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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

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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 Glycans have long been known to be one of the most abundant biological molecules in living organisms. They can function as energy compounds, form structural cell wall/matrix polymers, or exist as oligomers that are attached on proteins, lipids and natural products to influence their properties and function. Because of their important biological roles, glycans have great potential for applications in the development of new drugs, materials, food additives and many other products. However, it is often difficult to directly obtain glycans from natural sources with ideal properties for these applications. Thus, modification of glycan structures for desired properties has emerged as an active area of research. This research area is generally called glycoengineering. 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: ·

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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.

Sustainable polymers play an indispensable role in the emergence of green materials, and the 21st century is an era of sustainable polymeric materials. Sustainable polymer-based materials have attracted considerable interest because of the energy crisis and ecological concerns as well as the potential to substitute certain petroleum-derived materials. This book covers the fundamentals of sustainable polymers and presents guidelines in a logical and clear manner for students and researchers to follow. It is a milestone that will help accelerate the progress and advancement in the field of sustainable polymers. The text explores the structure and chemistry of various sustainable polymers, such as cellulose, hemicellulose, lignin, chitosan, starch, guar gum, pectin, and protein, for the possible development of green sustainable materials. Industrial Biorefineries and White Biotechnology provides a comprehensive look at the

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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

?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

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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.

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.

Waste Electrical and Electronic Equipment (WEEE) Handbook, Second Edition, is a

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one-stop reference on current electronic waste legislation initiatives, their impact, and the latest technological considerations for reducing electronic waste (e-waste) and increasing the efficiency of materials recovery. It also provides a wide-range of global and corporate examples and perspectives on the challenges that face specific regions and companies, along with the solutions they are implementing in managing e-waste, offering further insights on how discarded products can be treated. Sections introduce the reader to legislation and initiatives to manage WEEE and discuss technologies for the refurbishment, treatment and recycling of waste electronics. Further sections focus on electronic products that present particular challenges for recyclers, explore sustainable design of electronics and supply chains, discuss national and regional WEEE management schemes, and more. Addresses the latest challenges and opportunities for electronic waste (e-waste) management, including e-waste collection models, circular economy implications, rare earth metal recovery, and much more. Draws lessons for waste electrical and electronic equipment (WEEE) policy and practice from around the world. Discusses legislation and initiatives to manage WEEE, including global e-waste initiatives, EU legislation relating to electronic waste, and eco-efficiency evaluation of WEEE take-back systems.

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

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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 This widely respected and frequently consulted reference work provides a wealth of information and guidance on industrial chemistry and biotechnology. Industries covered span the spectrum from salt and soda ash to advanced dyes chemistry, the nuclear industry, the rapidly evolving biotechnology industry, and, most recently, electrochemical energy storage devices and fuel cell science and technology. Other

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topics of surpassing interest to the world at large are covered in chapters on fertilizers and food production, pesticide manufacture and use, and the principles of sustainable chemical practice, referred to as green chemistry. Finally, considerable space and attention in the Handbook are devoted to the subjects of safety and emergency preparedness. It is worth noting that virtually all of the chapters are written by individuals who are embedded in the industries whereof they write so knowledgeably. New materials hold the key to fundamental advances in energy conversion and storage, both of which are vital in order to meet the challenge of global warming and the finite nature of fossil fuels. Nanomaterials in particular offer unique properties or combinations of properties as electrodes and electrolytes in a range of energy devices. Supercapacitors have been widely acknowledged to be promising devices for energy storage. This book describes the latest progress in the discovery and development of nanoelectrolytes and nanoelectrodes for supercapacitor applications.

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

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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

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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. Electrochemical Energy: Advanced Materials and Technologies covers the development of advanced materials and technologies for electrochemical energy conversion and storage. The book was created by participants of the International Conference on Electrochemical Materials and Technologies for Clean Sustainable Energy (ICES-2013) held in Guangzhou, China, and incorporates select papers presented at the conference. More than 300 attendees from across the globe participated in ICES-2013 and gave presentations in six major themes: Fuel cells and hydrogen energy Lithium batteries and advanced secondary batteries Green energy for a clean environment Photo-Electrocatalysis Supercapacitors Electrochemical clean energy applications and markets Comprised of eight sections, this book includes 25 chapters featuring highlights from the conference and covering every facet of synthesis, characterization, and performance evaluation of the advanced materials for electrochemical energy. It thoroughly describes electrochemical energy conversion and

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storage technologies such as batteries, fuel cells, supercapacitors, hydrogen generation, and their associated materials. The book contains a number of topics that include electrochemical processes, materials, components, assembly and manufacturing, and degradation mechanisms. It also addresses challenges related to cost and performance, provides varying perspectives, and emphasizes existing and emerging solutions. The result of a conference encouraging enhanced research collaboration among members of the electrochemical energy community, *Electrochemical Energy: Advanced Materials and Technologies* is dedicated to the development of advanced materials and technologies for electrochemical energy conversion and storage and details the technologies, current achievements, and future directions in the field.

Driven both by real industrial needs and curiosity for fundamental research, edible oil structuring has emerged as a subject of growing interest with applications in real food systems. With contributions from leading research groups around the world, this book provides a comprehensive and concise overview of the field with special emphasis on the updates from the last 5 years. New insights into the mechanism of gelation in mono- and multicomponent gels are discussed for several categories of previously known structuring agents along with the potential food applications of some of these systems. In addition, use of alternative methods to explore structuring properties of hydrophilic biopolymers are presented with illustrative examples. Some new concepts such as bio-

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based synthesis of supergelators, foamed oleogels and use of innovative dispersion techniques give a broader picture of the current research in edible oil structuring. This book will be of interest to students, academics and scientists involved in the research of edible oil structuring. It will be an important reference as it provides current information on the state-of-the-art of the field.

Cellular Structures—Advances in Research and Application: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Cellular Structures. The editors have built Cellular Structures—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Cellular Structures in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Cellular Structures—Advances in Research and Application: 2012 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 definitive guide to organic coatings, thoroughly revised and updated—now with coverage of a range of topics not covered in previous editions Organic Coatings:

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Science and Technology, Fourth Edition offers unparalleled coverage of organic coatings technology and its many applications. Written by three leading industry experts (including a new, internationally-recognized coatings scientist) it presents a systematic survey of the field, revises and updates the material from the previous edition, and features new or additional treatment of such topics as superhydrophobic, ice-phobic, antimicrobial, and self-healing coatings; sustainability, artist paints, and exterior architectural primers. making it even more relevant and useful for scientists and engineers in the field, as well as for students in coatings courses. The book incorporates up-to-date coverage of recent developments in the field with detailed discussions of the principles underlying the technology and their applications in the development, production, and uses of organic coatings. All chapters in this new edition have been updated to assure consistency and to enable extensive cross-referencing. The material presented is also applicable to the related areas of printing inks and adhesives, as well as areas within the plastics industry. This new edition Completely revises outdated chapters to ensure consistency and to enable extensive cross-referencing Correlates the empirical technology of coatings with the underlying science throughout Provides expert troubleshooting guidance for coatings scientists and technologists Features hundreds of illustrative figures and extensive references to the literature A new, internationally-recognized coatings scientist brings fresh perspective to the content. Providing a broad overview for beginners in the field of organic coatings

and a handy reference for seasoned professionals, *Organic Coatings: Science and Technology*, Fourth Edition, gives you the information and answers you need, when you need them.

Functional diversity and molecular architecture in biologically active oxindoles. Transition metal-catalyzed intramolecular Heck reactions and amide α -arylations. Asymmetric rearrangements of O-carbonylated oxindoles and related processes. Amination, hydroxylation, and halogenation reactions of 3-substituted oxindoles. Conjugate addition and alkylation reactions of 3-substituted oxindoles. Asymmetric aldol and Mannich reactions of isatins. Michael additions to isatin-derived electron-deficient alkynes. Nucleophilic substitution reactions of functionalized 3-substituted oxindoles. Enantioselective construction of spirooxindoles by cycloaddition, annulation, and cascade cyclization reactions of methyleneindolinone derivatives. The 3,3-disubstituted-2-oxindole moiety is present in many chiral alkaloids that exhibit interesting biological activities. The enantioselective synthesis of chiral oxindole derivatives has been mainly achieved by asymmetric catalytic methods. In this review we highlight the most important catalytic methods relevant to the synthesis of chiral, non-spirocyclic 3,3-disubstituted oxindoles.

Lab-on-a-Chip Devices and Micro-Total Analysis Systems A Practical

GuideSpringer

Volume 17, entitled Lead: Its Effects on Environment and Health of the series Metal Ions in Life Sciences centers on the interrelations between biosystems and lead. The book provides an up-to-date review of the bioinorganic chemistry of this metal and its ions; it covers the biogeochemistry of lead, its use (not only as gasoline additive) and anthropogenic release into the environment, its cycling and speciation in the atmosphere, in waters, soils, and sediments, and also in mammalian organs. The analytical tools to determine and to quantify this toxic element in blood, saliva, urine, hair, etc. are described. The properties of lead(II) complexes formed with amino acids, peptides, proteins (including metallothioneins), nucleobases, nucleotides, nucleic acids, and other ligands of biological relevance are summarized for the solid state and for aqueous solutions as well. All this is important for obtaining a coherent picture on the properties of lead, its effects on plants and toxic actions on mammalian organs. This and more is treated in an authoritative and timely manner in the 16 stimulating chapters of Volume 17, which are written by 36 internationally recognized experts from 13 nations. The impact of this recently again vibrant research area is manifested in nearly 2000 references, over 50 tables and more than 100 illustrations (half in color). Lead: Its Effects on Environment and Health is an essential resource for

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scientists working in the wide range from material sciences, inorganic biochemistry all the way through to medicine including the clinic ... not forgetting that it also provides excellent information for teaching.

Graphene is the strongest material ever studied and can be an efficient substitute for silicon. This six-volume handbook focuses on fabrication methods, nanostructure and atomic arrangement, electrical and optical properties, mechanical and chemical properties, size-dependent properties, and applications and industrialization. There is no other major reference work of this scope on the topic of graphene, which is one of the most researched materials of the twenty-first century. The set includes contributions from top researchers in the field and a foreword written by two Nobel laureates in physics. Volumes in the set: K20503 Graphene Science Handbook: Mechanical and Chemical Properties (ISBN: 9781466591233) K20505 Graphene Science Handbook: Fabrication Methods (ISBN: 9781466591271) K20507 Graphene Science Handbook: Electrical and Optical Properties (ISBN: 9781466591318) K20508 Graphene Science Handbook: Applications and Industrialization (ISBN: 9781466591332) K20509 Graphene Science Handbook: Size-Dependent Properties (ISBN: 9781466591356) K20510 Graphene Science Handbook: Nanostructure and Atomic Arrangement (ISBN: 9781466591370)

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Authored by two longtime researchers in tobacco science, *The Chemical Components of Tobacco and Tobacco Smoke, Second Edition* chronicles the progress made from late 2008 through 2011 by scientists in the field of tobacco science. The book examines the isolation and characterization of each component. It explores developments in pertinent analytical

Carbon-Based Polymer Nanocomposites for Environmental and Energy Applications provides the fundamental physico-chemical characterizations of recently explored carbon-based polymer nanocomposites, such as carbon nanotubes, graphene and its derivatives, nanodiamond, fullerenes and other nano-sized carbon allotropes. The book also covers the applications of carbon-based polymer nanocomposite in the environmental and energy fields. Topics range from the various approaches that have been explored and developed for the fabrication of carbon-based polymer nanocomposite, to their applications in tackling environmental and energy related issues. Provides a clear picture of the current state-of-the-art and future trends in carbon-based polymer nanomaterials Explains the interactions between nanofiller-polymer matrices and mechanisms related to applications in environmental pollution and energy shortage Includes computational and experimental studies of the physical and chemical properties of carbon-based polymer nanocomposites Features chapters written by world

leading experts

This is an important handbook for anyone wishing to get a comprehensive view of graphene nanocomposites and bring established methodologies into their laboratory.

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

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energy engineers, industry managers, politicians and managers working to develop sustainable energy sources and bio-economies.

Scorpion Venoms—Advances in Research and Application: 2012 Edition is a ScholarlyPaper™ that delivers timely, authoritative, and intensively focused information about Scorpion Venoms in a compact format. The editors have built Scorpion Venoms—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Scorpion Venoms in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Scorpion Venoms—Advances in Research and Application: 2012 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/>.

This book discusses the methods synthesizing various carbon materials, like graphite, carbon blacks, carbon fibers, carbon nanotubes, and graphene. It also details different functionalization and modification processes used to improve the properties of these materials and composites. From a geometrical–structural point of view, it examines different properties of the composites, such as mechanical, electrical, dielectric,

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thermal, rheological, morphological, spectroscopic, electronic, optical, and toxic, and describes the effects of carbon types and their geometrical structure on the properties and applications of composites.

Chemical Engineering III includes the proceedings of the 3rd SREE Conference on Chemical Engineering (CCE 2013, Hong Kong, 28-29 December 2013) and the 2nd SREE Workshop on Energy, Environment and Engineering (WEEE 2013, which was a part of CCE 2013). The contributions discuss current practical challenges and solutions in Chemical Engineering, and

Issues in Medical Chemistry / 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Medicinal Chemistry. The editors have built Issues in Medical Chemistry: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Medicinal Chemistry in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Medical Chemistry: 2012 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/>.

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The CRC Concise Encyclopedia of Nanotechnology sets the standard against which all other references of this nature are measured. As such, it is a major resource for both skilled professionals and novices to nanotechnology. The book examines the design, application, and utilization of devices, techniques, and technologies critical to research at the

An In-Depth Look at the Outstanding Properties 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 supe

Globally, lithium ion batteries (LIBs) are leaders in the energy storage sector but there are concerns regarding load leveling of renewable energy sources as well as smart grids and limited availability of lithium resources resulting in cost increase. Therefore, sodium ion batteries (SIBs) are being researched as next-generation alternatives to LIBs due to their similar sustainability and electrochemistry. This book mainly focuses on the current research on electrode materials and proposes future directions for SIBs to meet the current challenges associated with the full cell aspect. Further, it provide insights into scientific and practical issues in the development of SIBs.

The unique structures and properties of dendrimers make them attractive for many applications, from drug delivery and antimicrobial agents to catalysis and as functional

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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.

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

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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 presents emerging economical and environmentally friendly polymer composites that are free of the side effects observed in traditional composites. It focuses on eco-friendly composite materials using granulated cork, a by-product of the cork industry; cellulose pulp from the recycling of paper residues; hemp fibers; and a range of other environmentally friendly materials procured from various sources. The book presents the manufacturing methods, properties and characterization techniques of these eco-friendly composites. The respective chapters address classical and recent aspects of eco-friendly polymer composites and their

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chemistry, along with practical applications in the biomedical, pharmaceutical, automotive and other sectors. Topics addressed include the fundamentals, processing, properties, practicality, drawbacks and advantages of eco-friendly polymer composites. Featuring contributions by experts in the field with a variety of backgrounds and specialties, the book will appeal to researchers and students in the fields of materials science and environmental science. Moreover, it fills the gap between research work in the laboratory and practical applications in related industries.

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

This expanded second edition provides a concise overview of the main principles and reactions of heterocyclic chemistry for undergraduate students studying chemistry and related courses. Using a successful and student-friendly "at a glance" approach, this book helps the

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student grasp the essence of heterocyclic chemistry, ensuring that they can confidently use that knowledge when required. The chapters are thoroughly revised and updated with references to books and reviews; extra examples and student exercises with answers online; and color diagrams that emphasize exactly what is happening in the reaction chemistry depicted.

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.

Since the discovery of graphene, it has become one of the most widely and extensively studied

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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.

This book is a compilation of papers presented at the Regional Tribology Conference 2011 (RTC2011) - Langkawi, Malaysia on 22 ~ 24 November 2011.

This PhD thesis presents the latest findings on the tunable surface chemistry of graphene/graphene oxide by systematically investigating the tuning of oxygen and nitrogen containing functional groups using an innovative carbonization and ammonia treatment. In addition, novel macroscopic assemblies or hybrids of graphene were produced, laying the theoretical foundation for developing graphene-based energy storage devices. This work will be of interest to university researchers, R&D engineers and graduate students working with

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carbon materials, energy storage and nanotechnology.

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