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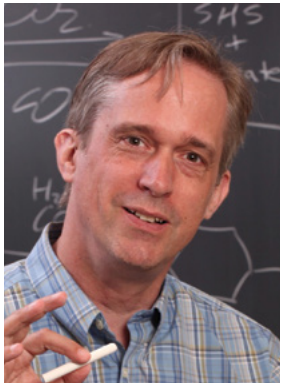
Written and edited by world experts, the series and professional reference titles that fall into our energy and environment collection tackle some of the most important and rapidly growing fields of chemistry affecting our world and its resources, from carbon capture and storage to CO_2 switchable materials.

Five minutes with...



Name Philip Jessop

Affiliation Queen's University, Canada

Co-author of *CO_2 Switchable Materials*

Publication date April 2019

ISBN 9781782628767

Tell us about your book
Consider a light bulb. You can switch it on when you want light, and you can switch it off to save energy. That switchability allows the light bulb to be greener and yet still do its job. Stimuli-responsive materials are just like that – materials that can switch back and forth between two versions of themselves and that capacity makes them easier and often greener to use. The trigger that causes the change could be light, voltage, acids, bases, temperature, or CO_2. Previous books about stimuli-responsive materials have ignored CO_2, but it's cheap, nontoxic, nonflammable, easy to remove from the system and it's a recycled waste material.

What do you think will be the next big breakthrough in your subject area?
My biggest hope is that these materials will solve one of the big roadblocks for sustainable chemistry: water removal. So many methods for converting biomass into fuels or chemicals have water removal as the biggest energy cost. Reducing that is crucial to getting lots of biomass-derived products into the marketplace. Can CO_2-switchable materials help? I believe so! But it will take lots of creativity and research followed by life cycle assessments to find out the answer.

What are the biggest challenges research concepts face to be applied at an industrial scale?
I used to think that it was risk-aversion. But now, after some experience in commercialisation, I've realised that the problem is money. Getting a new technology into the marketplace is insanely expensive! At the early stage, when lots of risk remains, investors are reluctant to invest, but someone has to pay to build and run that pilot plant. Once the pilot plant is built and run, and the technology is proven at a significant scale, then investors feel more comfortable funding further steps.

What was the biggest challenge you faced when writing your book?
Time! Writing the book was a delight. I'm a storyteller at heart - that's why I enjoy being a teacher. But, while the writing wasn't a problem, finding the time to do the writing was. My collaborator and friend Prof. Michael Cunningham and I are both busy, like most professors – teaching, research, service, travel, refereeing, editing, mentoring, it's all worthwhile but there are only so many hours in the day.

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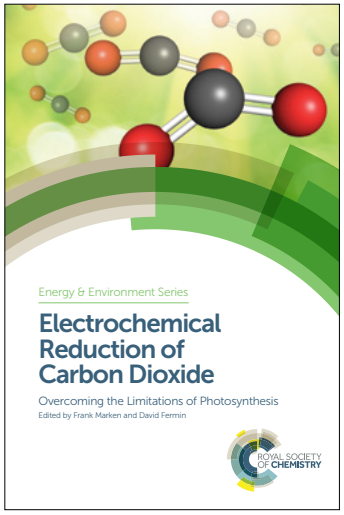

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Energy lies at the heart of modern society, and it is critical that we make informed choices of the methods by which we convert and manage energy. This series provides up-to-date and critical perspectives on the various options that are available. The wide range of topics covered reflects the wealth of chemical ideas and concepts that have the potential to make an important impact the search for sustainable energy. Books in this series form important references for chemists and material scientists, chemical and process engineers, energy researchers, bio-scientists and environmental scientists from across academia, industry and Government.

Carbon Capture and Storage

Niall Mac Dowell Imperial College London, UK | **Mai Bui** Imperial College London, UK

This book will provide the latest global perspective on the role and value of carbon capture and storage (CCS) in delivering temperature targets and reducing the impact of global warming. As well as providing a comprehensive, up-to-date overview of the major sources of carbon dioxide emission and negative emissions technologies, the book also discusses technical, economic and political issues associated with CCS along with strategies to enable commercialisation.

Hardback | 350 pages | 9781788011457 | 2019 | £159.00 | $220.00

ISBN 978-1-78801-145-7

Carbon Dioxide Electrochemistry

Homogeneous and Heterogeneous Catalysis

Marc Robert Université Paris Diderot, France | **Cyrille Costentin** Université Paris Diderot, France | **Kim Daasbjerg** Aarhus University, Denmark

Conversion of light and electricity to chemicals is an important component of a sustainable energy system. Carbon Dioxide Electrochemistry showcases different advances in the field, and bridges the two worlds of homogeneous and heterogeneous catalysis that are often perceived as in competition in research. Written and edited by internationally recognised scientists, this title will appeal to students and researchers working in energy, catalysis, chemical engineering and physical chemistry.

Hardback | 450 pages | 9781788015462 | 2020 | £179.00 | $250.00

ISBN 978-1-78801-546-2

Electrochemical Methods for Hydrogen Production

Keith Scott Newcastle University, UK

Increased hydrogen supplies using cleaner methods are seen as essential for potential hydrogen based power systems for transportation and renewable energy conversion into fuel. This book provides a comprehensive picture of the various routes to use electricity to produce hydrogen using electrochemical science and technology. Edited by an expert in the field, this title will be of interest to graduate students and researchers in academia and industry working in energy, electrochemistry, physical chemistry and chemical engineering.

Hardback | 375 pages | 9781788013789 | 2019 | £169.00 | $235.00

Future Lithium-ion Batteries

Ali Eftekhari Belfast Academy Ltd, UK

Lithium-ion batteries are an established technology with recent large-scale batteries finding emerging markets for electric vehicles and household energy storage. This book collects authoritative perspectives from global experts to project the emerging opportunities in the field of lithium-ion batteries. It will provide researchers with cutting-edge leads to advance the next generation of materials. With contributions from global experts, this book will be of use to graduate students and researchers in academia and industry interested in lithium-ion batteries and energy storage.

Hardback | 500 pages | 9781788014182 | 2019 | £179.00 | $300.00

Magnesium Batteries

Research and Applications

Maximilian Fichtner Helmholtz Institute Ulm, Germany

Magnesium batteries, in particular rechargeable non-aqueous systems, are an area of intense research as they present a sustainable energy storage system that has the potential to outperform Li-ion batteries. The book covers scientific and technical challenges, bringing together contributions in the field of anodes, cathodes, electrolytes and particularly promising systems such as the Mg-S cell. Edited by a leading name in the field, this title will appeal to students and researchers both new to and already working in battery materials across chemistry, physics, engineering and materials science.

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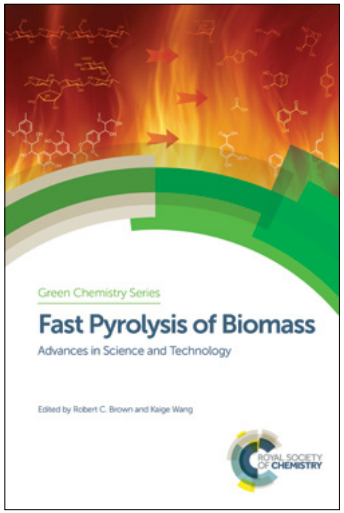
Organic Thermoelectric Materials

Zhiqun Lin Georgia Institute of Technology, USA | **Ming He** Peking University, China

Organic thermoelectric materials have gained attention in energy-harvesting and cooling applications due to their intrinsic low cost, energy efficient, and eco-friendly nature. This book summarises the significant progress in the molecular designs, physical characterizations, and performance optimizations of organic thermoelectric materials, focusing especially on the effective routes to minimize the thermal conductivity and maximize the power factor. This informative guide will appeal to graduate students as well as academic and industrial researchers across chemistry, materials science, physics and engineering interested in the materials and their applications.

Hardback | 400 pages | 9781788014700 | 2020 | £169.00 | $235.00



About the series

ISSN: 1757-7039

Green chemistry is one of the most important and rapidly growing fields in modern chemistry, and is widely recognised as being important across the chemical sciences, and throughout industry, education and research. This series provides high-level research books at the cutting-edge of green chemistry. The books are invaluable to industrialists, researchers and academics worldwide and anyone interested in the practical means that are being used to reduce the environmental impact of chemical processes and products.

Bioplastics and Biocomposites

A Practical Introduction

David Grewell Iowa State University, USA

Providing readers with a fundamental understanding of plastics and polymer processing, this book introduces bioplastics and biocomposites. Concepts covered include bioplastic processing, formulations, biocomposites, properties of biobased materials, economic evaluations of biobased materials, end of life treatment as well as environmental impacts of biobased materials. This book is ideal for researchers new to this field looking for a solid understanding in the materials science, processing and social and economic impacts of bioplastics.

Hardback | 250 pages | 9781782626565 | 2018 | £149.00 | $205.00

ISBN 978-1-78262-656-5

CO_2-switchable Materials

Solvents, Surfactants, Solutes and Solids

Philip G Jessop Queen's University, Canada | **Michael F Cunningham** Queen's University, Canada

Summarizing recent progress in the preparation, self-assembly, and functional applications of CO_2-responsive materials, this book explores the physical chemistry of CO_2-switching, including constraints on structural design and process conditions, together with applications. The book discusses the environmental, health, and safety advantages and disadvantages compared to conventional materials. It is ideal for researchers and industrialists working in green chemistry, chemical engineering, polymer chemistry and material science.

Hardback | 250 pages | 9781782628767 | 2019 | £149.00 | $205.00

ISBN 978-1-78262-876-7

Flow Chemistry

Integrated Approaches for Practical Applications

Santiago Luis University Jaume I, Spain | **Eduardo Garcia-Verdugo** University Jaume I, Spain

In flow chemistry reactions are performed in a tube with the reactants pumped through the vessel. It has the benefit of being easily scaled up and it is straightforward to integrate synthesis, workup and analysis into one system. This volume provides an update on recent advances in the field of flow chemistry, with special emphasis on new, integrated approaches for green and efficient chemistry. This book is a valuable resource for researchers in green chemistry, chemical engineers and Industrial chemists working in the pharma and fine chemicals industries.

Hardback | 450 pages | 9781788014984 | 2020 | £179.00 | $250.00

Greener Analytical Techniques

Miguel de la Guardia University of Valencia, Spain | **Salvador Garrigues** University of Valencia, Spain

As a key area of chemistry, improving the greenness of analytical techniques is of great interest to researchers. The last decade has seen some significant developments in this area, including the use of new smart materials as analytical tools. Covering topics including solvent selection, miniaturization and metrics for the evaluation of "greenness" this book will be of use to researchers, both in academia and in industry, interested in integrating safer and more sustainable analytical techniques into their work.

Hardback | 350 pages | 9781788015370 | 2019 | £169.00 | $235.00

Green Chemistry for Surface Coatings, Inks and Inks and Adhesives

Sustainable Applications

Rainer Höfer Editorial Ecosiris, Germany | **Avtar Singh Matharu** University of York, UK | **Zhanrong Zhang** Chinese Academy of Sciences, China

Highlighting sustainable technologies and applications of renewable raw materials within the framework of green and sustainable chemistry, circular economy and resource efficiency, provides a cradle-to-cradle perspective. From potential feedstocks to recycling/reuse opportunities and the de-manufacture of adhesives and solvents, the book applies green chemistry principles to all aspects of adhesive and sealant manufacture. The book is ideal for researchers and industrialists working in green chemistry, industrial coatings, adhesives and inks and printing technologies.

Hardback | 300 pages | 9781782629948 | 2019 | £179.00 | $250.00

Green Synthetic Processes and Procedures

Roberto Ballini University of Camerino, Italy

There has been great growth in the field of Green Chemistry over the past few years, but now one of the biggest challenges is to embed the green chemistry ideals of safety and sustainability as standard, both in industry and academia. Providing a thorough overview of the current green synthetic toolbox, from biocatalysis to sonochemistry, this book is a useful tool for any chemist wishing to design cleaner and safer processes.

Hardback | 300 pages | 9781788015127 | 2019 | £159.00 | $220.00

Renewable Resources for Surface Coatings, Inks and Adhesives

Rainer Höfer Editorial Ecosiris, Germany

Providing a detailed survey of renewable raw materials for paints, inks and glues, this book examines the raw materials that are used, their sourcing and processing. It explores biorefineries and white biotechnology manufacturing technologies and the use of renewable raw materials in the latest developments in industrial surface coatings and adhesives. The book is ideal for researchers and industrialists working in green chemistry, industrial coatings, adhesives and inks and printing technologies.

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Resource Recovery from Wastes

Towards a Circular Economy

Lynne Macaskie University of Birmingham, UK | **D J Sapsford** University of Birmingham, UK |
Will Mayes University of Hull, UK

The concept of a circular economy has been gaining increasing attention in recent years. Many of the sources of chemicals we have become reliant on are dwindling and the accumulation of waste products poses a serious environmental problem. Recovering resources from these waste materials can reduce our dependence on less sustainable virgin feedstocks, as well as reducing the quantity of material going to landfill sites. Bringing together a broad range of cross-disciplinary topics on resource recovery this book provides a valuable resource for those working in circular economy research, green chemistry and waste management.

Hardback | 450 pages | 9781788013819 | 2019 | £179.00 | $251.00

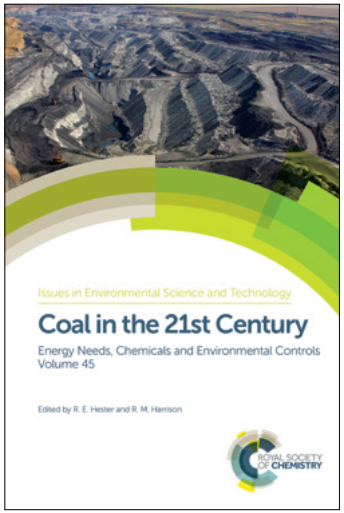
Transportation Biofuels

Pathways for Production

Alwin Hoogendoorn The Centre of Expertise Biobased Economy, The Netherlands |
Han van Kasteren Eindhoven University of Technology and the Centre of Expertise Biobased Economy, The Netherlands

Ten years on from the publication of the first edition of this book and fossil fuels still dominate the transport industry. However, there have been a number of advances in the production of biofuels for transportation use. This new edition provides updates on the previously discussed pathways for biofuels, including new experimental results and pilot plant studies, making it a useful read for researchers and industrialists working in biofuel development as well as postgraduate students studying fuel alternatives.

Hardback | 250 pages | 9781788015042 | 2019 | £149.00 | $205.00



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

Written by world experts in their specialised fields, this series tackles important environmental topics. It also focuses on broader issues, notably economic, legal and political considerations. Authors are drawn from industry, the public service and academic organisations. The books are invaluable for scientists and engineers in industry and public service, consultancy and academic institutions. They are also essential reading for students taking specialised courses in environmental chemistry, and provide supplementary reference material for general science courses. Two new volumes are published each year and the series is available through subscription as well as individual purchase

Energy Storage Options and Their Environmental Impact

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

The growth of renewable energy technologies, mainly wind and solar, demands the development of practical and economically viable energy storage technologies. This book explores the current state-of-the-art of large-scale energy storage and examines the likely environmental impacts of the main categories based on the types of energy stored.

Hardback | 326 pages | 9781788013994 | 2019 | £70.00 | $95.00

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Indoor Air Pollution

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

Time-activity diaries kept by members of the general public indicate that on average people spend around 90% of their time indoors, this is associated with considerable exposure to air pollutants. Given its importance as a source of air pollution exposure, increasing attention is being given to pollution of the indoor environment. This volume will consider both chemical and biological pollutants in the indoor atmosphere from their sources to chemical and physical transformations, human exposure and potential effects on human health.

Hardback | 250 pages | 9781788015141 | 2019 | £70.00 | $95.00

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Drinking Water Treatment for Developing Countries

Physical, Chemical and Biological Pollutants

Aniruddha Bhalchandra Pandit Institute of Chemical Technology, Mumbai, India | **Jyoti Kishen Kumar** Institute of Chemical Technology, Mumbai, India

Drinking water availability and safety is a major challenge faced globally and is highly pronounced in developing countries worldwide. This book shines a light on drinking water treatment methods and scale of operation specifically for the developing regions. Covering both conventional and emerging treatment technologies, the authors discuss the removal of chemical, physical and biological pollutants from drinking water, with a focus on developing countries. Conservation by rainwater harvesting, wastewater reuse, and selection criteria of feasible methods are considered in the context of issues relevant to Africa, Asia, Latin America and the Caribbean. With case studies connecting theory to real world matters, showcasing efficiencies and drawbacks, this book is ideal for graduate and postgraduate level course use in engineering departments or for self-study and research.

Hardback | 350 pages | 9781788010191 | 2019 | £86.99 | $122.00

ISBN 978-1-78801-019-1

Life Cycle Assessment

A Metric for The Circular Economy

Aiduan Borrion University College London, UK | **Onesmus Mwabonje** Imperial College London, UK | **Mairi Black** University of Surrey, UK

Life Cycle Assessment (LCA) is an established methodology used to quantify the environmental impacts of products, processes and services. Circular Economy (CE) thinking is conceptual way of thinking of the impacts of consumption. This title provides a robust systematic approach to the circular economy concept, using the established methodology of LCA. The book will provide a practical guide for those who wish to use LCA as a research tool or to inform policy, process, and product improvement.

Hardback | 320 pages | 9781788014458 | 2020 | £70.00 | $95.00

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The Handbook of Environmental Remediation

Classic and Modern Techniques

Chaudhery Mustansar Hussain New Jersey Institute of Technology, USA

Remediation technologies to control or prevent pollution from hazardous waste material is a critical research area in academia and industry. This book brings together traditional and emerging techniques for waste management, combining chemical, biological and engineering methods.

Hardback | 600 pages | 9781788013802 | 2019 | £125.00 | $175.00

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