Biodegradable Thermogels

Xian Jun Loh A*STAR (Agency for Science, Technology and Research), Singapore
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Synopsis
Biodegradable thermogels are a promising class of stimuli-responsive polymers. This book summarizes recent developments in thermogel research with a focus on synthesis and self-assembly mechanisms, gel biodegradability, and applications for drug delivery, cell encapsulation and tissue engineering. A closing chapter on commercialisation shows the challenges faced bringing this new material to market. Edited by leading authorities on the subject, this book offers a comprehensive overview for academics and professionals across polymer science, materials science and biomedical and chemical engineering.

Brief Contents
- Thermogelling polymers and its history
- Thermogelling PLGA based copolymers
- Polyester-based Biodegradable Thermogelling Systems as Emerging Materials for Therapeutic Applications
- Biodegradable thermogelling polymers for drug delivery
- Injectable Thermogelling Polymers for Bone and Cartilage Tissue Engineering
- Thermogels for Stem Cell Culture
- Degradation Behaviour of Biodegradable Thermogels
- From bench to bedside – OncogelTM, an in-situ hydrogel for in vivo applications
- Hydrogel-based 3D scaffolds for stem cell culturing and differentiation
- Beyond thermogels – Other forms of noncovalently formed polymeric hydrogels

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Carbon-based Nanomaterials in Analytical Chemistry

Carlos D Garcia  Clemson University, USA
Agustín G Crevillén  Universidad Nacional de Educación a Distancia, Spain
Alberto Escarpa  Universidad of Alcalá, Spain

Synopsis
This book serves as a reference manual that guides readers through the possibilities of carbon nanomaterials in various fields of chemical analysis. It provides current guidance to selecting the most appropriate material for targeted analytical application whilst considering the future trends in this field. Presenting the most relevant advances in employing carbon-based nanostructured materials for analytical purposes, this book fills a gap in the literature for graduate students and professional researchers across analytical chemistry in industry and academia.

Brief Contents
- Carbon-based nanomaterials in Analytical Chemistry
- Carbon nanomaterials in sample preparation
- Carbon nanomaterials in separation techniques
- Carbon nanomaterials in optical detection
- Carbon nanomaterials in electrochemical detection
- Carbon nanomaterials in advanced detection analytical technologies
- Subject index
The Chemical Biology of Human Vitamins

Christopher T Walsh  Harvard Medical School, USA
Yi Tang  University of California Los Angeles, USA

Synopsis
As humans evolved from primordial organisms they lost the capacity to make certain essential molecules. This textbook provides a thorough chemocentric view on the key small molecules of life, the human vitamins and their active coenzyme forms. Authored by leading educators, this text will serve as an ideal guide and reference point for chemists in both academia and industry, graduates and advanced undergraduate students in biochemistry, chemical biology, metabolism and metabolomics.

Brief Contents
- Human Vitamins: Discovery and Characterization
- Metabolic Logic through the Lens of Coenzyme Forms of Human Vitamins
- Vitamin B1 Converted to the Coenzyme Thiamin Pyrophosphate
- Vitamin B2 Riboflavin
- Vitamin B3 Niacin and the Nicotinamide Coenzymes
- Vitamin B5: Pantothenate
- Coenzyme Forms of Vitamin B6
- Vitamin B7: Biotin
- Vitamin B9: Folic Acid
- Vitamin B12: Two Coenzyme Forms

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Dioxygen-dependent Heme Enzymes

Masao Ikeda-Saito Tohoku University, Japan
Emma Raven University of Leicester, UK

Synopsis
This book covers the varied catalytic activities of O2-dependent heme enzymes. Heme proteins are distributed widely in biological systems and are involved in a wide range of processes that are essential to the cell. Edited and authored by the leading global researchers in this area, this text will be a useful resource for postgraduate students and researchers in biochemistry and metallobiology working in or moving into research areas involving heme proteins.

Brief Contents
- O2-dependent catalysis by heme model systems
- Computational work on the tryptophan dioxygenases
- Controlling regio- and stereoselectivity of cytochrome P450 monooxygenases by protein engineering
- Heme oxygenase
- Metalloprotein design by genetic code expansion
- O2-dependent nitration in P450s
- Oxygen activation and long-range electron transfer in MauG
- P450 OleT reactivity
- Principles of O2 activation - a chemistry perspective
Cereal Grain-based Functional Foods
Carbohydrate and Phytochemical Components

Trust Beta  University of Manitoba, Canada
Mary Ellen Camire  University of Maine, USA

Synopsis
The past decade has seen much new research into determining which carbohydrates and phytochemicals are present in grains, and how to make these nutritionally available. This book covers the chemical composition of cereal grains, with special emphasis on new techniques to improve their functionality. Including topics such as the composition and functionality of oligosaccharides and sugars, polysaccharide types, and the role and definition of dietary fibre, this title provides researchers, clinicians and students with a comprehensive compendium on aspects of whole grain components.

Brief Contents
- An Overview of Grain Components and Changes Occurring in Grain Constituents with Different Forms of Processing
- Composition and Functionality of Sugars and Oligosaccharides in Cereal Grains
- Polysaccharide Types and Functionality in Cereal Grains
- Starch Properties and Modification in Grains and Grain Products
- Dietary Fiber Definition and Analysis in Grain Products
- Resistant and Slowly-digested Starch in Grain Products
- Functionality of Beta-Glucan from Oat and Barley as it Relates to Health
- Dietary Arabinoxylans in Grains and Grain Products

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Graphene-based Membranes for Mass Transport Applications

Hongwei Zhu, Tsinghua University, China
Pengzhan Sun, Tsinghua University, China

Synopsis
Graphene-based membrane materials are gaining much interest, especially for environmental applications. The book focuses on the research area of graphene membrane-based filtration and separation technologies covering the structure, composition and general properties of graphene and its derivatives as well as the selective mass transport properties of the membranes. The book provides an introduction and reference to physicists, chemists, material scientists, chemical engineers and students who are entering or already working in the field of graphene-based membrane materials.

Brief Contents

• Current State-of-the-art Membrane-based Filtration and Separation Technologies
• Functional Membranes for Filtration and Separation
• Graphene-based Membranes
• Mass Transport Properties of Perfect Graphene Lattice
• Mass Transport Properties of Nanoporous Graphene Membranes
• Selective Mass Transport Properties of Graphene Oxide Lamellar Membranes
• Mechanism of Selective Mass Transport Through Graphene Oxide Membranes

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Optimizing NMR Methods for Structure Elucidation

Characterizing Natural Products and Other Organic Compounds

Darcy C Burns University of Toronto, Canada
William F Reynolds University of Toronto, Canada

Synopsis

This book is aimed at informing organic chemists and natural products chemists on the use of NMR for structure elucidation to enable them to ensure they yield the most reliable possible data in the minimum possible time. It covers the latest pulse sequences, acquisition and processing methods, practical areas not covered in most texts eg detailed consideration of the relative advantages and disadvantages of different pulse sequences, choosing acquisition and processing parameters to get the best possible data in the least possible time, pitfalls to avoid and how to minimize the risks of getting wrong structures.

Brief Contents

- Basics of the NMR Experiment
- Pulsed Fourier Transform NMR
- The NMR Spectrometer
- Acquiring 1H and 13C Spectra
- One-dimensional Pulse Sequences
- Two-Dimensional NMR Basics
- Two-dimensional Homonuclear Spectroscopy
- Heteronuclear Shift Correlation Sequences
- Sample Dereplication and Data Archiving

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Self-organized Motion

Physicochemical Design based on Nonlinear Dynamics

Satoshi Nakata Hiroshima University, Japan
Véronique Pimienta University of Toulouse, France
István Lagzi Budapest University of Technology and Economics, Hungary
Hiroyuki Kitahata Chiba University, Japan
Nobuhiko J Suematsu Meiji University, Japan

Synopsis
The book gives an overview of the self-propelled motion of chemical objects far from their thermodynamic equilibrium at various spatial scales and its applications. The book will discuss theoretical aspects, the characteristics of the motion, and design procedures of such systems from the viewpoint of nonlinear dynamics. The book is suitable for graduate students and researchers interested in physical and theoretical chemistry as well as soft matter.

Brief Contents
- Theoretical and experimental design of self-propelled objects based on nonlinearity
- Mathematical Model and Analyses on Spontaneous Motion of Camphor Particle
- Coupled convective instabilities: autonomous motion and deformation of an oil drop on a liquid surface
- Dynamical deformation of interface induced by aggregate formation
- Synthetic approaches to control self-propelled motion of micrometre-sized oil droplets in aqueous solution
- Physical Chemistry of Energy Conversion in Self-propelled Droplets Induced by Dewetting Effect

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Therapies for Retinal Degeneration
Targeting Common Processes

Enrique J de la Rosa Centro de Investigaciones Biológicas CSIC, Spain
Thomas G Cotter University College Cork, Ireland

Synopsis
Sight loss and blindness affects many worldwide and the search for adequate drugs remains a challenge and an important area of interest in the drug discovery field. This book addresses approaches to the treatment of ocular diseases, a common component of which is neurodegeneration. The book discusses common cellular processes across disease pathways and common targets for drugs that target ocular disease as well as the newest approaches, such as cell and gene therapies.

Brief Contents
- The Cellular Course of Retinal Degenerative Conditions
- Immune response of the Retina
- Modulation of Calcium Overload and Calpain Activity
- CNS Targets for the Treatment of Retinal Dystrophies: a Win-Win Strategy
- Modulation of p75NTR/proNGF as a Therapeutic Approach for Degenerative Retinopathies
- Modulation of cGMP-signalling to Prevent Retinal Degeneration
- PEDF Peptides in Retinal Degenerations
- Beyond Anti-Inflammation: Steroid Induced Neuroprotection in the Retina
- Alternative Experimental Models of Ciliary Trafficking and Dysfunction in the Retina

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