discovery to Manufacturing
- Medicinal Chemistry - How "Green" Is Our Synthetic Tool Box?
Nanomedicines
Design, Delivery and Detection
Edited by Martin Braddock

Synopsis
Nanomedicines and nanopharmacology are rapidly developing fields with new techniques and applications under constant development. This book will provide an overview of the chemistry of nanocarrier design and the considerations that need to be made when developing a nanomedicine.

Brief Contents
- Design Considerations for Properties of Nanocarriers on the Disposition and Efficiency of Drug and Gene Delivery
- Non clinical efficacy Targeting Cyclins and Cyclin-Dependent Kinases Involved in Cell Cycle Regulation by RNAi as a Potential Cancer Therapy
- Nanoparticle carriers to overcome biological barriers to siRNA delivery
- Magnetic targeting as a vehicle for delivery of nanomedicines
- Development of Theranostics – Imaging Considerations and Targeted Drug Delivery
- The Role of Imaging in Nanomedicine Development and Clinical Translation
Oxidative Stress and Redox Signalling in Parkinson’s Disease

Edited by Rodrigo Franco, Jonathan Doorn and Jean-Christophe Rochet

Synopsis
Parkinson’s disease is the second most common neurodegenerative disorder affecting millions of people worldwide. In order to find neuroprotective strategies, the mechanisms of the disease need to be understood, and there have been links made between oxidative damage and Parkinson’s Disease. This book provides a thorough review of the latest research developments regarding the mechanisms by which oxidative stress and redox signaling mediate Parkinson’s Disease. It is designed to cover basic knowledge regarding oxidative stress and redox signaling, Parkinson’s disease, and neurodegeneration, while also exploring in detail the latest advancement in the research field. Topics covered will include dopamine metabolism, metal homeostasis and DNA-damage.

Brief Contents
- Parkinson’s Disease: Pathogenesis and Etiology
- Oxidative Stress and Redox Signalling in the Parkinsonian Brain
- Mitochondrial Dysfunction in Parkinson’s Disease
- Catecholamine Metabolism and the Generation of Reactive Aldehydes
- Dopamine Oxidation and Parkinson’s Disease
- GSH and Thiol Redox Signalling
- Nitric Oxide Signalling
- Inflammation in Parkinson’s Disease
- Redox Signalling and Dopaminergic Cell Death/Survival
- Iron Metabolism and Parkinson’s Disease
Principles of Thermal Analysis and Calorimetry

Edited by Simon Gaisford, Vicky Kett and Peter Haines

Synopsis
Since the original text published in 2001, there have been significant advances in various analytical techniques and their applications. Each chapter of the new book is rewritten by a contemporary expert in the field, who explains the basic principles of the technique and highlights any recent technical advances in instrumentation or methods of analysis. Where appropriate and fully integrated into the chapters, applications are used to highlight particular operating principles or methods of interpretation. All chapters have been reviewed to ensure consistency and accuracy of nomenclature and descriptions thus ensuring the quality of the book. Primarily aimed at undergraduate courses and the chemical industry where this technique is being used, it may also find a use with instrument manufacturers where they are introducing this method.

Brief Contents
- Nomenclature
- Thermogravimetric Analysis
- Dynamic Vapour Sorption
- DTA and DSC
- Temperature-Modulated DSC
- Isothermal Microcalorimetry
- Isothermal Reaction Calorimetry and Adiabatic Calorimetry
- TMA and DMA
- Dielectric Spectroscopy
- Micro-TA

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Stimuli-Responsive Materials
From Molecules to Nature Mimicking Materials Design
Marek W Urban

Synopsis
The ability for a material to change properties in response to external stimuli is an attractive feature for numerous applications and as such stimuli responsive materials are gaining attention across many different fields. This book introduces the concepts of stimuli-responsiveness, including the fundamental materials properties required for design. It provides readers with comprehensive scientific principles and developments of stimuli responsive materials, as well as the recent technological advances. Written by a renowned expert in the field, this book is suitable for anyone interested in stimuli responsive materials working in polymers, biochemistry, biotechnology and materials science.

Brief Contents
- What is Stimuli-Responsiveness?
- Biochemical and Chemical Responses
- Functional Groups Capable of Stimuli-Responsiveness
- Synthetic Aspects of Stimuli-Responsive Materials
- Passive and Active Molecular Sensors
- Time and Length Scales of Stimuli-Responsiveness
- Physical and Chemical Responsiveness
- Structure-Property Relationships in Stimuli-Responsive Polymers
- Directional Responses and Structural Changes
- Multi-Component Materials and Heterogeneity
Supramolecular Chemistry at Surfaces

David Amabilino

Synopsis

The book covers the methods of preparing and studying self-assembled structures at surfaces and interfaces, including small clusters, monolayers and thin films, and how supramolecular chemistry can influence structure and function on surfaces e.g. porous surface systems, modifiers of interface energy and sensor-based systems. This is the first book to give a multidisciplinary view of the supramolecular aspects of interfaces providing the reader with an objective summary of all the deposition methods and their characterisation. Written by a leading expert in the field, it will appeal to students and researchers in supramolecular chemistry, nanoscience, polymer chemistry and physics, surface science and materials science.

Brief Contents

- Surfaces for supramolecular systems
- Tools for surface characterisation of surface-based supramolecular systems
- Supramolecular systems on the surface of water
- Physisorbed layers at interfaces
- Chemisorbed layers at interfaces
- Layer-by-layer growth of polyelectrolyte systems
- Supramolecular chemistry in thin film formation upon deposition from solution and vapour
- Supramolecular chemistry for the formation of dynamic systems at surfaces
- Patterning of surfaces for supramolecular chemistry and template effects
Synthetic Methods in Drug Discovery

Edited by David C Blakemore, Paul M Doyle and Yvette M Fobian

Synopsis

There are an overwhelming number of synthetic methods that can be used to create novel chemical motifs and templates with potentially valuable drug-like properties. This book will highlight key methods that have real impact in drug discovery and facilitate delivery of drug molecules. Uniquely, it will provide both academic and industrial perspectives on these key reactions giving the reader an excellent overview of the techniques used in modern synthesis. Reaction types will be conveniently framed in the context of their value to industry and the challenges and limitations of methodologies will be discussed with relevant illustrative examples. Moreover, the book will discuss key opportunities in expanding chemical space, including the important area of introducing three dimensional shape to the traditional flat molecules. Edited and authored by leading scientists from both academia and industry, this book will be a valuable reference for all chemists involved in drug discovery as well as postgraduate students in medicinal chemistry.

Brief Contents

- Suzuki, Negishi, Hiyama, Sonogashira and Heck couplings
- Buchwald and Chan-Lam couplings
- CH activation approaches to molecules, decarboxylative palladium mediated couplings, new frontiers with transition metals and SP2 SP3 couplings;
- Organometallics and their use in the pharmaceutical industry
- Hydrogen borrowing chemistry and catalytic amide bond forming reactions
- Asymmetric hydrogenation, chiral reduction, dihydroxylation and epoxidation, the use of auxiliaries in industry and the potential of organocatalysis