

Materials science

New books

from the Royal Society of Chemistry

Our books publishing programme supports scientists, researchers, students and teachers with high quality, internationally respected chemical science titles spanning the breadth of our subject.

The books we're publishing in 2018 cover the core disciplines, related fields and emerging topics such as chemical biology and functional food. Contributions come from all over the world, from leading researchers including Emma Raven, Mark Vrakking, Jintao Zhang and Bill Price.

More books for established series...

It's been 10 years since the first book in our Catalysis series – *Carbons and Carbon Supported Catalysts in Hydroprocessing* – hit the shelves. Since then, the series has grown to include over 30 titles, and there are five more joining the series this year. Head to page 54 to read more.

The successful Soft Matter and New Developments in NMR series celebrate their fifth birthday in 2018. We're adding new books to these series providing first rate resources for researchers.

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If you have any queries, contact books@rsc.org to talk to the team.

For a list of books published prior to 2018, visit rsc.li/backlist

Happy reading

Roheena Anand Publisher, Books

Sara Bowler Senior Sales Executive, Books

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From reference works written for chemical engineering initiatives to comprehensive volumes that provide in-depth analysis of biodegradable thermogels, this year's titles are the latest in an established line of valuable materials science resources within our books portfolio.

Five minutes with...



Name Jintao Zhang

Affiliation Shandong University, China

Author of *Chemically Derived Graphene*

Book publication date March 2018

ISBN 9781788010801

Why is your research important?

Diminishing fossil fuel reserves and climate change are increasingly driving the world towards the development of sustainable and clean energy, such as wind, tide, and solar energies. High-performance energy devices play crucial roles for making harvested energy portable. Our research is aimed at the development of advanced energy storage and conversion devices via electrode materials design and mechanism exploitation, to generate efficient solutions for maximising electrochemical performance.

What question or challenge were you setting out to address with your book?

Our research looks at enhancing the energy density, power density, and cycling stability of batteries and supercapacitors through the use of chemically derived graphene as an advanced electrode material. More generally, we wanted to look at chemically derived graphene as a two-dimensional carbon platform, to understand the charge storage and/or catalytic mechanisms from a fundamental viewpoint. The basic principles obtained can be used with other materials, diversifying the functions of currently existing materials and the design of new two-dimensional materials.

In your opinion, what is the biggest unanswered question in chemistry?

How to establish an efficient sustainable energy cycle would be one of them. In nature, plants can smoothly convert solar energy and carbon dioxide into diverse natural products and biomaterials, releasing oxygen essential for life. Carbon materials including heteroatom doped graphene have been used for the electrocatalytic reduction of carbon dioxide into organic fuels. Learning from nature, we may incorporate proper catalysts to modulate the carbon cycle for achieving an eco-friendly energy cycle.



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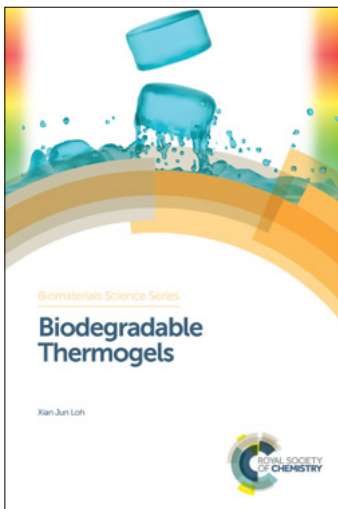
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About the series

ISSN: 2397-1401

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Roger Narayan University of North Carolina, USA

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Addressing the hottest topics in biomaterials science, these authoritative texts provide in-depth overviews and analysis for graduates, academics and practitioners requiring a deeper understanding of the subject. Emphasising a physical science and engineering approach, titles address physicochemical properties and structure-property relationships to inform function and design. Capturing underpinning principles applied to biomaterials science, as well as emerging technological advances and applications, this series is a high quality resource for those studying and conducting research in biomaterials science and engineering.

Biodegradable Thermogels



Xian Jun Loh Institute of Materials Research & Engineering, Singapore

Biodegradable thermogels are a promising class of stimuli-responsive polymers. This book summarises 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. Written by a leading authority on the subject, this book offers a comprehensive overview for academics and professionals across polymer science, materials science and biomedical and chemical engineering.

Hardback | 250 pages | 9781782629405 | 2018 | £149.00 | \$209.00



Biofabrication and 3D Tissue Modeling



Dong-Woo Cho Pohang University of Science and Technology (POSTECH), Korea

3D tissue modelling is an emerging field of investigation for disease mechanisms, as well as drug development and studying therapeutic effects. This book presents the principles, fabrication technologies, and applications from tissue engineering for regenerative medicine to in vitro tissue models to screen drugs and study diseases. With contributions from international leading scientists, providing insights on strategy, design and future perspectives, it is a comprehensive guide for academics and practitioners.

Hardback | 400 pages | 9781788011983 | 2019 | £179.00 | \$251.00





Biomaterial Control of Therapeutic Stem Cells

Akon Higuchi National Central University, Taiwan

Covering both human embryonic stem cells (hESCs) and human induced pluripotent stem cells (hiPSCs), this book bridges the gap between biomaterials research of stem cells and their use in clinical trials. The differentiation of human pluripotent stem cells (hPSCs) can be regulated by biological and physical cues from the biomaterials they are cultured on. This book provides a systematic treatment of stem cell culture and differentiation on specific biomaterials covering: 2D and 3D culture of hPSCs; differentiation of stem cells into cardiomyocytes, osteoblasts, neural lineages and hepatocytes; and biomaterials for clinical trials of stem cell therapies. A closing chapter looks at future trends. Written by an international leader in the field, this book is suitable for researchers working in biomaterials science, bioengineering, regenerative medicine and drug design.

Hardback | 250 pages | 9781788012072 | 2019 | £149.00 | \$209.00



Stimuli-responsive Drug Delivery Systems

Amit Singh AllExcel Inc., USA | Mansoor M. Amiji Northeastern University, USA

Providing an essential grounding to the booming area of smart materials, this book applies core materials chemistry and material design principles across a range of stimuli-responsive and triggered drug delivery systems, including pH-responsive, enzyme-responsive, and light responsive. Throughout the book attention is paid to pertinent examples, connecting theory with real-world applications. With a closing chapter on regulatory and commercial challenges to set the scene for successful clinical translation, this is a must-have guide for the field for graduates, academic researchers and practitioners.

Hardback | 500 pages | 9781788011136 | 2018 | £179.00 | \$251.00



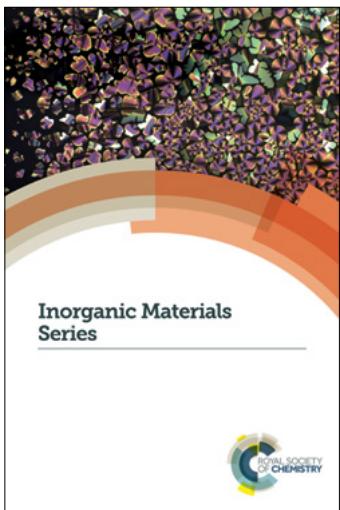
Tribology of Medical Devices

Zhongmin Jin Southwest Jiaotong University, China | Jing Zheng Southwest Jiaotong University, China | Wei Li Southwest Jiaotong University, China | Zhongrong Zhou Southwest Jiaotong University, China

Tribology deals with wear, stress, friction and lubrication of solids and fluids. These are important issues to consider when designing medical implants. This book is the first authored book to focus on tribology related to medical devices, bringing together fundamental principles, including tribocorrosion, and characterization tools applied across a broad range of devices and systems including, musculoskeletal, dental, cardiovascular, ocular and skin systems. It will appeal to graduates and researchers in the fields of materials science, biomedical engineering and mechanical engineering.

Hardback | 350 pages | 9781788011471 | 2019 | £169.00 | \$237.00





About the series

ISSN: 2472-3819

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Duncan W Bruce University of York, UK |

Dermot O'Hare University of Oxford, UK |

Richard I Walton University of Warwick, UK

This new series will provide authoritative coverage of topical and emerging research areas in inorganic materials chemistry and its related disciplines in physics, biology and materials science. The series will cover the three key areas of materials class, function and methodology, with each volume themed around a specific type of material, characterisation method, preparation technique or application. The books are written at a level accessible to advanced undergraduates, postgraduates and researchers wishing to learn about the subject.

Energy Storage and Conversion Materials



Stephen Skinner Imperial College London, UK

The book covers the application of inorganic materials in the storage and conversion of energy, with an emphasis on how solid-state chemistry allows development of new functional solids for energy applications. Topics include: thermochemical energy conversion; high temperature co-electrolysis – a route to syngas; oxide thermoelectric devices for energy conversion; fuel cell electrolytes for low temperature SOFCs and solid state lithium batteries.

Hardback | 350 pages | 9781788010900 | 2018 | £99.99 | \$140.00



Post-combustion Carbon Dioxide Capture Materials



Qiang Wang Beijing Forestry University, China

The use of inorganic materials for post-combustion carbon dioxide capture materials, including carbon-based adsorbents; zeolite and silica based adsorbents; metal organic frameworks (MOFs) based adsorbents; alkali metal carbonate and ionic liquid-based adsorbents, are covered in this book. The emphasis is on the design, synthesis, characterization, performance, mechanism, and application of these different inorganic materials.

Hardback | 350 pages | 9781788011099 | 2018 | £99.99 | \$140.00





Pre-combustion Carbon Dioxide Capture Materials

Qiang Wang Beijing Forestry University, China

Pre-combustion carbon dioxide capture materials, including layered double hydroxides derived sorbents; magnesium oxide based sorbents; calcium oxide based sorbents; and alkali ceramics based sorbents are described in this book from an inorganic material perspective. The emphasis is on the design, synthesis, characterised, performance, mechanism, and application of these different inorganic materials.

Hardback | 350 pages | 9781788011082 | 2018 | £99.99 | \$140.00



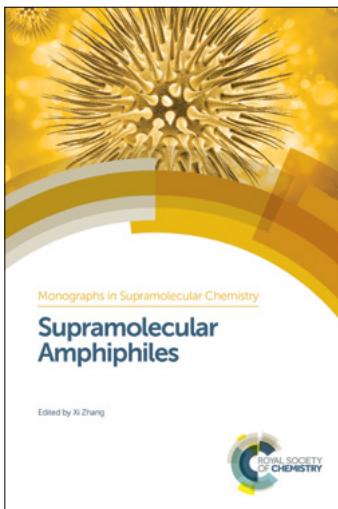
Solar Energy Capture Materials

Elizabeth A Gibson Newcastle University, UK

This volume covers the use of inorganic materials for Solar Energy Capture, with an emphasis on how solid-state chemistry allows development of new functional solids for energy applications. Chapters include: silicon-based photovoltaic devices; compound semiconductor-based solar cells; photoelectrochemical solar cells; solution processed solar cells and photon management/tandem solar cells.

Hardback | 350 pages | 9781788011075 | 2018 | £99.99 | \$140.00





About the series

ISSN: 1368-8642

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Jonathan Steed Durham University, UK | **Philip Gale** The University of Sydney, Australia

Supramolecular chemistry concerns the structure and function of molecular assemblies formed through weak interactions. These complexes have found diverse applications in materials chemistry, nanoscience, catalysis, food sciences, and medicine, and this has led to a rapid expansion in supramolecular chemistry research. With contributions from high profile international scientists working within the field, each book in the series covers a key concept for graduate level students and above interested in supramolecular chemistry and its diverse applications. The books are ideal for reference and as state-of-the art guides, and they aim to enable further developments of new applications through an understanding of the fundamentals and a comprehensive overview of the latest research.

Chemical Topology, Tilings and Entanglement **ee**

Charlotte Bonneau Kingston University London, UK | **Toen Castle** University of Pennsylvania, USA |

Myfanwy Evans Technische Universität Berlin, Germany | **Stephen Hyde** Australian National University, Australia

Structural entanglement in molecular graphs and nets is relevant to many chemical materials, from fullerenes to DNA complexes. This book explores the concepts of two-dimensional topology, geometry, and reticulations of surfaces of varying topology as a means to generate and describe tangled structures. Orbifolds, knot theory and chirality are discussed as modern approaches to symmetry, concepts that were pioneered by the authors of this new book. The book maintains a focus on the latest chemical applications throughout.

Hardback | 300 pages | 9781782626480 | 2018 | £159.00 | \$223.00



Co-crystals



Preparation, Characterization and Applications

Christer B Aakeröy Kansas State University, USA | **Abhijeet S Sinha** Kansas State University, USA

Applications of co-crystals are varied and in the past decade this area of research has received tremendous attention from academia and industry alike. This book not only focuses on the effective design of co-crystals based on hydrogen- or halogen-bonds, but it also provides insights into practical synthesis and characterisation of co-crystals. It also highlights the more recent but increasingly important practical applications of co-crystallization in, for example, pharmaceuticals, energetic materials, and separation technology. Postgraduate students and researchers new to applied co-crystal research and crystal engineering will find this a useful resource.

Hardback | 300 pages | 9781788011150 | 2018 | £159.00 | \$223.00





Dendrimer Chemistry



Synthetic Approaches Towards Complex Architectures

Michael Malkoch KTH Royal Institute of Technology, Sweden | **Sandra García**

Gallego KTH Royal Institute of Technology, Sweden

The dendrimer field continues to grow due to the unique structure of dendrimers that lends itself to useful properties and applications, such as in drug delivery. This book covers the latest advances in the synthesis of dendrimers and other complex dendritic architectures. It provides an overview of the most established building blocks for each family of dendritic material, and highlights the synthetic and structural trends and new applications. This will be a handy reference for postgraduate students and researchers in organic chemistry, polymer chemistry, (nano) materials science and macromolecular chemistry.

Hardback | 350 pages | 9781788011327 | 2018 | £169.00 | \$237.00



Metallomacrocycles



From Structures to Applications

Hai-Bo Yang East China Normal University, China

Metallomacrocycles are organic macrocycles with metal moieties that endow interesting properties and allow diverse applications, such as in sensing, drug delivery and catalysis. This book will provide the background, design and construction, higher order systems, and applications of metallomacrocycles. This will be primarily useful for postgraduate students and researchers, and particularly to those interested in coordination driven self-assembly, supramolecular chemistry and nanoscience.

Hardback | 350 pages | 9781782628583 | 2018 | £169.00 | \$237.00



Molecular Gels



Structure and Dynamics

Richard Weiss Georgetown University, USA

Edited and authored by leading researchers, this book provides a timely update of the molecular gels field which has expanded and progressed rapidly in the last decade. Chapters examine the physical chemistry of molecular gels, including the most recent theories, experimental techniques and computational approaches. Final chapters on applications of molecular gels illustrate, with modern case studies, the principles developed in previous chapters. This will be an indispensable resource for postgraduate students and researchers in supramolecular chemistry, materials science, polymer chemistry and soft matter, chemical engineering.

Hardback | 350 pages | 9781788011112 | 2019 | £159.00 | \$223.00



Supramolecular Chemistry in Biomedical Imaging



Stephen Faulkner University of Oxford, UK | **Thorfinnur Gunnlaugsson** Trinity College Dublin, Ireland | **Gearóid Ó Máille** Trinity College Dublin, Ireland

There have been great advances in biomedical imaging techniques in recent years and they are becoming prominent in supramolecular chemistry. This book will clarify the current understanding of these techniques. This publication caters for academics coming to the field from mainstream supramolecular chemistry and graduate students interested in supramolecular chemistry, imaging agents and imaging techniques for biomedical applications.

Hardback | 300 pages | 9781782622970 | 2018 | £159.00 | \$223.00





Understanding Intermolecular Interactions in the Solid State

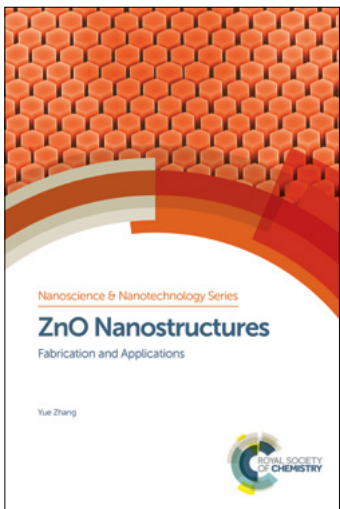
Approaches and Techniques

Deepak Chopra IISER Bhopal, India

Technological and computational advances in the last decade have meant a vast increase in knowledge about crystalline matter. This book will focus on the role of intermolecular interactions in the assembly of molecules in periodic arrangements in crystals. It highlights experimental and computational approaches to understanding weak intermolecular interactions in the solid state. This will be a useful resource for postgraduates and researchers in crystal engineering, crystallography, physical chemistry, solid-state chemistry, supramolecular chemistry and materials science.

Hardback | 350 pages | 9781788010795 | 2018 | £169.00 | \$237.00





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The possible uses of nanotechnology span many fields from energy to health; as a result there is a wealth of scientific nanoscience research taking place all over the world. When there is so much information available on the topic, it can be difficult to get a complete overview of the latest developments. The Nanoscience and Nanotechnology Series provides a comprehensive resource of books covering key topics such as the characterisation, performance and properties of nanostructured materials and technologies and their applications. With contributions from leading experts in nanoscale research, the books are suitable for graduate student level and above in chemistry, materials science, engineering, biology and physics wanting to know more about nanoscience.

Chemically Derived Graphene



Functionalization, Properties and Applications

Jintao Zhang Shandong University, China

There is great interest in chemically derived graphene due to its unique properties and various potential applications including energy storage. The book provides a comprehensive overview of the recent and state-of-the-art research on chemically derived graphene materials for different applications. The key researchers in the field have contributed chapters and the book will attract a broad readership from students and researchers across materials science, chemistry, nanoengineering and related fields.

Hardback | 400 pages | 9781788010801 | 2018 | £169.00 | \$237.00



Graphene-Based Membranes for Mass Transport Applications

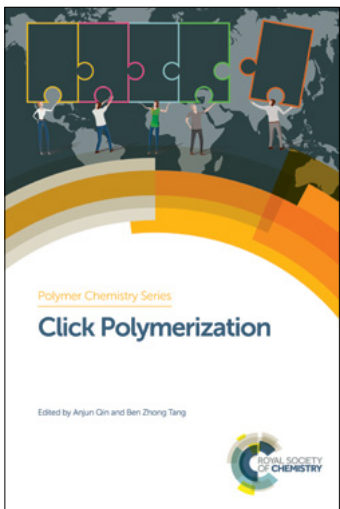


Hongwei Zhu Tsinghua University, China | **Pengzhan Sun** Tsinghua University, China

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.

Hardback | 300 pages | 9781782629399 | 2018 | £159.00 | \$223.00





About the series

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Polymer chemistry is a vast research area and with so many papers published on the topic, it's hard to know where to start and what papers to read. With contributions from leading experts across the world, each book in the series covers key themes in polymer chemistry research for graduate students and researchers. The perfect introduction to key topics giving the reader the knowledge to continue their work.

Click Polymerization



Anjun Qin South China University of Technology, China | **Ben Zhong Tang** The Hong Kong University of Science and Technology, Hong Kong

A comprehensive summary of the recently emerged technique of click polymerization, edited by world renowned experts. From the basic knowledge through to the recent progress of click polymerizations, the book provides a complete overview for readers. This authoritative guide will provide an excellent resource for graduate students and researchers interested in polymer chemistry and materials science.

Hardback | 350 pages | 9781782627166 | 2018 | £169.00 | \$237.00



Macromolecules Incorporating Transition Metals



Tackling Global Challenges

Alaa Abd-El-Aziz University of Prince Edward Island, Canada | **Christian Agatemor** University of Prince Edward Island, Canada | **Wai-Yeung Wong** Hong Kong Baptist University, Hong Kong

New materials are required to solve global challenges such as the growing energy demand and reducing the threat of new and re-emerging diseases and infections. Metallopolymers is an exciting and promising area of research and this book focuses on the strategy of incorporating transition metals into macromolecules to design functional materials for addressing such problems. The book appeals to those interested in polymer chemistry, organometallic chemistry and materials science as well as the applications of the materials for example optoelectronic systems, sensors, energy harvesting and biomedical research.

Hardback | 350 pages | 9781782628996 | 2018 | £169.00 | \$237.00





Molecularly Imprinted Polymers for Analytical Chemistry Applications



Włodzimierz Kutner Polish Academy of Sciences, Poland | **Piyush Sindhu Sharma**
Polish Academy of Science, Poland

There is great interest in the preparation and application of synthetic receptor-based recognition units for chemical sensors. The book summarises the latest developments and applications of molecular imprinting for selective chemical sensing. Specific chapters include: designing of molecular cavities aided by computational modelling, application of molecularly imprinted polymers (MIPs) for separation as well as sensing of pharmaceuticals and nucleotides. The book is suitable for analytical and biomedical scientists as well as polymer and materials scientists.

Hardback | 350 pages | 9781782626473 | 2018 | £179.00 | \$251.00



Photopolymerisation Initiating Systems

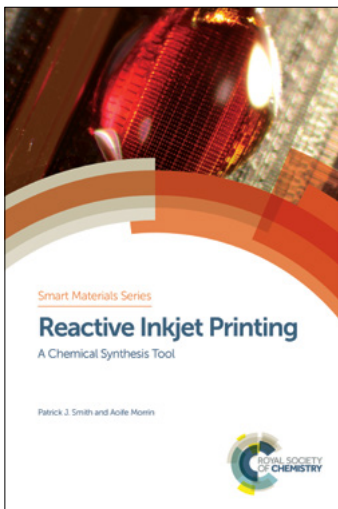


Jacques Lalevee Institut de Science des Matériaux de Mulhouse, France |
Jean-Pierre Fouassier ENSCMu-UHA, France

Edited by experienced editors and leading names in the field, the book provides an update on the latest developments in the research of photoinitiating systems along with their applications. The book is suitable for postgraduate students and researchers in academia and industry interested in polymer chemistry, organic chemistry, materials science and the applications of the materials.

Hardback | 400 pages | 9781782629627 | 2018 | £179.00 | \$251.00





About the series

ISSN: 2046-0066

Series editors

Hans-Jorg Schneider Universität des Saarlandes, Germany | **Mohsen Shahinpoor** University of Maine, USA

The progress of new functional materials plays a vital role in solving many of today's global challenges, from energy and sustainability to medicine and healthcare. With a wealth of information available it's hard to find a resource providing a complete overview of the different types of smart materials available. Each book in the series covers the fundamentals and applications of different material system from renowned international experts. Stay in the know with the Smart Materials Series – the intelligent way to find your materials solution.

Also in the series

Biobased Smart Polyurethane Nanocomposites

From Synthesis to Applications

Niranjan Karak Tezpur University, India

Polyurethane nanocomposites present an attractive and sustainable way for designing smart materials that can be used in packaging, health and energy applications. The book brings together the most recent research in the field from the basic concepts through to their application in paints and surface coatings, shape memory, self-healing, self-cleaning, biomaterials and packaging materials. Written by a leading expert on polyurethane nanocomposites, the book is a great introduction to this smart material and its applications.

Hardback | 338 pages | 9781788011808 | 2017 | £169.00 | \$237.00



Reactive Inkjet Printing

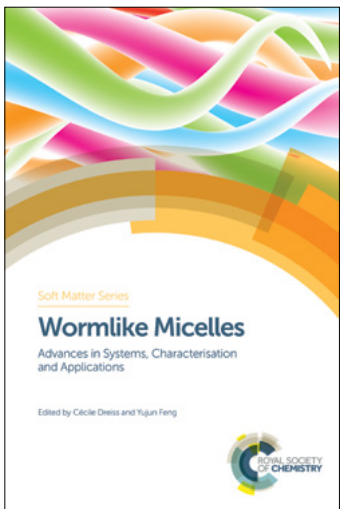
A Chemical Synthesis Tool

Patrick J Smith University of Sheffield, UK | **Aoife Morrin** Dublin City University, Ireland

Edited by two leading experts, the book describes the use of inkjet printing as a chemical synthesis tool in which an inkjet printer dispenses one or more reactants to form a product in situ. The book is suitable for advanced undergraduates, graduates and researchers in materials science, specifically those interested in tissue engineering, materials synthesis and additive manufacture.

Hardback | 250 pages | 9781782627678 | 2018 | £149.00 | \$209.00





About the series

ISSN: 2048-7681

Series editors

Hans-Jürgen Butt Max Planck Institute for Polymer Research, Germany | **Ian W Hamley** University of Reading, UK | **Howard A Stone** Princeton University, USA

With contributions from experts in the field, the books in this series provide an essential overview of the latest developments in soft matter research. Each title covers a specific aspect of soft matter, from the fundamental concepts of soft matter systems to the diverse applications across different disciplines. The books are suitable for advanced undergraduate students, postgraduate students and professional researchers working in soft matter science and related fields.

Electrospinning



Basic Research to Commercialization

Erich Kny Austrian Institute of Technology, KEMTK, Austria | **Kajal Ghosal** Dr. B. C. Roy College of Pharmacy and Allied Health Sciences, India | **Sabu Thomas** Mahatma Gandhi University, India

Electrospinning is a technique used to produce nanofibres from a polymer solution using an electrostatic force. The technology is now being used to create materials for a wide variety of uses. This new book focuses on recent developments and understanding the commercial applications of electrospinning. The book will be suitable for graduate students, academics and industrial entrepreneurs in materials science, polymer science and chemical engineering as well as those interested in the energy and health applications of the materials.

Hardback | 350 pages | 9781788011006 | 2018 | £159.00 | \$223.00

Polymer Modified Liquid Crystals



Ingo Dierking University of Manchester, UK

The book will cover the whole range of polymer dispersed liquid crystals and polymer stabilized liquid crystals from materials synthesis and polymerization, through to the physical properties of the composites involving a range of different phases, theoretical aspects, all the way to the wide range of applications (both display and non-display uses eg heat repellent foils and paints). The book will appeal to graduate students and academic and industrial researchers interested in the materials research aspects as well as from the applications point of view.

Hardback | 350 pages | 9781782629825 | 2017 | £159.00 | \$223.00

Nanoscience

Volume 5

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

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 5 provides a critical and comprehensive assessment of the most recent research and opinion from across the globe. 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.

Hardback | 250 pages | 9781788013710 | 2018 | £314.95 | \$441.00



Also of interest



Organometallic Chemistry

Volume 42

Nathan Patmore University of Huddersfield, UK | **Paul Elliot** University of Huddersfield, UK

With the increase in volume, velocity and variety of information, researchers can find it difficult to keep up to date with the literature in their field. This interdisciplinary field has the potential to provide answers to problems and challenges faced in catalysis, synthetic organic chemistry and the development of therapeutic agents and new materials. Providing an invaluable volume, this volume contains analysed, evaluated and distilled information on the latest in organometallic chemistry research.

Hardback | 250 pages | 9781788010054 | 2019 | £314.95 | \$441.00



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