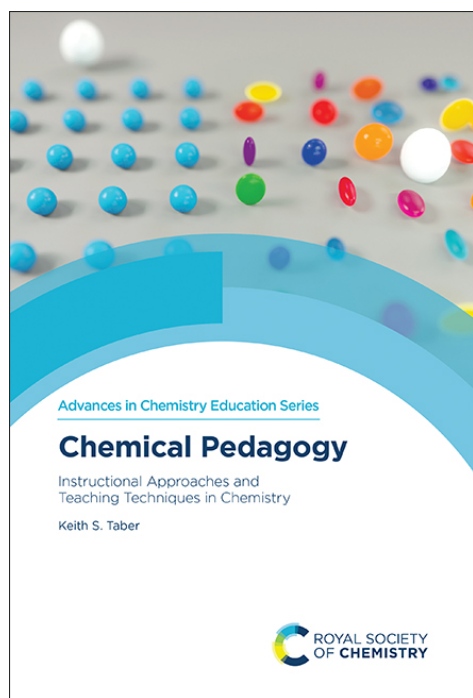


# Advance Book Information



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## Chemical Pedagogy

### Instructional Approaches and Teaching Techniques in Chemistry

Keith S Taber University of Cambridge, UK

#### Synopsis

Chemical Pedagogy introduces core principles – from research into human cognition and learning – to provide a theoretical perspective on how to best teach for engagement and understanding. An examination of some of the more contentious debates about pedagogy leads to the advice to seek 'optimally guided instruction' which balances the challenge offered to learners with the level of support provided. This provides a framework for discussing a wide range of teaching approaches and techniques that have been recommended to those teaching chemistry across educational levels, including both those intended to replace 'from the front' and others that can be built into traditional lecture courses to enhance the learning experience.

#### Brief Contents

- An Introduction to Chemical Pedagogy
- Evaluating Pedagogy Through Experimental Studies of Teaching
- Debates About Pedagogy
- Optimally Guided Instruction
- Designing Teaching Schemes and Sequences
- Matching Teaching to Learners
- Making the Unfamiliar Familiar: Presenting Subject Matter
- Lectures and Laboratories: Their Discontents and Alternatives
- Engaging Different Voices in the Chemistry Classroom
- Designing and Curating Learning Resources
- Strategies for Organising Chemistry Teaching
- Learners Choosing and Creating

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<b>Series:</b>	Advances in Chemistry Education Series Volume 12

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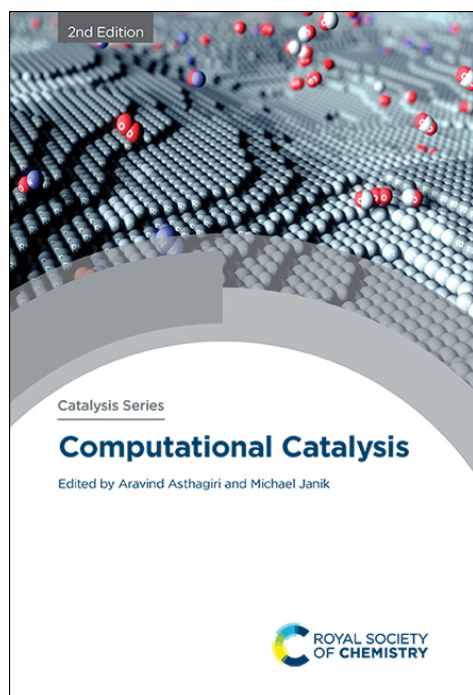
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# Advance Book Information



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## Computational Catalysis

**Aravind Asthagiri** Ohio State University, USA

**Michael Janik** Pennsylvania State University, USA

### Synopsis

Documenting the many advances made possible by improved computing power and new developments in approaches such as machine learning this new edition of **Computational Catalysis** provides a detailed introduction to the up-to-date techniques for first principles-based modelling of catalysts. Written to be accessible to anyone familiar with quantum mechanical methods, this is a valuable resource for researchers working in both the fields of computational chemistry and catalysis.

### Brief Contents

- Computational Catalyst Screening
- First-principles Thermodynamic Models in Heterogeneous Catalysis
- Kinetic Monte Carlo
- Modelling Solvent Effects in Catalysis
- Density Functional Theory Methods for Electrocatalysis
- Machine Learning Techniques in Computational Catalysis
- ReaxFF Reactive Force-field for Heterogeneous Catalysis
- Modelling Complex Structures in Heterogeneous Catalysis

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**THEMA:** PNRD, PNRP

**BISAC:** SCI013070, SCI013050

**Series:** Catalysis Series Volume 48

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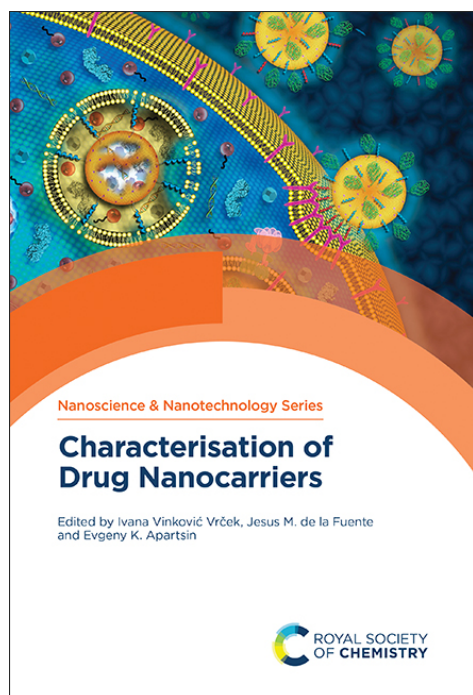
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# Advance Book Information



## Characterisation of Drug Nanocarriers

**Ivana Vinković Vrček** Institute for Medical Research and Occupational Health, Croatia

**Jesus M de la Fuente** Instituto de Nanociencia y Materiales de Aragón (INMA), Spain

**Evgeny K Apartsin** CNRS Coordination Chemistry Laboratory, France

### Synopsis

Nanotechnology has the potential to solve many unmet, urgent healthcare requirements. However, bridging the translational gap between lab and clinic for nanodrugs is still challenging, and there is limited guidance on regulatory-relevant information and approaches. The main aim of this book is to provide guidance on characterization of drug carrier properties and efficacy required for regulatory acceptance of nanomaterials for their use in medicine. This book provides a comprehensive overview of drug loading and delivery nanocarriers, including their characteristics, methodologies and techniques to evaluate the association and interaction of the drug with different nanocarriers.

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**Audience:**

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**THEMA:** PDT, TCB, PSB, MKG

**BISAC:** SCI050000, TEC009010,  
SCI093000, SCI013020

**Series:** Nanoscience &  
Nanotechnology Series

### Brief Contents

- Introduction to Nanomedicine and Nanopharmaceuticals
- Solid Nanocarriers and Bioconjugation Strategies for Efficient *In Vivo* Drug Transport
- Micellar Nanocarriers
- Nanovesicles
- Polymer-based Nanovesicles
- Dendrimers
- Metal-based Nanocarriers
- Graphene-based Multifunctional Nanomaterials for Biomedical Applications
- Targeted Nanocarriers
- Genetically Engineered Protein Nano-carriers: Viral Capsids and Cage Proteins
- Understanding the GxP Requirements During Different Phases of Nanopharmaceutical Development

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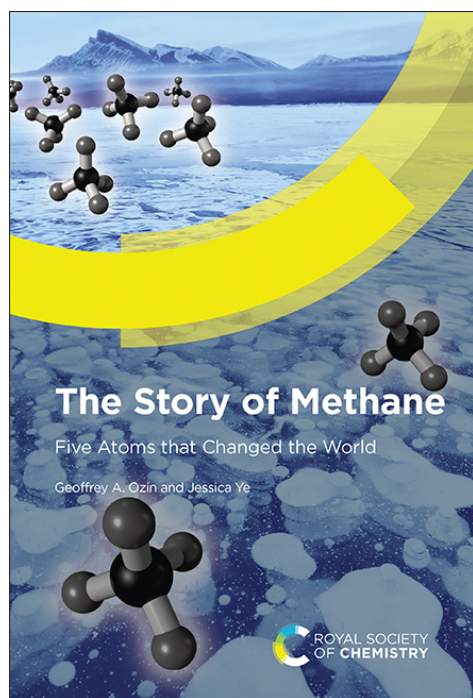
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## The Story of Methane

### Five Atoms that Changed the World

**Geoffrey A Ozin** University of Toronto, Canada

**Jessica Ye** University of Toronto, Canada

#### Synopsis

This book explores the contradictory nature of methane, since it is a potent greenhouse gas, but has the potential to play an important role in the energy transition towards a sustainable global economy. Are we crushing it? We can and must transform methane into a clean fuel, feedstock or hydrogen carrier for The Green Economy. Or is methane crushing it? Our One World will soon be crushed by methane and other molecules if we are either unable or unwilling to transform methane fast enough to save ourselves and the planet. Written by distinguished scientists, the book appeals to a broad spectrum of academic and industrial communities, the public and policy makers with an interest in how this small molecule, consisting of just five atoms, has had such a profound impact.

#### Key Features and Highlights

- Views methane with a new lens as a possible solution for solving the climate crisis.
- Details the origins, uses and future of methane in a way that is understandable to any reader.
- Shines light on the latest research from extraction from natural gas to artificial synthesis from carbon dioxide and types of reactions that occur to convert methane into other useful compounds.

#### Brief Contents

- Introducing Methane
- Understanding Methane
- Catalyzing Methane
- Making Methane
- Utilizing Methane
- Storing Methane
- Methane Detection
- Commercializing Methane

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<b>THEMA:</b>	PNC, THFG, RNU, TDC, PNRD, PDG
<b>BISAC:</b>	SCI013080, TEC009010, SCI026000

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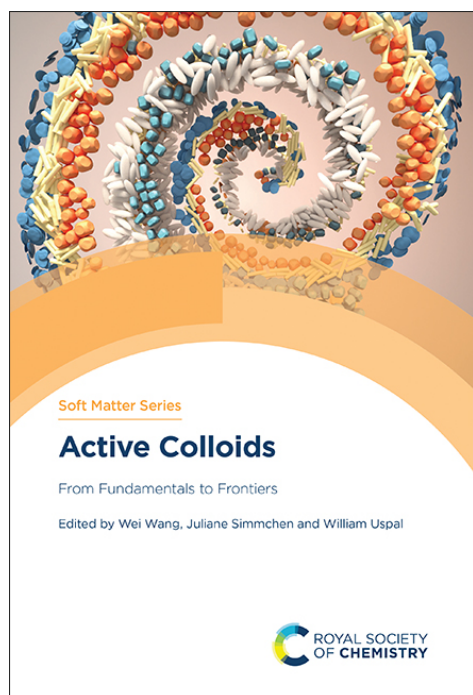
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## Active Colloids

### From Fundamentals to Frontiers

**Wei Wang** Harbin Institute of Technology, China

**Juliane Simmchen** University of Strathclyde, UK

**William Uspal** University of Hawaii, USA

### Synopsis

Active colloids are self-propelled particles, powered by energy harvested from the environment. This field of research has been growing over the past-20 years, attracting researchers from multiple disciplines. Biomedical engineers seek to harness the abilities of motile bacteria, materials chemists are fascinated by the concept of synthetic particles becoming autonomous and the new opportunities this presents, and soft matter physicists see active colloids as a model system for active matter, unravelling the principles of nonequilibrium systems. With expert contributions from around the world, this book is a useful reference and a source of inspiration for new and experienced researchers.

### Brief Contents

- Introduction to Colloidal Particles
- Quantitative Microscopy of Active Colloids
- Introduction to Active Colloids
- Chemically Powered Active Colloids
- Magnetically Powered Active Colloids
- Light-driven Active Colloids
- Self-propelling Droplets
- Active Colloids Moved by Critical Mixing
- Swimming Microorganisms as Active Colloids
- Introduction to Theories and Modelling of Active Colloids
- Simulation of Active Colloids
- Hydrodynamics of Active Matter
- Collective Behaviours: Experiments
- Collective Behaviours: Theory
- Active Colloids in Complex Environments
- Applications of Active Colloids
- Active Matter and Artificial Intelligence

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**BISAC:** SCI077000, SCI013050,  
SCI055000

**Series:** Soft Matter Series, Volume 20

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# Advance Book Information



## Sensing Materials and Devices for Biomarkers

**Vishal Mutreja** Chandigarh University, India

**Deepika Kathuria** Chandigarh University, India

**Shweta Sareen** Panjab University, India

**Jeongwon Park** University of Nevada Reno, USA

### Synopsis

Biomarker test kits are used worldwide for a variety of simple assays, such as COVID-19 or diabetes. This book explores the range of sensing materials used in these devices, such as nanocarbon, metal oxides, and biomolecules. Each chapter presents a different method of detection and concludes with a look to the future of sensors in health care systems. Written for researchers, chemical engineers, and device fabricators, this concise book provides the latest technologies and challenges present in the field.

### Brief Contents

- Introduction to Biosensors: An Overview
- Colorimetric Paper-based Point-of-care Testing for Disease Biomarkers
- Fluorometric Sensors and Devices for Biomarkers
- Surface-enhanced Raman Scattering (SERS)-based Sensors for Biomarkers
- Potentiometric Devices for Biomarkers
- Impedimetric Sensors for Detection of Biomarkers
- Smartphone-based Devices for Biomarkers
- An Insight on the Journey from Design to Commercialization of Healthcare Sensors

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<b>Series:</b>	Detection Science, Volume 28

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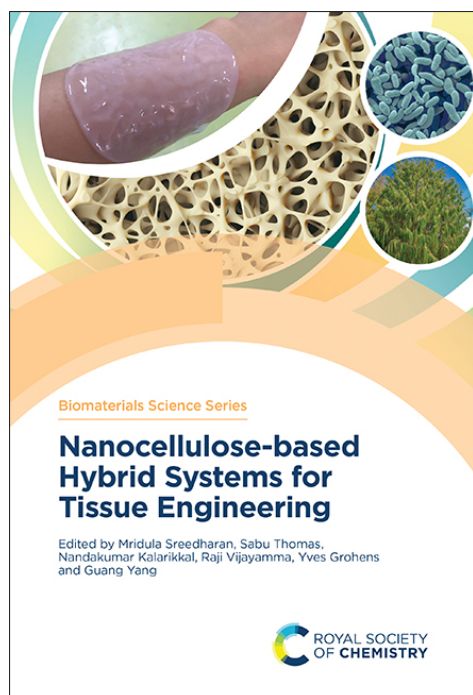
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# Advance Book Information



## Nanocellulose-based Hybrid Systems for Tissue Engineering

**Mridula Sreedharan** Mahatma Gandhi University, India

**Sabu Thomas** Mahatma Gandhi University, India

**Nandakumar Kalarikkal** Mahatma Gandhi University, India

**Raji Vijayamma** Mahatma Gandhi University, India

**Yves Grohens** Université Bretagne Sud, France

**Guang Yang** Huazhong University of Science and Technology, China

### Synopsis

Nanocellulose biomaterials offer new opportunities in tissue engineering that are sustainable and biodegradable, and at a low cost. Providing the fundamentals behind nanocellulose, this book explores the extraction, characterisation, and fabrication of nanocellulose biomaterials in a wealth of applications. The audience will include students, researchers, and professionals looking to use natural composites and bionanocomposites for tissue engineering and biomedical implants.

### Brief Contents

- Nanocellulose: Source, Chemistry and Properties
- Structure, Properties, and Applications of Plant-based and Bacterial Nanocellulose in Tissue Engineering
- Nanocellulose as an Antibacterial Material in Tissue-engineered Constructs
- Immunological Aspects of Nanocellulose
- Nanocellulose-based Hydrogels: Synthesis, Characterisation, and Tissue Engineering Applications
- Nanocellulose-based Aerogels in Tissue Engineering Applications
- Electrospinning of Nanocellulose-based Natural Polymer Composites for Tissue Engineering
- Electrospinning of Nanocellulose–Synthetic Polymer Composites: A Multifaceted Approach to Tissue Engineering Breakthroughs
- Electrospinning of Nanocellulose–Nanoparticle Composites: Multifunctional Biomaterials for Advanced Tissue Engineering
- Functionalization of Nanocellulose for Tissue Engineering Applications
- Biodegradation of Nanocellulose Scaffolds
- 3D Bioprinting of Nanocellulose Scaffolds for Tissue Engineering Applications
- Nanocellulose Composites in Skin Tissue Engineering and Wound Dressing
- Bone and Cartilage Tissue Engineering Scaffolds with Nanocellulose
- Recent Advances in Vascular Tissue Engineered Grafts with Nanocellulose
- An Overview of Lifecycle Assessment of Nanocellulose Using Machine Learning Techniques

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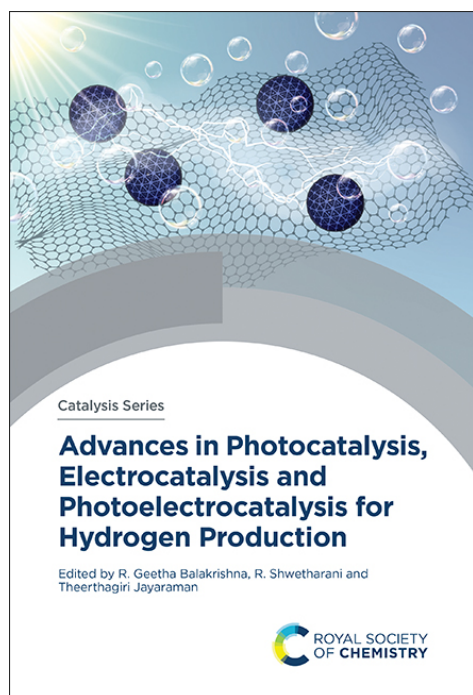
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# Advance Book Information



## Advances in Photocatalysis, Electrocatalysis and Photoelectrocatalysis for Hydrogen Production

R Geetha Balakrishna Jain University, India

R Shwetharani Jain University, India

Theerthagiri Jayaraman Gyeongsang National University, Republic of Korea

### Synopsis

Hydrogen has a lot of promise as an alternative to various carbon containing fuels as burning it releases only water which does not contribute to climate change.

Photocatalysis, electrocatalysis and the combining of the two in photoelectrocatalysis offer pathways to producing hydrogen from different starting materials and with lower energy costs, which will be essential to making sustainable hydrogen fuel a reality.

**Advances in Photocatalysis, Electrocatalysis and Photoelectrocatalysis for Hydrogen Production** brings together the latest developments in applying these types of catalysis to producing hydrogen. This book is an important resource for anyone working in photo- and electrocatalysis or with an interest in routes for green hydrogen.

### Brief Contents

- Introduction to Photocatalytic Hydrogen Production
- Perovskite-based Photocatalysts for Hydrogen Production
- Metal Oxide-based Catalysts
- Carbon-based Photocatalysts for Hydrogen Generation
- Metal–Organic Framework-based Photocatalysts for Hydrogen Production
- COF-based Catalysts for Hydrogen Production
- Metal Phosphide-based Photocatalysts for Hydrogen Production
- Transition-metal Dichalcogenide-based Photocatalyst Materials for Hydrogen Production
- Heterostructures, Plasmonics, and Quantum Dot Photocatalysts for Hydrogen Production
- Harnessing Both Light and Dark Conditions for Photocatalytic Hydrogen Production: Pathway for Ultimate Green Hydrogen
- Introduction to Electrocatalytic Hydrogen Production
- Transition Metal Dichalcogenide-based Electrocatalysts
- Metal and Metal Oxide-based Electrocatalysts for the Hydrogen Evolution Reaction
- Carbon-based Electrocatalysts for Hydrogen Evolution
- Metal Phosphide-based Electrocatalysts for Hydrogen Production
- Advances in Metal–Organic Frameworks for Electrocatalytic Hydrogen Generation
- Alternative Electrocatalysts: Exploring Quantum Dots and Transition Metal MXenes
- Introduction to Photo-electrocatalytic Hydrogen Production
- Catalysts for Photo-electrochemical H<sub>2</sub> Production
- Commercialization Status of Electrocatalysis, Photocatalysis and Photo-electrocatalysis Processes

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**THEMA:** PNRD, THV

**BISAC:** SCI013050, TEC031010,  
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**Series:** Catalysis Series Volume 47

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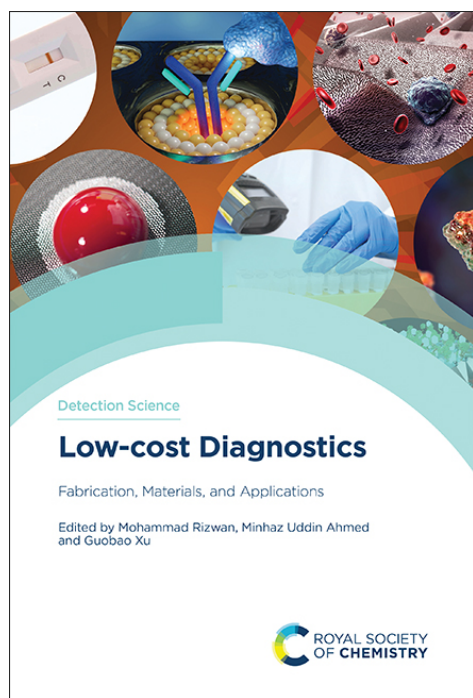
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## Low-cost Diagnostics

### Fabrication, Materials, and Applications

**Mohammad Rizwan** University of Lodz, Poland

**Minhaz Uddin Ahmed** University of Brunei Darussalam, Brunei Darussalam

**Guobao Xu** Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, China

### Synopsis

Developments in low-cost diagnostics in recent decades have drawn tremendous attention. Low-cost diagnostics are inexpensive, portable and easy to handle without special training and can be mass produced. This book compiles details of recent advances in different areas. High-quality studies published recently will be covered by leading scientific researchers and scientists working across the globe. Additionally, this book contains chapters on regulation and commercialisation by relevant experts. Overall, the book is a comprehensive reference for undergraduate and graduate students, new researchers, established scientists in academia, as well as professional researchers and scientists working in similar fields.

### Brief Contents

- Colorimetric Paper-based Sensors for Low-cost Clinical Diagnostics
- Fluorescent Probes Developed for Low-cost Small Molecule Diagnostics
- Low-cost Electrochemiluminescence Sensors Empower Point-of-care Diagnostics
- Advancement and Application of Nanomaterials Toward Cost-effective Immunosensing Platforms for Food Allergens
- Graphene Nanomaterials for Sensors
- Towards Nanozyme Based Biosensors for Internet of Things and Related Applications: A Cost Effective Approach in Healthcare Monitoring
- Nanocellulose Based Low-cost Chemical Sensors for Healthcare Monitoring
- Low-cost Microfluidic Paper-based Analytical Devices ( $\mu$ PADs): Fabrication Methods, Flow Control, and Applications
- Recent Advances in COVID-19 Diagnostics
- 3D-printed Low-cost Electroanalytical Diagnostics Platforms: Basics, Materials, Fabrication and Applications
- Printed Electrodes for the Diagnosis of Viral Infections
- Alpha-synuclein as a Molecular Marker for the Diagnosis of Neurological Disorders
- Immunosensors for Cancer Biomarker Diagnosis: Promises and Challenges
- Advancing Electrical Impedance Spectroscopy (EIS): Low-power, High-accuracy, Wide-dynamic-range, and High-throughput Impedance Measurement Circuits and Architectures

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<b>Series:</b>	Detection Science Volume 26

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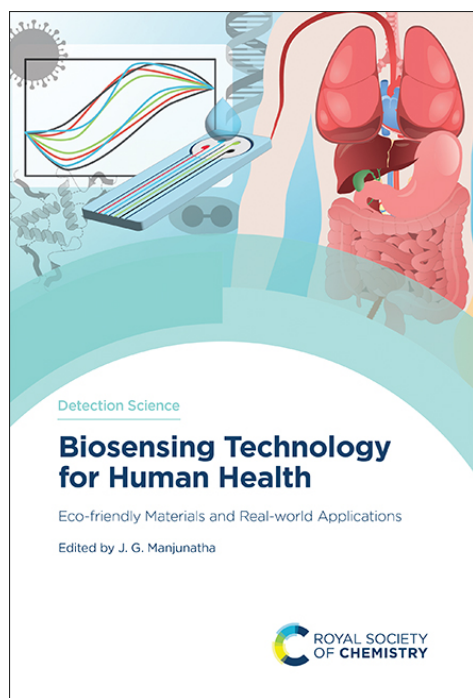
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## Biosensing Technology for Human Health

### Eco-friendly Materials and Real-world Applications

**J G Manjunatha** FMKMC College, Constituent College of Mangalore University, India

#### Synopsis

The rapid advances in biosensing technology over the past few decades have revolutionized the field of human health. This book provides a comprehensive overview of the current state of biosensing technologies, their applications and future prospects. The book explores the fundamental principles underlying biosensing technology then details various types of biosensors, including electrochemical sensors. The subsequent sections of the book are dedicated to the practical applications of biosensing technologies in human health. This book is a crucial resource for academics, researchers, and those who want to learn more about electrochemical phenomena, experiment with cutting-edge methods and use biosensors for a variety of purposes.

#### Brief Contents

- Brief Overview of Different Biosensors: Properties, Applications, and Their Role in Chemistry
- Green Applications of Electrochemical Biosensors
- Theoretical Characteristics of Bio-sensing Technology
- A Comparative Study of the Application of Biosensors in Human Health
- Recent Advancement of Biosensors as Electrodes
- Detection of Heavy Metals Present in the Environment by Biosensors
- Microplastic Detection and Quantification with Biosensing Techniques
- Biosensors for Determination of Toxic Phenolic Compounds Present in Cosmetics
- Electrochemical Biosensors Available for Identifying Hazardous Chemicals Used in Agriculture
- Electrochemical Biosensors for Analysis of Neurochemicals
- Electro-analysis of Vitamins Using Carbon Sensors
- Effect of Biosensors on Food Dyes: A Review
- Biosensors for the Quantification of Food Flavours and Additives
- Detection of Toxins in Food by Biosensors
- Biosensors for the Quantification of Flavonoids
- Toxicity, Safety and Disposal of Developed Biosensors
- Sustainability of Biosensors over Conventional Methods
- Detection of Psychotomimetic Drugs in Beverages and Food

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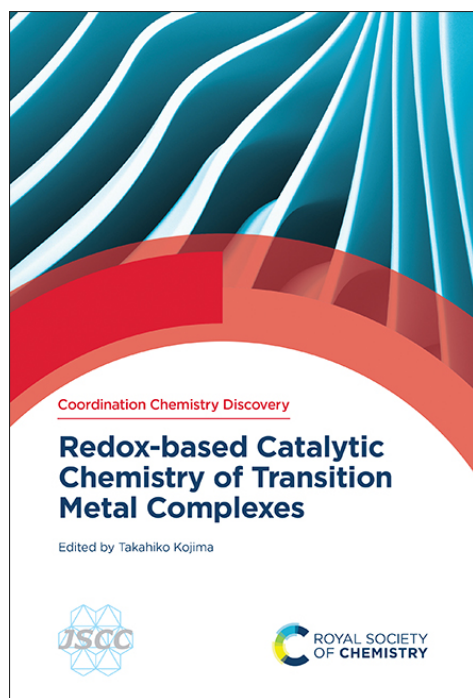
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## Redox-based Catalytic Chemistry of Transition Metal Complexes

Takahiko Kojima University of Tsukuba, Japan

### Synopsis

Transition metal complexes as catalysts play an indispensable role in transformation of chemical substances to value-added products using less energy-consuming processes and with high selectivity and efficiency. In collaboration with the Japan Society of Coordination Chemistry (JSCC), the work is a translation of the original Japanese book focusing on metal complex catalysts that are effective in redox reactions and covers important reactions involving metal complex catalysts. It describes not only what reactions proceed, but also the intermediates they pass through and how the reactions proceed, including computational chemistry approaches. It allows you to gain a deeper understanding of the reaction mechanisms of metal complex catalysts.

### Brief Contents

- Overview of the Catalytic Chemistry of Metal Complexes
- Bioinspired Catalysts of Non-heme Iron Oxygenases
- The Role of Copper in Biocatalysis
- Oxidation of Inert Substrates by Metalloenzymes
- Catalytic Oxidation Reactions Using Second and Third Series Transition Metal Complexes
- Integration of Metal Nanoparticles and Metal–Organic Frameworks for Composite Catalysts
- Environmentally Friendly Liquid-phase Oxidation Reactions Using Polyoxometalate Compounds
- Metal Complex Catalysts Immobilized on Porous Materials
- A Theoretical Approach for Investigating the Reaction Mechanism of Methane–Methanol Conversion, and Application of the Approach to Catalysts
- Activation of H<sub>2</sub>
- Nitrogen Fixation
- Activation of the Dinitrogen Molecule: The Relationship Between the Structures and Reactivities of Dinitrogen Metal Complexes
- Hydrogenation of Organic Compounds
- Transition-metal Complexes for Transformations of Tetrafluoroethylene
- Catalytic Reactions by Metal Clusters
- Functionalization *via* C–H Bond Activation
- Photocatalytic Redox Reactions with Metal Complex Catalysts
- CO<sub>2</sub> Reduction Using Metal Complexes as Photocatalysts

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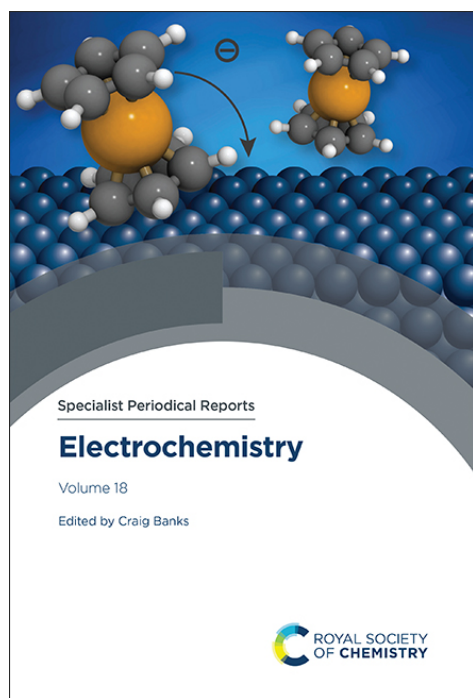
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## Electrochemistry

### Volume 18

**Craig Banks** Manchester Metropolitan University, UK

#### Synopsis

Providing the reader with an up-to-date digest of the most important research currently carried out in the field, this volume is compiled and written by leading experts from across the globe. It reviews the trends in electrochemical sensing and its applications and touches on research areas from a diverse range. Coverage is extensive and will appeal to a broad readership from chemists and biochemists to engineers and materials scientists. The reviews of established and current interests in the field make this book a key reference for researchers in this exciting and developing area.

#### Brief Contents

- Hybrid materials for electrocatalysis and photoelectrocatalysis
- Electrochemical glucose biosensors based on microbial whole cells
- Electrochemistry in the service of forensic science: fundamentals and applications
- Electroanalytical overview: the sensing of dopamine
- Electrochemistry of ruthenium solid-state surface: fabrication and application
- Self-assembled nanomaterials for fabrication of electrochemical biosensors for biomedical applications
- Electroanalytical overview: the sensing of rutin
- Ruthenium-catalyzed electrochemical C–H activation for organic synthesis
- Transistor based electrochemical devices: fundamentals to applications
- Recent progress on layered double hydroxides-based electrocatalysts for electrochemical water splitting
- Metal and metal oxide-based electrochemical sensors for environmental monitoring
- Electrochemical eyes: exploring forensic mysteries with electrochemical sensor technologies
- Plasmon-enhanced electrocatalysis
- Chip fabrication from electrochemical perspective: challenges and opportunities

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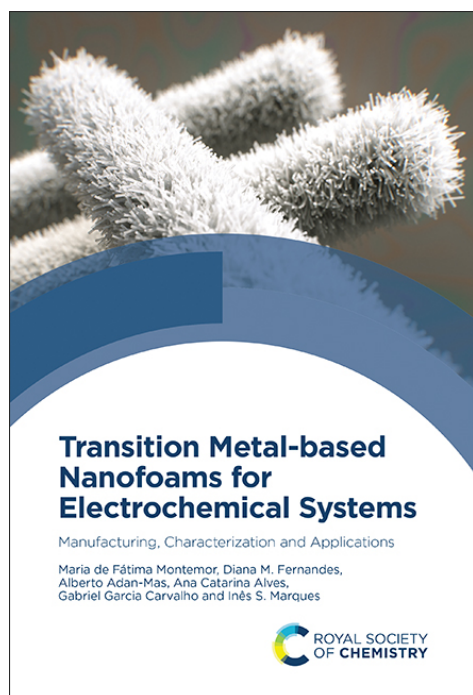
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**BISAC:** SCI013100, SCI013030, SCI050000

## Transition Metal-based Nanofoams for Electrochemical Systems

### Manufacturing, Characterization and Applications

**Maria de Fátima Montemor** Universidade de Lisboa, Portugal  
**Diana M Fernandes** University of Porto, Portugal  
**Alberto Adan-Mas** University of Lisbon, Portugal  
**Ana Catarina Alves** Universidade de Lisboa, Portugal  
**Gabriel Garcia Carvalho** Universidade de Lisboa, Portugal  
**Inês S Marques** University of Porto, Portugal

### Synopsis

Metal foams are lightweight materials inspired by structures in nature. They are defined as three-dimensional frameworks with interconnected porous structures – nano-, meso- and macropores – that combine essential physical and mechanical features of metals with a highly porous nanoarchitectures. These types of porous materials can be used in a variety of different scientific fields and, as a result, have gained increasing attention in recent years. Given the heightened academic and industrial interest in efficient materials, sparked by the high demand for new clean technologies, this book is more relevant and timelier than ever.

### Brief Contents

- Introduction
- Methodologies to Prepare Metal Foams
- Functionalization of Metal Nanofoams
- Property Characterization of Metal Foams
- Supercapacitor Applications
- Metallic Foams for Modern Batteries Applications
- Energy-related Electrocatalysis Applications
- Challenges and Outlook

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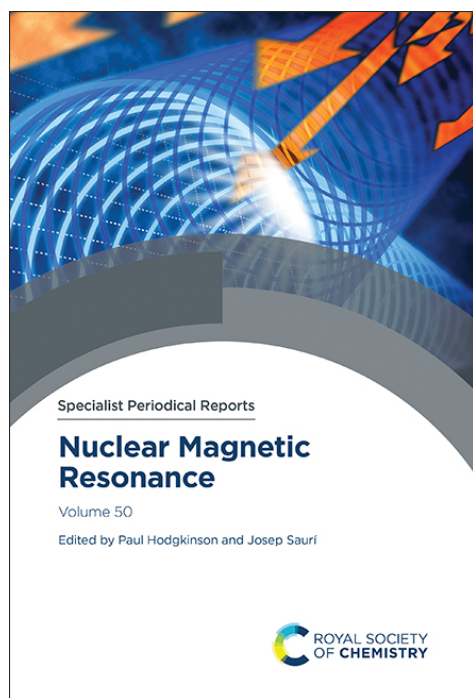
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## Nuclear Magnetic Resonance

### Volume 50

**Paul Hodgkinson** Durham University, UK

**Josep Sauri** Universitat Autònoma de Barcelona, Spain

### Synopsis

The success of NMR and its constant redevelopment mean that the literature is vast and wide-ranging. This volume contains chapters which distil the key recent literature in different areas, covering the spectrum of NMR theory and practice, including theory and computation of nuclear shielding, theoretical and practical aspects of indirect spin–spin couplings and nuclear spin relaxation. With applications across chemistry, physics and medicine, nuclear magnetic resonance is a proven, uniquely versatile and powerful spectroscopic technique, and other chapters on NMR in soft matter, NMR of proteins and nucleic acids and NMR in living systems provide accounts of its versatility. All the reports in this volume are invaluable both for new researchers and for seasoned practitioners, particularly service managers.

### Brief Contents

- Theory and computation of nuclear shielding
- Theoretical and practical aspects of indirect spin–spin couplings
- Nuclear Spin Relaxation
- NMR spectroscopy of small molecules in solution
- Solid-state NMR spectroscopy
- Hyperpolarisation techniques
- NMR of soft matter systems
- NMR of proteins and nucleic acids
- NMR in living systems

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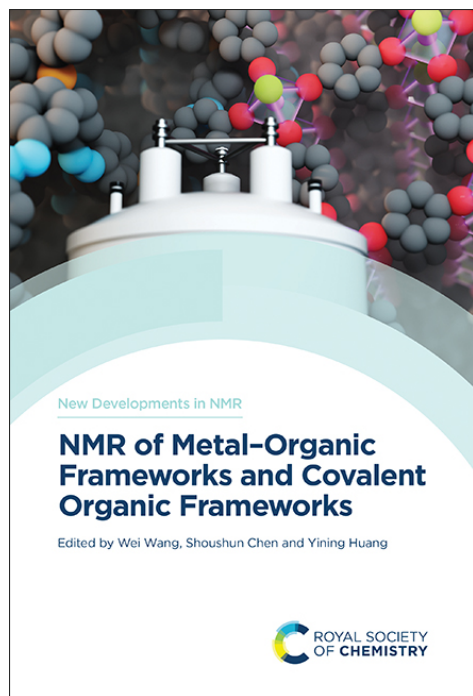
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## NMR of Metal–Organic Frameworks and Covalent Organic Frameworks

**Wei Wang** Lanzhou University, China

**Shoushun Chen** Lanzhou University, China

**Yining Huang** The University of Western Ontario, Canada

### Synopsis

New porous materials, metal organic frameworks (MOFs) and covalent organic frameworks (COFs) have been receiving an abundance of research interest in recent years. This book is the first comprehensive title to cover solid state NMR,  $^{129}\text{Xe}$  NMR and diffusion NMR methods that have been applied to solve the key scientific issues in MOF and COF research. In comparison to single-crystal X-ray diffraction and high resolution electron microscopy, solid-state NMR provides determinative or complementary information regarding MOFs and COFs. The book will benefit researchers interested in structural identification but have little expertise in NMR. It bridges knowledge gap and provides a unique reference work in this field of research.

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**Series:** New Developments in NMR  
Volume 35

### Brief Contents

- Overview
- Metal Centers and Doped Metals in MOFs and COFs
- Organic Linkers in MOFs and COFs
- Host–Guest Interaction in MOFs
- Structure Dynamics in MOFs
- Dynamic Nuclear Polarization in MOFs and COFs
- Summary and Future Outlook

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