Biocatalysis
An Industrial Perspective

Gonzalo de Gonzalo  Universidad de Sevilla, Spain
Pablo Dominguez de Maria  Sustainable Momentum, SL, Canary Islands, Spain

Synopsis
Bridging the gap between research and industry, this book focusses solely on the use of biocatalysis in industry. Contributors discuss aspects of their current research or already implemented commercialized processes; provide thoughts on the industrial motivation to use biocatalysis and how to succeed in industrial biotransformations; and explore current challenges for further research. This unique volume is an inspirational guide for industrialists and researchers, providing valuable information for the set-up of future biocatalytic industrial concepts.

Brief Contents
- Biocatalysis at Evonik
- Biocatalysis at DSM
- Biocatalysis at Merck
- Biocatalysis at Pfizer
- Biocatalysis at c-LEcta
- Biocatalysis at Evotec
- Biocatalysis at BASF
- Biocatalysis at GSK
- Biocatalysis at Lonza
- Biocatalysis at Codexis

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Coal in the 21st Century

Energy Needs, Chemicals and Environmental Controls

R E Hester University of York, UK R M Harrison University of Birmingham, UK

Synopsis
Coal has been the fastest growing energy resource in recent years, especially in
developing nations where demand for electricity is growing rapidly. This book examines
the impacts that the ongoing mining and burning of coal is having on our environment.
It is an important reference for students studying energy and the environment;
researchers and industrialists working in energy, and policy-makers involved in the
regulations surrounding energy and the environment.

Brief Contents
- World Energy Needs
- Coal Mining
- Coal-fired Power Plants
- Pollution
- Health Impacts
- Regulation
- Liquid Fuels and Chemicals/Plastics from Coal: Case Studies
- Carbon Capture, Use and Storage
Cross-relaxation and Cross-correlation Parameters in NMR
Molecular Approaches
Daniel Canet Universite de Lorraine, France

Synopsis
Spin relaxation parameters, although difficult to interpret, are attracting interest in NMR as these parameters are capable of yielding both structural and dynamic information. For example, contrast in MRI is obtained through spin relaxation of the water protons in biological tissues. Cross-relaxation and cross-correlation parameters afford a non-ambiguous approach to molecular structure and dynamics although they require some special skills for their experimental determination and for their exploitation. This work will provide a detailed account of cross-relaxation and cross-correlation which would be timely and fill a gap in the present NMR literature for the analytical scientist.

Brief Contents
- Introduction to nuclear spin cross-relaxation and cross-correlation phenomena in liquids
- Homonuclear cross-relaxation and cross-correlation in small or medium-size molecules and in soft matter
- Heteronuclear cross-relaxation and cross-correlation in small or medium-size molecules and in soft matter
- Cross-relaxation and cross-correlation in large biomolecules
- Subject Index
Synopsis
Diatoms, single algae cells, are gaining much interest in nanoscience due to their distinctive porous silica structure and properties. The proposed book is the first book published on diatom nanotechnology providing the most comprehensive overview in this field from international leading experts. The book covers the unique porous silica structure of diatoms, the mechanism of their formation, properties and the broad range of applications in nanotechnology including nanofabrication, optical biosensors, gas sensors, water purifications, photonics, drug delivery, batteries, solar cells, supercapacitors, new adsorbents and composite materials.

Brief Contents
- Whence the diversity of diatom frustules?
- Fluid interactions of diatoms
- Diatoms: learning lesson in nanotechnology and materials engineering
- In vitro and vivo approaches for the immobilization of enzymes and receptor proteins in diatom biosilica
- Micro- and nano-optical devices from diatom nanostructures: light control by Mother Nature
- Nanoengineering of Diatom’s Surface for Plausible Application
- Diatoms for Drug Delivery Applications
- The potential of modified diatom frustules for solar energy conversion
Contrast Agents for MRI
Experimental Methods

Valérie C Pierre University of Minnesota, USA
Matthew J Allen Wayne State University, USA

Synopsis
As a practical reference guide for designing and performing experiments, this book focuses on the five most common classes of contrast agents for MRI and describes how to characterise and evaluate them. For each class of contrast agents, a description of the theory behind their mechanisms is discussed briefly to orient the new reader. Then detailed subchapters discuss the different physical chemistry methods used to characterise each class of contrast agents in terms of their efficacy, safety and in vivo behavior and their performance. The editors and contributors are at the forefront of research in the field of MRI contrast agents and this unique book is a timely addition to the literature in this area.

Brief Contents
- General synthetic and physical methods
- Gadolinium-based contrast agents
- Chemical exchange saturation transfer (CEST) contrast agents
- Iron oxide nanoparticle-based contrast agents
- Transition metal-based T1 contrast agents
- Fluorine-based contrast agents
- Standard biological and in vivo methods

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Membrane Engineering for the Treatment of Gases

Volume 1: Gas-separation Issues with Membranes

Enrico Drioli The Institute on Membrane Technology, National Research Council, Italy Giuseppe Barbieri The Institute on Membrane Technology, National Research Council, Italy Adele Brunetti The Institute on Membrane Technology, National Research Council, Italy

Synopsis

Elaborating on recent and future developments in the field of membrane engineering, Volume 1 focuses on new membrane materials recently emerged in gas separation. It also explores membrane pilot plant trials of gas separation, such as CO2 from flue gas and biogas, as well as a cost analysis of competitive membrane and hybrid systems. Together with Volume 2, these books form an innovative reference work on membrane engineering and technology in the field of gas separation and gaseous phase membrane reactors.

Brief Contents

- Modelling of gas separation in thermally-rearranged polymeric membranes
- Materials by design: multiscale molecular modelling for the design of nanostructured membranes
- Thermally rearranged (TR) polymers: An ultimate solution for membrane gas separations
- Multi-scale Molecular Modelling Approaches for Designing/Selecting Polymers Used for Developing Novel Membranes
- Thermally Rearranged Polymer Membranes for Gas Separation
- Highly Permeable Polymer Membranes for Gas Separation (PIMs)
- Graphene-based Membranes for Gas Separation

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- Highly Permeable Polymer Membranes for Gas Separation (PIMs)
- Graphene-based Membranes for Gas Separation

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Edible Oil Structuring
Concepts, Methods and Applications
Ashok R Patel, Ghent University, Belgium

Synopsis
The application of lipid science and technology to real food systems has become increasingly interesting for industrial scientists. Providing a comprehensive and concise overview of the field of edible oil structuring, this book uniquely emphasises the latest developments from the last five years. Specifically, new insights into the gelation behaviour of several categories of building blocks will be presented along with some potential food applications. The book will conclude with a discussion on the unresolved challenges and future perspectives related to this emerging area. Appealing to those with an industrial need and a curiosity for fundamental research, this book enables the reader to get a comprehensive understanding of the recent developments in this field.

Brief Contents
- Section 1 – Oil Structuring: Concepts, Overview and Recent Progress
- Section 2 - Structuring Units: Bio-Based Molecular Structuring Agents
- Biomimicry: An Approach For Oil Structuring
- Section 3 - Structuring Units: Crystalline Particles and Self-Assembled Structures: New Insights into Wax Crystal Networks in Oleogels
- Structuring Edible Oil Phases with Fatty Acids and Alcohols
- Gelation Properties of Gelator Molecules Derived from 12-Hydroxystearic Acid
- Section 4 - Structuring Units: Polymeric Strands and Network: Thermo-Gelation of Ethylcellulose Oleogels
Engineering Health
How Biotechnology Changed Medicine

Lara Marks King’s College London and the University of Cambridge, UK

Synopsis
Biotechnology is one of the hot growth areas in medicine today, with significant recent increases in global investment. Despite the importance of this growth, much of this information does not reach people beyond the scientific community. This book provides an overview of the fundamental role biotechnology plays in medicine for the lay reader. Written in an engaging and accessible style, Engineering Health covers biotechnology in drug discovery, the manufacturing of products and the safety, delivery and cost of today’s medicines.

Brief Contents

- Introduction: Biotechnology
- Biopharmaceutical Proteins: The manufacturing challenge
- Vaccines: The recombinant revolution
- Monoclonal antibodies and the transformation of healthcare
- The changing fortune of immunotherapy for cancer
- Gene therapy: An evolving story
- Stem cells and regenerative medicine
- Protein therapeutics and blinding diseases
- Synthetic biology – a game changer?
- Synthetic Biology – Engineering tomorrow’s medicines
Mechanochemistry in Materials
Yoan C Simon University of Southern Mississippi, USA
Stephen L Craig Duke University, USA

Synopsis
Mechanochemistry in materials science has experienced tremendous growth in the last 5 years and has developed to become one of the most important topics in polymer science today. With a particular focus on polymers and soft materials the book discusses experimental and theoretical considerations. Appealing to a broad range of materials scientists, working in industry and academia, this well-presented and comprehensive title will be essential reading for postgraduate researchers upwards.

Brief Contents
- Fundamentals of covalent m-chem
- Mechanophore design
- Mechanophores for sensing
- Mechanophores for chemical function
- Materials design principles for mechanical transduction events
- Aggregation based responses
- Morphological (e.g., polydiacetylenes, liquid crystals)
- Polyelectrolytes/charge density
- Systems-level responses
- Mechanically responsive polymer capsule permeability

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Membrane Engineering for the Treatment of Gases

Volume 2: Gas-separation Issues Combined with Membrane Reactors

Enrico Drioli The Institute on Membrane Technology, National Research Council, Italy
Giuseppe Barbieri The Institute on Membrane Technology, National Research Council, Italy
Adele Brunetti The Institute on Membrane Technology, National Research Council, Italy

Synopsis
Elaborating on recent and future developments in the field of membrane engineering, Volume 2 is devoted to the main advances in gaseous phase membrane reactors and separators. The book covers innovative membranes and new processes, and includes new chapters on cost analysis and life cycle assessment. Together with Volume 1, these books form an innovative reference work on membrane engineering and technology in the field of gas separation and gaseous phase membrane reactors.

Brief Contents

• Pd-based Membranes in Hydrogen Production: Long Term Tests and Contaminants Effects
• Polarization and CO Inhibition in Pd-based Membranes
• High Temperature Membrane Reactors
• Industrial Applications of High Temperature Membrane Reactors for Gas Treatment
• Liquid Fuels Production in Membrane Reactors (C1-chemistry)
• Flow-through Catalytic Membrane Reactors for the Destruction of a Chemical Warfare Simulant
• Carbon Molecular Sieve Membranes for H2 and CO2 Separation

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Nanoscience

Volume 4

P John Thomas  Bangor University, UK
Neerish Revaprasadu  University of Zululand, South Africa

Synopsis

The field of nanoscience continues to grow at an impressive rate and, with such a vast landscape of material, careful distillation of the most important discoveries will help researchers find the key information they require. Nanoscience Volume 4 provides a critical and comprehensive assessment of the most recent research and opinion from across the globe. Coverage includes diverse topics such as 2-D nanomaterials, quantum dot solar cells and core nanoparticles for drug delivery applications. Anyone practising in any nano-allied field, or wishing to enter the nano-world will benefit from this resource, presenting the current thought and applications of nanoscience.

Brief Contents

- Supramolecular Chemistry of AIE-active Luminophores
- 2D Nanomaterials
- Quantum Dot Solar Cells
- Core-shell Nanoparticles for Drug Delivery Applications
- Ligands for Enhancing Charge Transport in Films of Nanocrystals
- TEM and Advances in Microscopy
- Role of Ligands in the Synthesis of Bi- and Multi-metallic Nanocrystals

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Nanogels for Biomedical Applications

Arti Vashist Florida International University, USA
Ajeet K Kaushik Florida International University, USA
Sharif Ahmad Jamia Millia Islamia, India
Madhavan Nair Florida International University, USA

Synopsis
This book provides a comprehensive overview of nanogels and their applications in nanomedicine. Each individual chapter will explore a different application of nanogels including drug delivery, diagnostics and therapeutics, tissue engineering and imaging. The content will also cover synthesis methods and characterization techniques for the different nanogels. The book will appeal to biologists, chemists, and nanotechnologists interested in translation research for personalized nanomedicine for health care.

Brief Contents
- Journey from Hydrogels to Nanogels: A Decade After
- Design and Engineering of Nanogels
- Medicinal Application of Nanogels
- Nanogels in Tuberculosis Diagnosis and Treatment
- Nanogels for Tissue Engineering
- Nanogels for Brain Delivery
- Magnetic Nanogel Enable Image Guided Therapy
- Nanogels for Gene Delivery
- Nanogels as A Targeted Drug Delivery Vehicle
- Nanogels: Stimuli Responsive Drug Delivery Carriers

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Nanostructured Materials for Type III Photovoltaics

Peter Skabara University of Strathclyde, UK
Mohammad Azad Malik University of Manchester, UK

Synopsis
Materials for Type III solar cells have branched into a series of generic groups, including organic ‘small molecule’ and polymer conjugated structures, fullerenes, quantum dots, hybrid organic/inorganic composites and perovskites. This book will give a collective insight into the different roles that nanostructured materials play in Type III solar cells. This will be an essential text for those working in materials science and technology, providing a fundamental understanding and appreciation of the potential and challenges associated with each of these technologies.

Brief Contents
- Reliably measuring the performance of emerging photovoltaic solar cells
- Bulk Heterojunction Organic Solar Cells - Working Principle and Power Conversion Efficiency
- High Performance Organic Photovoltaic (OPV) Donor Polymers
- P-type molecular materials for organic solar cells
- Fullerenes and new acceptors for organic solar cells
- Structure/property processing relationships for organic solar cells
- Charge generation and recombination processes in organic solar cells
- Dye sensitised solar cells
- Hybrid Solar Cells
Nanotoxicology
Experimental and Computational Perspectives

Edited by Alok Dhawan, Diana Anderson and Rishi Shanker

Synopsis
This book addresses the gaps relating to health and safety issues of this field and aims to bring together fragmented knowledge on nanosafety. Not only do chapters address conventional toxicity issues, but also more recent developments such as food borne nanoparticles, life cycle analysis of nanoparticles and nano ethics. In particular this book presents a unique compilation of experimental and computational perspectives. The book is aimed towards postgraduates, academicians, and practicing industry professionals but also serves as an excellent foundation for researchers new to nanotechnology and nanotoxicology.

Brief Contents
- Nanotoxicology: Challenges for Biologists
- Chemical synthesis of nanoparticles for diverse applications
- Synthesis of nanoparticles for biomedical applications
- Behaviour of ENPs in suspension
- Models for nanotoxicology
- Uptake of ENMs in cells: Methods and Mechanisms
- Unravelling the dose metrics of ENPs
- Protocols for in vitro and in vivo toxicity assessment of ENPs
- Genetic toxicology of ENPs
- Immunotoxicity of ENPs

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Pharmacology for Chemists
Drug Discovery in Context

Raymond Hill  Imperial College London, UK
Terry Kenakin  University of North Carolina, USA
Tom Blackburn  TPBioventures LLC, USA

Synopsis
Assuming little previous knowledge of biology, this book aids graduate chemists to close the gap in their knowledge of pharmacology and make the link between medicinal chemistry and the way in which drugs act on the body. The availability of receptor structures has revolutionised drug discovery and development necessitating an up-to-date source of information for chemists entering this new pharmacological world. Chapters explain the history of pharmacology, the relationship between receptor structure and function and receptor pharmacology relevant to drug design. This unique textbook will be an essential resource for chemists planning to work in drug discovery, or postgraduate students and practising chemists interested in expanding their pharmacology knowledge.

Brief Contents
- The Biotech-Pharmaceutical Industry – Evolution or Revolution?
- Pharmacology An Historical Perspective
- Receptor Pharmacology – Designing and Characterizing Drug/Compound Function and Quantitative analysis
- Actions of drugs on organs in the body
- Predicting dose and selective efficacy in clinical studies from preclinical experiments: practical pharmacodynamics
- Structure based drug discovery and advances in protein receptor crystallography
- The Future of ADMET in Drug Design
Organoselenium Compounds in Biology and Medicine
Synthesis, Biological and Therapeutic Treatments

Vimal Kumar Jain  Bhabha Atomic Research Centre, India
Indira Priyadarsini

Synopsis
Organoselenium shows incredible promise in medicine, particularly cancer therapy. This book discusses organoselenium chemistry and biology in the context of its therapeutic potential, taking the reader through synthetic techniques, bioactivity and therapeutic applications. Divided into three sections, the first describes synthetic advances in bioactive selenium compounds; the second explains the biophysics and biochemistry of organoselenium compounds, as well as selenoproteins the final section closes with several chapters devoted to therapeutic and medicinal applications of organoselenium compounds.

Brief Contents

- An overview of organoselenium chemistry: From fundamentals to Synthesis
- Synthesis of organoselenium compounds with potential biological activities
- Carbohydrate-derived organoselenium compounds—Synthesis and application in the structural analysis of biomolecules
- The relevant chemistry of imidazoline-2-selone donors having potentials biological applications
- Looking over the traditional idea of GPx-mimetics as antioxidants
- Organoselenium cations: Structures, reactivity and applications
- Organoselenium fluorophores for probing ROS and heavy metals
- Non-bonded selenium...heteroatom interactions in selenoenzymeglutathioneperoxidase (GPx) and mimics

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