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Explore the Practical Applications and Promising Developments of Graphene The Graphene Science Handbook is a six-volume set that describes graphene's special structural, electrical, and chemical properties. The book considers how these properties can be used in different applications (including the development of batteries, fuel cells, photovoltaic cells, and supercapacitors based on graphene) and produced on a massive and global scale. Volume One: Fabrication Methods Volume Two: Nanostructure and Atomic Arrangement Volume Three: Electrical and Optical Properties Volume Four: Mechanical and Chemical Properties Volume Five: Size-Dependent Properties Volume Six: Applications and Industrialization This handbook describes the fabrication methods of graphene; the nanostructure and atomic arrangement of graphene; graphene's electrical and optical properties; the mechanical and chemical properties of graphene; the size effects in graphene, characterization, and applications based on size-affected properties; and the application and industrialization of graphene. Volume six is dedicated to the application and industrialization of graphene and covers: The design of graphene- and biomolecule-based nanosensors and nanodevices The use of graphene-based field-effect-transistor (GFET)-like structures as sensing substrates and DNA aptamers as sensing elements Recent advances in graphene-based DNA sensors The antibacterial properties of graphene-based nanomaterial (NM) The chemical and physical properties of graphene and its current uses The development of sensitive and selective field-effect transistors (FET) biosensors based on graphene The unique properties of ordered graphene (G) Various methods currently employed for the production of graphene nanocomposites The supramolecular chemistry of graphene derivatives, and more Renewable fuel research and process development requires interdisciplinary approaches involving chemists and physicists from both scientific and engineering backgrounds. Here is an important volume that emphasizes green chemistry and green engineering principles for sustainable process development from an interdisciplinary point of view. It creates an enriching knowledge base on green chemistry of biofuel production, sustainable process development, and green engineering principles for renewable fuel production. This book includes chapters contributed by both research scientists and research engineers with significant experience in biofuel chemistry and processes. The book offers an abundance of scientific experimental methods and analytical procedures and interpretation of the results that capture the state-of-the-art knowledge in this field. The wide range of topics make this book a valuable resource for academicians, researchers, industrial practitioners and scientists, and engineers in various renewable energy fields. Key features: • Emphasizes green chemistry and green engineering principles for sustainable process development for biofuel production • Discusses a wide array of biofuels from algal biomass to waste-to-

energy technologies and wastewater treatment and activated sludge processes • Presents advances and developments in biofuel green chemistry and green engineering, including process intensification (microwaves/ultrasound), ionic liquids, and green catalysis • Looks at environmental assessment and economic impact of biofuel production

Pulp and Paper Industry: Nanotechnology in Forest Industry covers the latest scientific and technical advances in the area of nanotechnology in forest sector providing information on recent developments, structure and properties, raw materials and methods for the production of nanocellulose along with their characterization and application in various industries with an analysis of both challenges and opportunities with respect to environmentally sound technologies and consumer concerns such as health effects. Also identifies the key barriers to innovation, and the breakthroughs required to make nanocellulosic materials viable alternatives in the important sectors. Thorough review of the evolution and development of different types of nanocelluloses In-depth coverage of preparation and characterization of nanocellulose Use of nanocellulose materials in a wide range of applications Commercial and precommercial developments Challenges and opportunities of nanocellulose market Identifies the key barriers to innovation, and the breakthroughs required to make nanocellulosic materials viable alternatives in the important sectors

The unique structures and properties of dendrimers make them attractive for many applications, from drug delivery and antimicrobial agents to catalysis and as functional materials. **Dendrimer Chemistry** provides an overview of the latest advances in the synthesis of dendrimers and other complex dendritic architectures. The book focuses on established building block families for generating dendritic macromolecules, capitalizing on the evolution in the synthesis of dendrimers and other complex dendritic architectures. Systems covered range from dendritic polyesters and naturally occurring monomers to novel dendritic families. Each chapter starts with an introduction to the dendrimer family and its important features followed by information on the building blocks used to generate the dendrimers, their synthetic strategies and the resulting architectures. Chapters also cover the characterization and structural analysis, commercial availability and cutting-edge applications. Including forewords from leaders in the field, this will be a useful reference for postgraduate students and researchers in organic chemistry, polymer chemistry, materials science and macromolecular chemistry.

Cellulose Nanocrystal/Nanoparticles Hybrid Nanocomposites: From Preparation to Applications presents a broad survey of the main innovations in the field of functionalized cellulose at the nanoscale and for hybrid nanoparticles-based nanocomposites for industrial application. The book covers the properties and applications of cellulose, including particle extraction, synthesis, functionalization of cellulose at the nanoscale, and hybrid nanoparticles and their processing and characterizations. Readers will find this to be a single and comprehensive

reference for future research on polymer-based nanocomposites. Hybrid nanocomposites based on cellulose at the nanoscale, and hybridized with other reinforcement agents represent a key advance in polymer-based materials. Cellulose is considered the most abundant polymer on the planet and an essential renewable resource. There is considerable research interest in the simple extraction and synthesis, nanoscale dimensions, high aspect ratio, mechanical, electrical and thermal properties of cellulose at the nanoscale and its hybridized materials. Nanocomposites and bio-nanocomposites with hybrid reinforcements, for example, are novel materials with enhanced properties due to the integration of cellulose with other nanoparticles, and new methods have been developed to extract cellulose at the nanoscale. The extracted cellulose shows potential applications in nanocomposites, and functionalization techniques are essential to create enhanced nanocomposites, particularly for hybrid nanoparticles. Presents the state-of-the-art in functionalized cellulose at the nanoscale, along with industrial applications of hybrid-nanoparticles-based nanocomposites Details the properties and applications of cellulose at the nanoscale and for hybrid nanocomposites Gives updates on hybrid nanoparticles, including the processing and characterization of nanocomposites Brings together expertise from chemistry, polymer science, engineering and manufacturing

Amino Alcohols—Advances in Research and Application: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Sphingosine. The editors have built Amino Alcohols—Advances in Research and Application: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Sphingosine in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Amino Alcohols—Advances in Research and Application: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>.

The Handbook of Composites From Renewable Materials comprises a set of 8 individual volumes that brings an interdisciplinary perspective to accomplish a more detailed understanding of the interplay between the synthesis, structure, characterization, processing, applications and performance of these advanced materials. The handbook covers a multitude of natural polymers/ reinforcement/ fillers and biodegradable materials. Together, the 8 volumes total at least 5000 pages and offers a unique publication. This 8th volume of the Handbook is solely focused on the Nanocomposites: Advanced Applications. Some of the important topics include but not limited to: virgin and recycled polymers applied to

advanced nanocomposites; biodegradable polymer-carbon nanotube composites for water and wastewater treatment; eco-friendly nanocomposites of chitosan with natural extracts, antimicrobial agents and nanometals; controllable generation of renewable nanofibrils from green materials and their application in nanocomposites; nanocellulose and nanocellulose composites; poly (lactic acid) biopolymer composites and nanocomposites for biomedical and biopackaging applications; impact of nanotechnology in water treatment: carbon nanotube and graphene; nanomaterials in energy generation; sustainable green nanocomposites from bacterial bioplastics for food packaging applications; PLA-nanocomposites: a promising material for future from renewable resources; biocomposites from renewable resources: preparation and applications of chitosan-clay nanocomposites; nano materials: an advanced and versatile nano additive for kraft and paper industries; composites and nanocomposites based on polylactic acid obtaining; cellulose-containing scaffolds fabricated by electrospinning: applications in tissue engineering and drug delivery; biopolymer-based nanocomposites for environmental applications; calcium phosphate nanocomposites for biomedical and dental applications: recent developments; chitosan-metal nanocomposites: synthesis, characterization and applications; multi-carboxyl functionalized nano-cellulose/nano-bentonite composite for the effective removal and recovery of metal ions; biomimetic gelatin nanocomposite as a scaffold for bone tissue repair; natural starches-blended ionotropically-gelled microparticles/beads for sustained drug release and ferrogels: smart materials for biomedical and remediation applications.

Advances in Physical Organic Chemistry provides the chemical community with authoritative and critical assessments of the many aspects of physical organic chemistry. The field is a rapidly developing one, with results and methodologies finding application from biology to solid-state physics. Reviews the application of quantitative and mathematical methods toward understanding chemical problems Covers organic, organometallic, bioorganic, enzymes and materials topics

Comprehensive Energy Systems provides a unified source of information covering the entire spectrum of energy, one of the most significant issues humanity has to face. This comprehensive book describes traditional and novel energy systems, from single generation to multi-generation, also covering theory and applications. In addition, it also presents high-level coverage on energy policies, strategies, environmental impacts and sustainable development. No other published work covers such breadth of topics in similar depth. High-level sections include Energy Fundamentals, Energy Materials, Energy Production, Energy Conversion, and Energy Management. Offers the most comprehensive resource available on the topic of energy systems Presents an authoritative resource authored and edited by leading experts in the field Consolidates information currently scattered in publications from different research fields (engineering as well as physics, chemistry, environmental sciences and economics), thus ensuring a common standard and language

Complex systems is a new field of science studying how parts of a system give rise to the collective behaviors of the system, and how the system interacts with its environment. This book examines the complex systems involved in environmental sustainability, and examines the technologies involved to help mitigate human impacts, such as renewable energy,

desalination, carbon capture, recycling, etc. It considers the relationships and balance between environmental engineering and science, economics, and human activity, with regard to sustainability.

Competition for energy resources worldwide will almost certainly increase because of population growth and economic expansion, especially in countries such as China and India, with large populations. In addition, environmental concerns with the use of certain energy sources add a complicating factor to decisions about energy use. Therefore there is likely to be an increased commitment around the world to invest in energy systems. The World Scientific Handbook of Energy provides comprehensive, reliable and timely sets of data on energy resources and uses; it gathers in one publication a concise description of the current state-of-the-art for a wide variety of energy resources, including data on resource availability worldwide and at different cost levels. The end use of energy in transportation, residential and industrial areas is outlined, and energy storage, conservation and the impact on the environment included. Experts and key personnel straddling academia and related agencies and industries provide critical data for further exploration and research. Experts in these various areas who provide relevant data for further exploration and research include former Head of the Nuclear Reactors Directorate of the CEA; Director of the Potential Gas Agency, who leads a team of 100 geologists, geophysicists and petroleum engineers; former CEO of an Icelandic engineering company that specializes in the design, construction and operation of "Kalina" binary power plants for geothermal, biomass and industrial waste heat recovery applications; Chairman of the Scottish Hydrogen and Fuel Cells Association; former Director of the Geo-Heat Center at the Oregon Institute of Technology, who received the Patricius Medal from the German Geothermal Association for "his pioneer work in the direct use of geothermal energy"; Division Director of NETL's Strategic Center for Coal, who provides expert guidance and consultation to major DOE-funded clean coal technology and carbon sequestration demonstration projects; an internationally recognized expert in the physics and technology of Inertial Confinement Fusion (ICF); former Senior Scientist and Director of the Center for Distributed Generation and Thermal Distribution with Washington State University, who was responsible for state policy, technical assistance to resource developers and investigations related to geothermal energy development; a main author on the 2005 Billion Ton Report and 2011 Billion Ton Update; and many more extremely well published and well known individuals straddling academia and related agencies and industries.

Microfluidics or lab-on-a-chip (LOC) is an important technology suitable for numerous applications from drug delivery to tissue engineering. Microfluidic devices for biomedical applications discusses the fundamentals of microfluidics and explores in detail a wide range of medical applications. The first part of the book reviews the fundamentals of microfluidic technologies for biomedical applications with chapters focussing on the materials and methods for microfabrication, microfluidic actuation mechanisms and digital microfluidic technologies. Chapters in part two examine applications in drug discovery and controlled-delivery including micro needles. Part three considers applications of microfluidic devices in cellular analysis and manipulation, tissue engineering and their role in developing tissue scaffolds and stem cell engineering. The final part of the book covers the applications of microfluidic devices in diagnostic sensing, including genetic analysis, low-cost bioassays, viral detection, and radio chemical synthesis. Microfluidic devices for biomedical applications is an essential reference for medical device manufacturers, scientists and researchers concerned with microfluidics in the field of biomedical applications and life-science industries. Discusses the fundamentals of microfluidics or lab-on-a-chip (LOC) and explores in detail a wide range of medical applications. Considers materials and methods for microfabrication, microfluidic actuation mechanisms and digital microfluidic technologies. Considers applications of microfluidic devices in cellular analysis and manipulation, tissue engineering and their role in developing tissue scaffolds and

stem cell engineering

Introduction to Fluoropolymers, Second Edition, provides a comprehensive overview of the history, principles, properties, processing and applications of fluoropolymers, supporting their development and utilization in high-performance applications, components, and products. This second edition has been updated and expanded to include new in-depth chapters on manufacturing and applications of PTFE and melt processible fluoropolymers. The book begins by demonstrating the role of fluoropolymers in everyday life, before introducing the history and basic principles of fluoropolymers. This is followed by detailed coverage of the main fluoropolymer types. Properties and applications are illustrated by real-world examples as diverse as waterproof clothing, vascular grafts and coatings for aircraft interiors. The different applications of fluoropolymers show the benefits of a group of materials that are highly water-repellant and flame-retardant, with unrivalled lubrication properties and a high level of biocompatibility. Health and safety and environmental aspects are also covered throughout the book, with a final chapter examining safety, disposal, and recycling in detail. This book is an essential resource for anyone looking to understand or use fluoropolymer materials in their products. This includes engineers, product designers, manufacturers, scientists, researchers, and other professionals, across industries such as automotive, aerospace, medical devices, food and beverages, high performance apparel, oil and gas, renewable energy, solar photovoltaics, electronics and semiconductors, pharmaceuticals, and chemical processing. This is also a valuable introductory guide for academic researchers and advanced students in plastics engineering, polymer science, and materials science. Introduces and demystifies fluoropolymers for a wide audience of engineers, designers, professionals, and researchers, across industries and disciplines Covers a broad range of materials, including polytetrafluoroethylene (PTFE), polyvinyl fluoride (PVF), vinylidene fluoride polymers, fluoroelastomers, and more Focuses on properties, processing methods and advanced industrial applications of fluoropolymers

This book is a printed edition of the Special Issue "Suzuki–Miyaura Cross-Coupling Reaction and Potential Applications" that was published in Catalysts

"This reference brings together an impressive array of research on the development of Science, Technology, Engineering, and Mathematics curricula at all educational levels"--Provided by publisher.

Even in today's electronic information age, traditional paper is a multi-purpose product that continues to be indispensable to people's daily work and lives. While paper is a valued product, the paper industry contributes to environmental pollution and consumption of natural resources, and the organic substances out of which traditional paper is made render it highly flammable and easy to burn. This book introduces a new technology to develop environmentally friendly fire-resistant paper using highly flexible ultralong hydroxyapatite nanowires and discusses applications and potential for commercialization. Discusses characterization, properties, and synthesis of ultralong hydroxyapatite nanowires and compares them with cellulose fibers Describes steps to design and create fire-resistant paper Covers a variety of function-based fire-resistant paper, including antibacterial, magnetic, photoluminescent, among others Examines a host of applications, such as paper for anti-counterfeiting, encryption and decryption, environmental, energy, and biomedical uses Considers commercialization potential and future prospects This book is aimed at materials scientists, chemical engineers, industrial chemists, and other researchers from across the scientific and engineering disciplines interested in the development of this exciting alternative to traditional paper.

Chemistry/Forensic Science Forensic chemistry is a subdiscipline of forensic science, its principles guide the analyses performed in modern forensic

laboratories. Forensic chemistry's roots lie in medico-legal investigation, toxicology and microscopy and have since led the development of modern forensic analytic techniques and practices for use in a variety of applications. Introduction to Forensic Chemistry is the perfect balance of testing methods and application. Unlike other competing books on the market, coverage is neither too simplistic, nor overly advanced making the book ideal for use in both undergraduate and graduate courses. The book introduces chemical tests, spectroscopy, advanced spectroscopy, and chromatography to students. The second half of the book addresses applications and methods to analyze and interpret controlled substances, trace evidence, questioned documents, firearms, explosives, environmental contaminants, toxins, and other topics. The book looks at innovations in the field over time including the latest development of new discernible chemical reactions, instrumental tools, methods, and more. Key features: Nearly 300 full-color figures illustrating key concepts and over 20 case studies Addresses all the essential topics without extraneous or overly advanced coverage Includes full pedagogy of chapter objectives, key terms, lab problems, end of chapter questions, and additional readings to emphasize key learning points Includes chemical structures and useful spectra as examples Fulfills the forensic chemistry course requirement in FEPAC-accredited programs Includes a chapter on Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNE) materials Comprehensive and accessible, without being overly technical, Introduction to Forensic Chemistry will be a welcome addition to the field and an ideal text designed for both the student user and professor in mind. Course ancillaries including an Instructor's Manual with Test Bank and chapter PowerPoint® lecture slides are available with qualified course adoption. This book contains a series of exercises and problems posed in the subject of green metrics. Essentially it is a "how to" book on evaluating the material efficiency, environmental impact, safety-hazard impact, and energy efficiency of any kind of chemical reaction or synthesis plan. Only the essential green metrics in each of these categories are used. The introduction highlights the hierarchy of metrics used throughout the book, explains the structure of how the book is arranged, how the problems are posed, and how the reader is to use the book. Examples refer to themes according to the headings given in the table of contents and are arranged in a hierarchical order. Key Features: The topics cover fundamentals in chemistry and the chemical industry in a blended fashion A unique text covering the fundamentals of green metrics from materials efficiency and environmental and safety-hazard impact, to new green technologies and more The book will be useful in a range of chemistry courses, from early undergraduate to advanced graduate courses, whether based in lectures, tutorials or laboratory experiments Using an extensive glossary of terms used in green metrics, each chapter has a specified theme where the relevant metrics definitions pertaining to that theme will be given with one or two illustrative worked examples Supplemental web-based downloadable material including

extra problems, full solutions, Excel files, ChemDraw files, templates, and exercises

Flexibility and stretchability of electronics are crucial for next generation electronic devices that involve skin contact sensing and therapeutic actuation. This handbook provides a complete entrée to the field, from solid-state physics to materials chemistry, processing, devices, performance, and reliability testing, and integrated systems development. This work shows how microelectronics, signal processing, and wireless communications in the same circuitry are impacting electronics, healthcare, and energy applications. Key Features: • Covers the fundamentals to device applications, including solid-state and mechanics, chemistry, materials science, characterization techniques, and fabrication; • Offers a comprehensive base of knowledge for moving forward in this field, from foundational research to technology development; • Focuses on processing, characterization, and circuits and systems integration for device applications; • Addresses the basic physical properties and mechanics, as well as the nuts and bolts of reliability and performance analysis; • Discusses various technology applications, from printed electronics to logic and memory devices, sensors, actuators, displays, and energy storage and harvesting. This handbook will serve as the one-stop knowledge base for readership who are interested in flexible and stretchable electronics.

Industrial Biorefineries and White Biotechnology provides a comprehensive look at the increasing focus on developing the processes and technologies needed for the conversion of biomass to liquid and gaseous fuels and chemicals, in particular, the development of low-cost technologies. During the last 3-4 years, there have been scientific and technological developments in the area; this book represents the most updated information and technological perspective on the topic. Provides information on the most advanced and innovative pretreatment processes and technologies for biomass Covers information on lignocellulosic and algal biomass to work on the principles of biorefinery Provides information on integration of processes for the pretreatment of biomass Designed as a textbook for both graduate students and researchers

This thesis presents a theoretical and experimental approach for the rapid fabrication, optimization and testing of holographic sensors for the quantification of pH, organic solvents, metal cations, and glucose in solutions. Developing non-invasive and reusable diagnostics sensors that can be easily manufactured will support the monitoring of high-risk individuals in any clinical or point-of-care setting. Sensor fabrication approaches outlined include silver-halide chemistry, laser ablation and photopolymerization. The sensors employ off-axis Bragg diffraction gratings of ordered silver nanoparticles and localized refractive index changes in poly (2-hydroxyethyl methacrylate) and polyacrylamide films. The sensors exhibited reversible Bragg peak shifts, and diffracted the spectrum of narrow-band light over the wavelength range $\lambda_{\text{peak}} \approx 495\text{-}1100\text{ nm}$. Clinical trials of glucose sensors in the urine samples of diabetic patients demonstrated that

they offer superior performance compared to commercial high-throughput urinalysis devices. Lastly, a generic smartphone application to quantify colorimetric tests was developed and tested for both Android and iOS operating systems. The sensing platform and smartphone application may have implications for the development of low-cost, reusable and equipment-free point-of-care diagnostic devices.

Kenaf fiber is gaining attention as an alternative reinforcement for composite products due to low cost, reduced environmental impact, and attractive mechanical properties. *Kenaf Fibers and Composites* covers the breadth of these exciting materials, from raw material preparation to application in a variety of products. It discusses fiber characterization and properties, how to prepare kenaf-based composites, and design, manufacturing, and applications. It also covers hybrid fiber composites, kenaf fiber thermosetting composites, kenaf fiber thermoplastic composites, kenaf fibers in various lengths, and forms and arrangements such as particulates, continuous roving, and woven fabrics. Cellulose-based kenaf composites and kenaf fiber-filled biopolymer composites are presented.

This book highlights the development and outcomes of research on and practical experience in science education in Taiwan. As the outcomes of the scholarship on science education in Taiwan have garnered attention in science education communities around the world, this book gathers the most relevant research on Taiwan, presenting it in a cohesive overview that will move science education forward in terms of policy, research and practice.

Natural plant fibers fibres are being increasingly used in manufacturing industrial products because of their renewable and biodegradable natures. Kenaf is an annual bast fibre crop that can provide fibres for several industrial applications (composites, insulation mats, absorbents, bedding material, etc.) as well as raw material for energy exploitation (solid biofuels). *Kenaf: A Multi-Purpose Crop for Several Industrial Applications* introduces the physiology and field management of kenaf, agronomy, productivity, harvesting as well as its the industrial and energy uses of this promising non-food crop. Including recent research collected by the BIOKENAF project, *Kenaf: A Multi-Purpose Crop for Several Industrial Applications* provides a global picture of state of the art research and developments with Kenaf from Asia, USA and Australia. This thorough introduction if followed up with an assessment of the crops economic viability as well as an the environmental impact assessment of kenaf. Although not a new crop, *Kenaf: A Multi-Purpose Crop for Several Industrial Applications* provides a comprehensive introduction to this crop and its developing applications for energy engineers, industry managers, politicians and managers working to develop sustainable energy sources and bio-economies.

Gasification is one of the most important advancements that has ever occurred in energy production. Using this technology, for example, coal can be gasified into a product that has roughly half the carbon footprint of coal. On a large scale, gasification

could be considered a revolutionary development, not only prolonging the life of carbon-based fuels, but making them “greener” and cleaner. As long as much of the world still depends on fossil fuels, gasification will be an environmentally friendlier choice for energy production. But gasification is not just used for fossil fuels. Waste products that would normally be dumped into landfills or otherwise disposed of can be converted into energy through the process of gasification. The same is true of biofeedstocks and other types of feedstocks, thus making another argument for the widespread use of gasification. The Handbook of Gasification Technology covers all aspects of the gasification, in a “one-stop shop,” from the basic science of gasification and why it is needed to the energy sources, processes, chemicals, materials, and machinery used in the technology. Whether a veteran engineer or scientist using it as a reference or a professor using it as a textbook, this outstanding new volume is a must-have for any library.

This book provides a detailed description of metal-complex functionalized carbon allotrope forms, including classic (such as graphite), rare (such as M- or T-carbon), and nanoforms (such as carbon nanotubes, nanodiamonds, etc.). Filling a void in the nanotechnology literature, the book presents chapters generalizing the synthesis, structure, properties, and applications of all known carbon allotropes. Metal-complex composites of carbons are described, along with several examples of their preparation and characterization, soluble metal-complex carbon composites, cost-benefit data, metal complexes as precursors of carbon allotropes, and applications. A lab manual on the synthesis and characterization of carbon allotropes and their metal-complex composites is included. Provides a complete description of all carbon allotropes, both classic and rare, as well as carbon nanostructures and their metal-complex composites; Contains a laboratory manual of experiments on the synthesis and characterization of metal-complex carbon composites; Discusses applications in diverse fields, such as catalysis on supporting materials, water treatment, sensors, drug delivery, and devices. Handbook of Nanomaterials for Industrial Applications explores the use of novel nanomaterials in the industrial arena. The book covers nanomaterials and the techniques that can play vital roles in many industrial procedures, such as increasing sensitivity, magnifying precision and improving production limits. In addition, the book stresses that these approaches tend to provide green, sustainable solutions for industrial developments. Finally, the legal, economical and toxicity aspects of nanomaterials are covered in detail, making this is a comprehensive, important resource for anyone wanting to learn more about how nanomaterials are changing the way we create products in modern industry. Demonstrates how cutting-edge developments in nanomaterials translate into real-world innovations in a range of industry sectors Explores how using nanomaterials can help engineers to create innovative consumer products Discusses the legal, economical and toxicity issues arising from the industrial applications of nanomaterials

Since the industrial revolution, chlorine remains an iconic molecule even though its production by the electrolysis of sodium chloride is extremely energy intensive. The rationale behind this book is to present useful and industrially relevant examples for alternatives to chlorine in synthesis. This multi-authored volume presents numerous contributions from an international spectrum of authors that demonstrate how to facilitate the development of industrially relevant and implementable breakthrough

technologies. This volume will interest individuals working in organic synthesis in industry and academia who are working in Green Chemistry and Sustainable Technologies.

The series Topics in Current Chemistry Collections presents critical reviews from the journal Topics in Current Chemistry organized in topical volumes. The scope of coverage is all areas of chemical science including the interfaces with related disciplines such as biology, medicine and materials science. The goal of each thematic volume is to give the non-specialist reader, whether in academia or industry, a comprehensive insight into an area where new research is emerging which is of interest to a larger scientific audience. Each review within the volume critically surveys one aspect of that topic and places it within the context of the volume as a whole. The most significant developments of the last 5 to 10 years are presented using selected examples to illustrate the principles discussed. The coverage is not intended to be an exhaustive summary of the field or include large quantities of data, but should rather be conceptual, concentrating on the methodological thinking that will allow the non-specialist reader to understand the information presented. Contributions also offer an outlook on potential future developments in the field./div Chapters "Sonocatalysis: A Potential Sustainable Pathway for the Valorization of Lignocellulosic Biomass and Derivatives", "Valorisation of Biowastes for the Production of Green Materials Using Chemical Methods" and "Green and Sustainable Separation of Natural Products from Agro-Industrial Waste: Challenges, Potentialities, and Perspectives on Emerging Approaches" are available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

Tietz Textbook of Clinical Chemistry and Molecular Diagnostics - E-BookElsevier Health Sciences

As a follow-up to the Handbook of Gasification Technology, also from Wiley-Scrivener, Synthesis Gas goes into more depth on how the products from this important technology can reduce our global carbon footprint and lead the United States, and other countries, toward energy independence. The environmental benefits are very high, and, along with carbon capture and renewable fuels, synthesis gas (or syngas) is a huge step toward environmental sustainability. Synthesis gas is one of the most important advancements that has ever occurred in energy production. Using this technology, for example, coal, biomass, waste products, or a combination of two or more of these can be gasified into a product that has roughly half the carbon footprint of coal alone. Used on a massive scale, just think of the potential for reducing carbon emissions! Synthesis Gas covers all aspects of the technology, from the chemistry, processes, and production, to the products, feedstocks, and even safety in the plant. Whether a veteran engineer or scientist using it as a reference or a professor using it as a textbook, this outstanding new volume is a must-have for any library.

This book covers all the steps in order to fabricate a lab-on-a-chip device starting from the idea, the design, simulation, fabrication and final evaluation. Additionally, it includes basic theory on microfluidics essential to understand how fluids behave at such reduced scale. Examples of successful histories of lab-on-a-chip systems that made an impact in fields like biomedicine and life sciences are also provided. This book also:

- Provides readers with a unique approach and toolset for lab-on-a-chip development in terms of materials, fabrication techniques, and components
- Discusses novel materials

and techniques, such as paper-based devices and synthesis of chemical compounds on-chip · Covers the four key aspects of development: basic theory, design, fabrication, and testing · Provides readers with a comprehensive list of the most important journals, blogs, forums, and conferences where microfluidics and lab-on-a-chip news, methods, techniques and challenges are presented and discussed, as well as a list of companies providing design and simulation support, components, and/or developing lab-on-a-chip and microfluidic devices.

The book consists of 21 chapters by subject matter experts and is divided into four parts: Soil Microenvironment and Biotransformation Mechanisms; Synergistic effects between substrates and Microbes; Polyhydroxyalakanooates: Resources, Demands and Sustainability; and Cellulose based biomaterials: Benefits and challenges. Included in the chapters are classical bioremediation approaches and advances in the use of nanoparticles for removal of radioactive waste. The book also discusses the production of applied emerging biopolymers using diverse microorganisms. All chapters are supplemented with comprehensive illustrative diagrams and comparative tables.

Since the third edition of this reference was completed, there have been major changes in the global chemical industry. With less emphasis on new processes for making basic chemicals and more emphasis on pollution prevention and waste disposal, petrochemical processes are giving way to biochemical processes. These changes are reflected in the new processes being developed, many of which have their own names. In addition, niche improvements are still being made in petrochemistry, and some of these processes have new names as well. Gathering and defining a large portion of special named processes that may fall outside standard chemical texts or be scattered among industry manuals, Encyclopedic Dictionary of Named Processes in Chemical Technology, Fourth Edition provides a single-source reference on an extensive array of named processes. It provides concise descriptions of those processes in chemical technology that are known by special names that are not self-explanatory. While overviews of the chemical technology industry are present in other books, most of the names defined within this volume are unique to this compilation. This reference includes named processes in current commercial use around the world, processes that have been or are being piloted on a substantial scale, and even obsolete processes that have been important in the past. The length of the dictionary entries reflects their importance and topicality. The text includes references that document the origins of the processes and review the latest developments. Written by a highly experienced and respected author, this user-friendly text is presented in a practical dictionary format that is useful for a broad audience including industrial chemists and engineers.

Production chemistry issues result from changes in well stream fluids, both liquid and gaseous, during processing. Since crude oil production is characterized by variable production rates and unpredictable changes to the nature of the produced fluids, it is essential for production chemists to have a range of chemical additives available for rectifying issues that would not otherwise be fully resolved. Modern production methods, the need to upgrade crude oils of variable quality, and environmental constraints demand chemical solutions. Thus, oilfield production chemicals are necessary to overcome or minimize the effects of the production chemistry problems. Production Chemicals for the Oil and Gas Industry, Second Edition discusses a wide variety of production chemicals used by the oil and gas industry for down-hole and

topside applications both onshore and offshore. Incorporating the large amount of research and applications since the first edition, this new edition reviews all past and present classes of production chemicals, providing numerous difficult-to-obtain references, especially SPE papers and patents. Unlike other texts that focus on how products perform in the field, this book focuses on the specific structures of chemicals that are known to deliver the required or desired performance—information that is very useful for research and development. Each updated chapter begins by introducing a problem, such as scale or corrosion, for which there is a production chemical. The author then briefly discusses all chemical and nonchemical methods to treat the problem and provides in-depth descriptions of the structural classes of relevant production chemicals. He also mentions, when available, the environmental properties of chemicals and whether the chemical or technique has been successfully used in the field. This edition includes two new chapters and nearly 50 percent more references. Since the discovery of graphene, it has become one of the most widely and extensively studied materials. This book aims to summarize the progress in synthesis, processing, characterization and applications of a special group of nanocarbon materials derived from graphene or graphene related derivatives by using various strategies in different forms. More specifically, three forms of macrosized materials are presented, i.e., one-dimension or 1D (fibers, wires, yarns, strands, etc.), two-dimension or 2D (films, membranes, papers, sheets, etc.) and three-dimension or 3D (bulk, hydrogels, aerogels, foams, sponges, etc.). Seven chapters are included with the first chapter serving to introduce the concept, definition, and nomenclature of graphene, graphene oxide and their derivatives. The main topics are covered in Chapters 2-7. Although they have coherent connections, each chapter of them is designed such that they can be studied independently. The target readers of this book include undergraduate students, postgraduate students, researchers, designers, engineers, professors, and program/project managers from the fields of materials science and engineering, applied physics, chemical engineering, biomaterials, materials manufacturing and design, institutes, and research funding agencies.

The sixth volume in a series of handbooks on graphene research and applications *The Handbook of Graphene, Volume 6: Biosensors and Advanced Sensors* discusses the unique benefits that the discovery of graphene has brought to the sensing and biosensing sectors. It examines graphene's use in leading-edge technology applications and the development of a variety of graphene-based sensors. The handbook looks at how graphene can be used as an electrode, substrate, or transducer in sensor design. Graphene-based sensor detection has achieved up to femto-levels, with performances delivering the advantages of greater selectivity, sensitivity, and stability.

The Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 6th Edition provides the most current and authoritative guidance on selecting, performing, and evaluating the results of new and established laboratory tests. This classic clinical chemistry reference offers encyclopedic coverage detailing everything you need to know, including: analytical criteria for the medical usefulness of laboratory tests, variables that affect tests and results, laboratory medicine, applications of statistical methods, and most importantly clinical utility and interpretation of laboratory tests. It is THE definitive reference in clinical chemistry and molecular diagnostics, now fully

searchable and with quarterly content updates, podcasts, clinical cases, animations, and extended content online through Expert Consult. Analytical criteria focus on the medical usefulness of laboratory procedures. Reference ranges show new approaches for establishing these ranges — and provide the latest information on this topic. Lab management and costs gives students and chemists the practical information they need to assess costs, allowing them to do their job more efficiently and effectively. Statistical methods coverage provides you with information critical to the practice of clinical chemistry. Internationally recognized chapter authors are considered among the best in their field. Two-color design highlights important features, illustrations, and content to help you find information easier and faster. NEW! Internationally recognized chapter authors are considered among the best in their field. NEW! Expert Consult features fully searchable text, quarterly content updates, clinical case studies, animations, podcasts, atlases, biochemical calculations, multiple-choice questions, links to Medline, an image collection, and audio interviews. You will now enjoy an online version making utility of this book even greater. UPDATED! Expanded Molecular Diagnostics section with 12 chapters that focus on emerging issues and techniques in the rapidly evolving and important field of molecular diagnostics and genetics ensures this text is on the cutting edge and of the most value. NEW! Comprehensive list of Reference Intervals for children and adults with graphic displays developed using contemporary instrumentation. NEW! Standard and international units of measure make this text appropriate for any user — anywhere in the world. NEW! 22 new chapters that focus on applications of mass spectrometry, hematology, transfusion medicine, microbiology, biobanking, biomarker utility in the pharmaceutical industry and more! NEW! Expert senior editors, Nader Rifai, Carl Wittwer and Rita Horvath, bring fresh perspectives and help ensure the most current information is presented. UPDATED! Thoroughly revised and peer-reviewed chapters provide you with the most current information possible.

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