

[Book] Zeolites In Sustainable Chemistry Synthesis Characterization And Catalytic Applications Green Chemistry And Sustainable Technology

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[Zeolites in Sustainable Chemistry](#)-Feng-Shou Xiao 2015-09-28

This book is devoted to the new development of zeolitic catalysts with an emphasis on new strategies for the preparation of zeolites, novel techniques for their characterization and emerging applications of zeolites as catalysts for sustainable chemistry, especially in the fields of energy, biomass conversion and environmental protection. Over the years, energy and the environment have become the most important global issues, while zeolitic catalysts play important roles in addressing them. With individual chapters written by leading experts, this book offers an essential reference work for researchers and professionals in both academia and industry. Feng-Shou Xiao is a Professor at the Department of Chemistry, Zhejiang University, China. Xiangju Meng is an Associate Professor at the Department of Chemistry, Zhejiang University, China.

Nanoparticle Design and Characterization for Catalytic Applications in Sustainable Chemistry-Rafael Luque 2019-10-05

This book presents an introduction to the preparation and characterisation of nanomaterials and their design for specific catalytic applications.

Zeolite Chemistry and Applications-Benoit Louis 2020-04-20

[Sustainable Nanoscale Engineering](#)-Gyorgy Szekely 2019-09-18

Sustainable Nanoscale Engineering: From Materials Design to Chemical Processing presents the latest on the design of nanoscale materials and their applications in sustainable chemical production processes. The newest achievements of materials science, in particular nanomaterials, opened new opportunities for chemical engineers to design more efficient, safe, compact and environmentally benign processes. These materials include metal-organic frameworks, graphene, membranes, imprinted polymers, polymers of intrinsic microporosity, nanoparticles, and nanofilms, to name a few. Topics discussed include gas separation, CO₂ sequestration, continuous processes, waste valorization, catalytic processes, bioengineering, pharmaceutical manufacturing, supercritical CO₂ technology, sustainable energy, molecular imprinting, graphene, nature inspired chemical engineering, desalination, and more. Describes new, efficient and environmentally accepted processes for nanomaterials design Includes a large array of materials, such as metal-organic frameworks, graphene, imprinted polymers, and more Explores the contribution of these materials in the development of sustainable chemical processes

Green Chemistry and Catalysis-R. A. Sheldon 2007-06-27

This first book to focus on catalytic processes from the viewpoint of green chemistry presents every important aspect: · Numerous catalytic reductions and oxidations methods · Solid-acid and solid-base catalysis · C-C bond formation reactions · Biocatalysis · Asymmetric catalysis · Novel reaction media like e.g. ionic liquids, supercritical CO₂ · Renewable raw materials Written by Roger A. Sheldon -- without doubt one of the leaders in the field with much experience in academia and industry -- and his co-workers, the result is a unified whole, an indispensable source for every scientist looking to improve catalytic reactions, whether in the college or company lab.

Heterogeneous Catalysis for Sustainable Energy-Landong Li 2022-05-03

Heterogeneous Catalysis for Sustainable Energy Explore the state-of-the-art in heterogeneous catalysis In Heterogeneous Catalysis for Sustainable Energy, a team of distinguished researchers delivers a comprehensive and cutting-edge treatment of recent advancements in energy-related catalytic reactions and processes in the field of heterogeneous catalysis. The book includes extensive coverage of the hydrogen economy, methane activation, methanol-to-hydrocarbons, carbon dioxide conversion, and biomass conversion. The authors explore different aspects of the technology, like reaction mechanisms, catalyst synthesis, and the commercial status of the reactions. The book also includes: A thorough introduction to the hydrogen economy, including hydrogen production, the reforming of oxygen-containing chemicals, and advances in Fischer-Tropsch Synthesis Comprehensive explorations of methane activation, including steam and dry reforming of methane and methane activation over zeolite catalysts Practical discussions of alkane activation, including cracking of hydrocarbons to light olefins and catalytic dehydrogenation of light alkanes In-depth examinations of zeolite catalysis and carbon dioxide as C1 building block Perfect for catalytic, physical, and surface chemists, Heterogeneous Catalysis for Sustainable Energy also belongs in the libraries of materials scientists with an interest in energy-related reactions and processes in the field of heterogeneous catalysis.

Zeolites and Zeolite-like Materials-Bert Sels 2016-07-29

Zeolites and Zeolite-like Materials offers a comprehensive and up-to-date review of the important areas of zeolite synthesis, characterization, and applications. Its chapters are written in an educational, easy-to-understand format for a generation of young zeolite chemists, especially those who are just starting research on the topic and need a reference that not only reflects the current state of zeolite research, but also identifies gaps and opportunities. The book demonstrates various applications of zeolites in heterogeneous catalysis and biomass conversion and identifies the endless possibilities that exist for this class of materials, their structures, functions, and future applications. In addition, it demonstrates that zeolite-like materials should be regarded as a living body developing towards new modern applications, thereby responding to the needs of modern technology challenges, including biomass conversion, medicine, laser techniques, and nanomaterial design, etc. The book will be of interest not only to zeolite-focused researchers, but also to a broad scientific and non-scientific audience. Provides a comprehensive review of the literature pertaining to zeolites and zeolite-like materials since 2000

Covers the chemistry of novel zeolite-like materials such as Metal-Organic Frameworks (MOFs), Covalent Organic Frameworks (COFs), hierarchical zeolite materials, new mesoporous and composite zeolite-like micro/mesoporous materials Presents essential information of the new zeolite-like structures, with a balanced coverage of the most important areas of the zeolite research (synthesis, characterization, adsorption, catalysis, new applications of zeolites and zeolite-like materials) Contains chapters prepared by known specialists who are members of the International Zeolite Association

Heterogeneous Catalysis in Sustainable Synthesis-Bela Torok 2021-09-17

Heterogeneous Catalysis in Sustainable Synthesis is a practical guide to the use of solid catalysts in synthetic chemistry that focuses on environmentally benign applications. Collating essential information on solid catalysts into a single volume, it reveals how the efficient use of heterogeneous catalysts in synthetic chemistry can support sustainable applications. Beginning with a review of the fundamentals of heterogeneous catalytic synthesis, the book then explores the basic concepts of heterogeneous catalytic reactions from adsorption to catalyst poisons, the use of non-traditional activation methods, recommended solvents, the major types of both metal and non-metal solid catalysts, and applications of these catalysts in sustainable synthesis. Based on the extensive experience of its expert author, this book aims to encourage and support synthetic chemists in using solid catalysts in their own work, while also highlighting the important link between heterogeneous catalysis and sustainability to all those interested. Combines foundational knowledge with a focus on practical applications Organizes information by reaction type, allowing readers to easily find examples of how to carry out specific reaction types with solid catalysts Highlights emerging areas such as nanoparticle catalysis and metal-organic framework (MOF) based catalysts

Catalysis for Clean Energy and Environmental Sustainability-K. K. Pant 2021-05-13

This book is part of a two-volume work that offers a unique blend of information on realistic evaluations of catalyst-based synthesis processes using green chemistry principles and the environmental sustainability applications of such processes for biomass conversion, refining, and petrochemical production. The volumes provide a comprehensive resource of state-of-the-art technologies and green chemistry methodologies from researchers, academics, and chemical and manufacturing industrial scientists. The work will be of interest to professors, researchers, and practitioners in clean energy catalysis, green chemistry, chemical engineering and manufacturing, and environmental sustainability. This volume focuses on the potentials, recent advances, and future prospects of catalysis for biomass conversion and value-added chemicals production via green catalytic routes. Readers are presented with a mechanistic framework assessing the development of product selective catalytic processes for biomass and biomass-derived feedstock conversion. The book offers a unique combination of contributions from experts working on both lab-scale and industrial catalytic processes and provides insight into the use of various catalytic materials (e.g., mineral acids, heteropolyacid, metal catalysts, zeolites, metal oxides) for clean energy production and environmental sustainability.

Chemistry of Zeolites and Related Porous Materials-Ruren Xu 2009-05-29

Widely used in adsorption, catalysis and ion exchange, the family of molecular sieves such as zeolites has been greatly extended and many advances have recently been achieved in the field of molecular sieves synthesis and related porous materials. Chemistry of Zeolites and Related Porous Materials focuses on the synthetic and structural chemistry of the major types of molecular sieves. It offers a systematic introduction to and an in-depth discussion of microporous, mesoporous, and macroporous materials and also includes metal-organic frameworks. Provides focused coverage of the key aspects of molecular sieves Features two frontier subjects: molecular engineering and host-guest advanced materials Comprehensively covers both theory and application with particular emphasis on industrial uses This book is essential reading for researchers in the chemical and materials industries and research

institutions. The book is also indispensable for researchers and engineers in R&D (for catalysis) divisions of companies in petroleum refining and the petrochemical and fine chemical industries.

Catalysis from A to Z-Boy Cornils 2019-11-11

Provides a complete and accessible A to Z collection of information on catalysis This updated and enlarged must-have edition of a classic book on catalysis explains the important terms of all aspects of the subject - including biocatalysis, homogeneous catalysis, heterogeneous catalysis - as well as the terms associated with it. It also looks at related topics like spectroscopy or analytical methods. Featuring 20% more content than the previous edition, it comprehensively covers the topic in a clear and concise manner, and includes abbreviations, brief biographic entries of important scientists who have worked in catalysis, trade names, important catalytic processes, named reactions, reactions, and other important keywords in the general field of catalysis. Written by more than 200 top scientists and with more than 15,000 entries on all aspects of catalysis, *Catalysis from A to Z: A Concise Encyclopedia*, 5th Edition is filled with figures, tables, cross-references, and references. It covers acids, ligands, catalytic reactions in organic synthesis, kinetics and thermodynamics of catalytic reactions, and catalyst labeling. The book also looks at theoretical backgrounds of catalytic reactions, industrial catalytic processes, autoclaves, colloids, nanomaterials, spectroscopically methods for catalyst analysis, and more. -Provides all the knowledge scientists need to know about homogeneous, heterogeneous, and biochemical catalysis -Includes more than 15,000 keywords in compact entries -Newly updated and expanded edition of the bestselling classic -Comprehensive, succinct, and easy to use -Edited by an experienced team of top editors and authors with contributions from over 200 scientific experts -Offers German and French translations of the keywords to help students and non-native English speakers *Catalysis from A to Z: A Concise Encyclopedia* is an ideal resource for every student, chemist, scientist, and engineer involved in catalytic chemistry, chemical engineering, biochemistry, organic chemistry, and more.

Nanosponges-Francesco Trotta 2019-02-05

An excellent overview of the field, covering in detail a wide range of different types of constituent materials, such as polymers, metals and metal oxides. It discusses their production and synthetic routes, as well as applications in several areas, including catalysis, drug delivery and environmental science. A must-have for scientists in academia and industry, as well as a valuable resource for both newcomers and more established researchers working in the field.

Green Chemical-Iyad Karamé 2017-07-05

Sustainable development and alternative energy constituted urgent needs in the last decade. Renewable chemicals, energy and bio-resource use became challenging topics in the sustainable, renewable and green sciences. This encourages and turns primordial needs the works in certain fields as developing of new and green catalysts for chemical transformations, in the domains of energy, environmental, pharmaceutical, agro-alimentary and cosmetically applications; evaluation of bio-resources compounds largely available for many applications in energy or as additives to fuels and other applications, reduction and conversion of greenhouse gas as well as developing new synthesis routes by avoiding the use of toxic and environmentally damage materials. In this book, the recent sustainable and green process is presented in three sections: "Greenhouse Gas Conversion Efficiency in Microwave", "Biomass Green Process" and "Green Synthesis and Catalysis".

Hydrocarbon Chemistry, 2 Volume Set-George A. Olah 2017-10-02

This book provides an unparalleled contemporary assessment of hydrocarbon chemistry - presenting basic concepts, current research, and future applications. • Comprehensive and updated review and discussion of the field of hydrocarbon chemistry • Includes literature coverage since the publication of

the previous edition • Expands or adds coverage of: carboxylation, sustainable hydrocarbons, extraterrestrial hydrocarbons • Addresses a topic of special relevance in contemporary science, since hydrocarbons play a role as a possible replacement for coal, petroleum oil, and natural gas as well as their environmentally safe use • Reviews of prior edition: "...literature coverage is comprehensive and ideal for quickly reviewing specific topics...of most value to industrial chemists..." (Angewandte Chemie) and "...useful for chemical engineers as well as engineers in the chemical and petrochemical industries." (Petroleum Science and Technology)

Recent Advances in the Science and Technology of Zeolites and Related Materials-C. Claeys 2004

Recent Advances in Science and Technology of Zeolites and Related Materials is a collection of oral and poster communications, presented during the 14th International Zeolite Conference (IZC). The conference was hosted by the Catalysis Society of South Africa. In the tradition of the IZC series, this Conference provides a forum for the presentation of new knowledge in the science and technology of zeolites and related materials. Papers presented cover a wide range of topics that include synthesis, structure determination, characterisation, modelling, and catalysis. This highly visual book is a must for readers looking to stay up-to-date on zeolite science. * This three-part volume provides valuable information on zeolites and related materials * Includes papers that cover topics such as structure determination, modelling and separation processes * Contains new and exciting developments in the field

Green Chemistry-Noel Harris 2019-09-21

Green Chemistry concerned with chemical research and engineering that encourages the design of products and processes that minimize the use and generation of hazardous substances. It is effective in controlling the impact of chemicals on human health and the environment. Chemists and chemical engineers applying green chemistry look at the entire life cycle of a product or process, from the origins of the materials used for manufacturing to the ultimate fate of the materials after they have finished their useful life. This book is written especially for researchers at various levels e.g. in industry, R&D Laboratories, University and College laboratories etc. It describes a large number of organic reactions under green conditions. The conditions used are aqueous phase, using PTC catalyst, sonication and microwave technologies.

Bioenergy Systems for the Future-Francesco Dalena 2017-06-19

Bioenergy Systems for the Future: Prospects for Biofuels and Biohydrogen examines the current advances in biomass conversion technologies for biofuels and biohydrogen production, including their advantages and challenges for real-world application and industrial-scale implementation. In its first part, the book explores the use of lignocellulosic biomass and agricultural wastes as feedstock, also addressing biomass conversion into biofuels, such as bioethanol, biodiesel, bio-methane, and bio-gasoline. The chapters in Part II cover several different pathways for hydrogen production, from biomass, including bioethanol and bio-methane reforming and syngas conversion. They also include a comparison between the most recent conversion technologies and conventional approaches for hydrogen production. Part III presents the status of advanced bioenergy technologies, such as applications of nanotechnology and the use of bio-alcohol in low-temperature fuel cells. The role of advanced bioenergy in a future bioeconomy and the integration of these technologies into existing systems are also discussed, providing a comprehensive, application-oriented overview that is ideal for engineering professionals, researchers, and graduate students involved in bioenergy. Explores the most recent technologies for advanced liquid and gaseous biofuels production, along with their advantages and challenges Presents real-life application of conversion technologies and their integration in existing systems Includes the most promising pathways for sustainable hydrogen production for energy applications

Nanoparticle Design and Characterization for Catalytic Applications in Sustainable Chemistry-Rafael Luque 2019-05-10

Nanoparticles exhibit a range of different properties when compared to bulk materials. Their high surface-area to volume ratio makes them particularly attractive for use as catalysts and recent years have seen an explosion of research in this area. The ability to fine-tune the size and structure of nanoparticles means that it is possible to design catalytic materials for improved activity or specificity. As catalysis is one of the key technologies for more sustainable production of both chemicals and energy, the past few years have seen increasing numbers of nanomaterials reported for these applications. Depending on the application, a number of different catalyst synthesis and optimization protocols can be used. This book provides comprehensive links between the design and fabrication method for nanoparticles and their catalytic performance (activity, selectivity and stability) in various applications. Presenting an introduction to the concept of catalyst design and recent developments in the preparation and characterisation of nanomaterials, followed by several chapters on the design of catalysts for specific applications, this book is a valuable resource for researchers working on catalytic reactions, industrial processes and nanomaterial applications.

Sustainable Industrial Chemistry-Fabrizio Cavani 2009-09-22

In recent years the need for sustainable process design and alternative reaction routes to reduce industry's impact on the environment has gained vital importance. The book begins with a general overview of new trends in designing industrial chemical processes which are environmentally friendly and economically feasible. Specific examples written by experts from industry cover the possibilities of running industrial chemical processes in a sustainable manner and provide an up-to-date insight into the main concerns, e.g., the use of renewable raw materials, the use of alternative energy sources in chemical processes, the design of intrinsically safe processes, microreactor and integrated reaction/separation technologies, process intensification, waste reduction, new catalytic routes and/or solvent and process optimization.

Green Synthetic Approaches for Biologically Relevant Heterocycles-Goutam Brahmachari 2021-02-26

Green Synthetic Approaches for Biologically Relevant Heterocycles, Second Edition, Volume Two: Green Catalytic Systems and Solvents reviews this significant group of organic compounds within the context of sustainable methods and processes, expanding on the first edition with fully updated coverage and a whole range of new chapters. Volume Two explores green catalytic systems and solvents and the techniques surrounding this approach, including metal and magnetic catalysis to organocatalysis and solid acid catalysis, cycloaddition reactions, and varied approaches using ionic liquids. This updated edition is an essential resource on sustainable approaches for academic researchers, R&D professionals, and students working across medicinal, organic, natural product and green chemistry. Provides fully updated coverage of the field with an emphasis on sustainability Highlights a range of different eco-friendly solvents and environmentally-friendly catalysts Collates the experience of a global team of expert contributors

Zeolite Synthesis-Mario L. Occelli 1989

This volume is a complete progress report on the various aspects of zeolite synthesis on a molecular level. It provides many examples that illustrate how zeolites can be crystallized and what the important parameters are that control crystallization. Forty-two chapters cover such topics as: crystallization techniques; gel chemistry; crystal size and morphology; the role of organic compounds; and novel synthesis procedures. It offers a complete review of zeolite synthesis as well as the latest finding in this important field. Contains benchmark contributions from many notable pioneers in the field, including R.M. Barrer, H. Robson, and Robert Milton.

Green Chemistry-Bela Torok 2017-11-07

Green Chemistry: An Inclusive Approach provides a broad overview of green chemistry for researchers from either an environmental science or chemistry background, starting at a more elementary level, incorporating more advanced concepts, and including more chemistry as the book progresses. Every chapter includes recent, state-of-the-art references, in particular, review articles, to introduce researchers to this field of interest and provide them with information that can be easily built upon. By bringing together experts in multiple subdisciplines of green chemistry, the editors have curated a single central resource for an introduction to the discipline as a whole. Topics include a broad array of research fields, including the chemistry of Earth's atmosphere, water and soil, the synthesis of fine chemicals, and sections on pharmaceuticals, plastics, energy related issues (energy storage, fuel cells, solar, and wind energy conversion etc.), greenhouse gases and their handling, chemical toxicology issues of everyday products (from perfumes to detergents or clothing), and environmental policy issues. Introduces the topic of green chemistry with an overview of key concepts Expands upon presented concepts with the latest research and applications, providing both the breadth and depth researchers need Includes a broad range of application based problems to make the content accessible for professional researchers and undergraduate and graduate students Authored by experts in a broad range of fields, providing insider information on the aspects or challenges of a given field that are most important and urgent

Biomass, Biofuels, Biochemicals-S. Saravanamurugan 2019-10-23

Biomass, Biofuels, Biochemicals: Recent Advances in Development of Platform Chemicals provides a detailed overview on the experimentally developed methods that facilitate platform chemicals derivation from biomass-based substrates with robust catalyst systems. In addition, the book highlights the green chemistry approach towards platform chemical production. Chapters discuss platform chemicals and global market volumes, the optimization of process schemes and reaction parameters with respect to achieving a high yield of targeted platform chemicals, such as sugars and furonic compounds by modifying the respective catalytic system, the influence of solvents on reaction selectivity and product distribution, and the long-term stability of employed catalysts. Overall, the objectives of the book are to provide the reader with an understanding of the societal importance of platform chemicals, an assessment of the techno-economic viability of biomass valorization processes, catalyst design for a specific reaction, and the design of a catalytic system. Covers recent developments on platform chemicals Provides comprehensive technological developments on specific platform chemicals Covers organic transformations, catalytic synthesis, thermal stability, reaction parameters and solvent effect Includes case studies on the production of a number of chemicals, such as Levulinic acid, glycerol, phenol derivatives, and more

Innovations in Green Chemistry and Green Engineering-Paul T. Anastas 2012-12-13

Processes that meet the objectives of green chemistry and chemical engineering minimize waste and energy use, and eliminate toxic by-products. Given the ubiquitous nature of products from chemical processes in our lives, green chemistry and chemical engineering are vital components of any sustainable future. Gathering together ten peer-reviewed articles from the Encyclopedia of Sustainability Science and Technology, Innovations in Green Chemistry and Green Engineering provides a comprehensive introduction to the state-of-the-art in this key area of sustainability research. Worldwide experts present the latest developments on topics ranging from organic batteries and green catalytic transformations to green nanoscience and nanotoxicology. An essential, one-stop reference for professionals in research and industry, this book also fills the need for an authoritative course text in environmental and green chemistry and chemical engineering at the upper-division undergraduate and graduate levels.

Recent Advances in the Science and Technology of Zeolites and Related Materials- 2004-12-18

Recent Advances in the Science and Technology of Zeolites and Related Materials

Methods and Reagents for Green Chemistry-Alvise Perosa 2007-05-25

This book aims to stimulate and promote the wide-ranging aspects of green chemistry and its major role in ensuring sustainable development. The book covers the following areas: green chemistry; green reagents and atom economy; safeguarding the atmosphere; industrial green catalysis; alternative reaction conditions; biocatalysis and green chemistry. This book is based on the third edition of the Collection of Lectures of the Summer Schools on Green Chemistry held in Venice, Italy in the summers of 1998-2003 (sponsored by the European Commission, TMR and Improving Programmes and carried out by the Consortzio Interuniversitario La Chimica per l'Ambiente).

Advances in Geopolymer-Zeolite Composites-Petrică Vizureanu 2021-10-13

Geopolymers and zeolites as eco-friendly materials can participate in cutting-edge research and applications due to their tailored properties, including superabsorbent capacity, heavy metals encapsulation, flame retardancy, mechanical performance, electrokinetic behaviour, corrosion resistance, and thermal properties. This book joins activities and knowledge of researchers from multiple fields to present a comprehensive overview of the advances in synthesis and characterization of geopolymers and zeolites, including base chemistry concepts, nanoscale characterization, and applications in top-level industry.

Synthesis of Redox Catalysts for Green Chemistry-Ulrich M. H. Hennings 2001

Advanced Functional Solid Catalysts for Biomass Valorization-Chaudhery Mustansar Hussain 2020-05-29

Advanced Functional Solid Catalysts for Biomass Valorization presents the basic concepts in catalysis (homogeneous, heterogeneous, and enzymatic) and the properties of various kinds of heterogeneous solid catalysts, including their structure, porosity, particle size, BET surface area, acid-base, and redox properties. Useful information about biorefineries, types of biomass feedstocks, their structures and properties as well as about several potential catalytic routes for biomass upgrading to useful fuels and chemicals is provided in this book. Importantly, this book covers the most recent developments toward functionalization of various solid catalysts, optimization of catalysts' properties, developing cascade catalytic strategies, exploring reaction kinetics/mechanisms, and evaluating catalysts' stability/reusability during biomass upgrading. Current challenges and opportunities for the future biorefineries as well as for the design of advanced functional solid catalysts are critically discussed. Describes catalysis as a promising technology for the development of eco-friendly and economically viable strategies for several important energy and environmental applications. Covers heterogeneous solid catalysts because of their versatile benefits in terms of catalysts' synthesis, production cost, stability, and reusability as compared to homogeneous liquid catalysts. Provides promising strategies for the design of new catalytic materials, such as carbon materials, metal-organic frameworks, zeolites, and mesoporous silicas. Describes functional solid catalysts for developing one-pot cascade processes for efficient biomass valorization and other vital chemical transformations.

Handbook of Green Chemistry and Technology-James H. Clark 2008-04-15

Sustainable development is now accepted as a necessary goal for achieving societal, economic and environmental objectives. Within this chemistry has a vital role to play. The chemical industry is successful but traditionally success has come at a heavy cost to the environment. The challenge for chemists and others is to develop new products, processes and services that achieve societal, economic

and environmental benefits. This requires an approach that reduces the materials and energy intensity of chemical processes and products; minimises the dispersion of harmful chemicals in the environment; maximises the use of renewable resources and extends the durability and recyclability of products in a way that increases industrial competitiveness as well as improve its tarnished image.

Mesoporous Zeolites-Javier García-Martínez 2015-05-26

Authored by a top-level team of both academic and industrial researchers in the field, this is an up-to-date review of mesoporous zeolites. The leading experts cover novel preparation methods that allow for a purpose-oriented fine-tuning of zeolite properties, as well as the related materials, discussing the specific characterization methods and the applications in close relation to each individual preparation approach. The result is a self-contained treatment of the different classes of mesoporous zeolites. With its academic insights and practical relevance this is a comprehensive handbook for researchers in the field and related areas, as well as for developers from the chemical industry.

Green Chemistry and Technologies-Long Zhang 2018-09-24

The book gives a systematic introduction to green chemistry principles and technologies in inorganic and organic chemistry, polymer sciences and pharmaceutical industry. It also discusses the use of biomass and marine resources for synthesis as well as renewable energy utilization and the concepts and evaluation of recycling economy and eco-industrial parks.

Encyclopedia of Renewable and Sustainable Materials- 2020-01-09

Encyclopedia of Renewable and Sustainable Materials provides a comprehensive overview, covering research and development on all aspects of renewable, recyclable and sustainable materials. The use of renewable and sustainable materials in building construction, the automotive sector, energy, textiles and others can create markets for agricultural products and additional revenue streams for farmers, as well as significantly reduce carbon dioxide (CO₂) emissions, manufacturing energy requirements, manufacturing costs and waste. This book provides researchers, students and professionals in materials science and engineering with tactics and information as they face increasingly complex challenges around the development, selection and use of construction and manufacturing materials. Covers a broad range of topics not available elsewhere in one resource Arranged thematically for ease of navigation Discusses key features on processing, use, application and the environmental benefits of renewable and sustainable materials Contains a special focus on sustainability that will lead to the reduction of carbon emissions and enhance protection of the natural environment with regard to sustainable materials

Nanoporous Catalysts for Biomass Conversion-Feng-Shou Xiao 2017-09-07

A comprehensive introduction to the design, synthesis, characterization, and catalytic properties of nanoporous catalysts for the biomass conversion With the specter of peak oil demand looming on the horizon, and mounting concerns over the environmental impact of greenhouse gas emissions, biomass has taken on a prominent role as a sustainable alternative fuel source. One critical aspect of the biomass challenge is the development of novel catalytic materials for effective and controllable biomass conversion. Edited by two scientists recognized internationally for their pioneering work in the field, this book focuses on nanoporous catalysts, the most promising class of catalytic materials for the conversion of biomass into fuel and other products. Although various catalysts have been used in the conversion of biomass-derived feedstocks, nanoporous catalysts exhibit high catalytic activities and/or unique product selectivities due to their large surface area, open nanopores, and highly dispersed active sites. This book covers an array of nanoporous catalysts currently in use for biomass conversion, including resins, metal oxides, carbons, mesoporous silicates, polydivinylbenzene, and zeolites. The authors summarize the design, synthesis, characterization and catalytic properties of these nanoporous

catalysts for biomass conversions, discussing the features of these catalysts and considering future opportunities for developing more efficient catalysts. Topics covered include: Resins for biomass conversion Supported metal oxides/sulfides for biomass oxidation and hydrogenation Nanoporous metal oxides Ordered mesoporous silica-based catalysts Sulfonated carbon catalysts Porous polydivinylbenzene Aluminosilicate zeolites for bio-oil upgrading Rice straw Hydrogenation for sugar conversion Lignin depolymerization Timely, authoritative, and comprehensive, Nanoporous Catalysts for Biomass Conversion is a valuable working resource for academic researchers, industrial scientists and graduate students working in the fields of biomass conversion, catalysis, materials science, green and sustainable chemistry, and chemical/process engineering.

Zeolites-Karmen Margeta 2020-07-22

Natural resources, such as zeolite minerals, have an inexhaustible potential for scientific research and application. Both natural and synthetic zeolites have application in many researched areas including water and soil industries, biochemistry, and medicine due to their environmental and economic acceptability, unique structure, and specific characteristics. Over three sections, this book presents a comprehensive overview of zeolites and their potential applications in science. Chapters cover such topics as the history of zeolites, their structure and properties, layered zeolites, and use of zeolites for gas storage and separation as well as in veterinary medicine.

Solution Combustion Synthesis Of Nanostructured Solid Catalysts For Sustainable Chemistry-Sergio Gonzalez-cortes 2020-10-23

The term 'green chemistry' was coined by Anastas and Warner in the early 1990s and it is nowadays the mainstay of designing and implementing advanced chemical processes that decrease or eliminate the use and generation of hazardous substances whilst minimizing energy consumption. Solution Combustion Synthesis of Nanostructured Solid Catalysts for Sustainable Chemistry is an interdisciplinary collection of fundamental and applied cutting-edge studies which highlight general and specific aspects of the synthesis of nanostructured catalysts through Solution Combustion Synthesis (SCS), studying their applications from the perspective of green chemistry. This book intends to integrate the fundamental principles of the SCS process with its engineering aspects and covers the synthesis of a wide variety of catalytic materials. This reference book can be used as a permanent consulting material for students, researchers and the general readership for green chemistry, nanochemistry, materials science and chemical engineering.

Sustainable Value Creation in the Fine and Speciality Chemicals Industry-R. Rajagopal 2014-06-12

The global fine and speciality chemicals industry is a vital segment within the chemical value chain, catering to a multitude of societal and industrial needs. Regulatory, sustainability and consumer forces have been constantly shaping the business fundamentals of this industry. Developing value creation strategies, which embed economic, environmental and social sustainability components, will need a comprehensive assessment of business, scientific and technological challenges facing the industry. Sustainable Value Creation in the Fine and Speciality Chemicals Industry assesses sustainable value creation options against the backdrop of global mega trends that are defining the present and future course of the industry. It discusses innovative strategies in feedstocks, R&D, technology, manufacturing, resource management and the supply chain as well as the significance of the bio-based chemical economy in enabling sustainable value creation in the fine and speciality chemicals industry. Topics covered include: • Transformation in the fine and speciality chemicals business • Sustainable management: evolution, transitions and tools • Research and technology directions • Resource optimization strategies • Bio-based chemicals, specialities and polymers • Sustainable practices in the fine and speciality chemicals industry • Sustainable value creation strategies Sustainable Value Creation in the Fine and Speciality Chemicals Industry presents a comprehensive overview of strategic options

for sustainability management in the global fine and speciality chemicals industry. It will be a valuable resource for chemists and chemical engineers involved in the design and development of economically, environmentally and socially sustainable practices for the future.

Environmentally Friendly Zeolites-Rafael Chaves Lima 2019-05-24

This book details zeolites, their structures and the parameters that influence their synthesis, providing a new and actual perspective of this field. Following this, the authors show different processes used to synthesize zeolites using residues, natural materials, and other eco-friendly materials such as raw powder glass, clays, aluminum cans, diatomites, rice ashes or coal ashes. Finally, this book gives the reader a wide range of different synthesis methods that they can be applied to several industrial processes.

Encapsulated Catalysts-Samahe Sadjadi 2017-06-08

Encapsulated Catalysts provides valuable information for chemists, chemical engineers, and materials scientists in this promising area. The book describes many kinds of encapsulated catalysts and their applications in chemistry, including organic, inorganic, hybrid, and biological systems. Unlike other works, which discuss traditional supports, this useful resource uniquely focuses on extremely important topics, such as the encapsulation effects on reactivity and selectivity, the difficulty of their separation from reaction mixture, and/or their sensitivity to reaction conditions, and the limit of their industrial applications. In addition, the book covers the immobilization of homogenous catalysts on inorganic or

organic supports and how it enables the separation of homogenous catalysts, as well as the protection or reuse of catalysts. Discusses one of the most promising advances in catalysis and recent developments in the area, including enzyme mimic catalysts and new nano-materials for catalyst encapsulation. Provides interdisciplinary coverage of organic, inorganic, and biological materials for encapsulation of catalysts. Describes various types of reactions which can be catalyzed in presence of encapsulated catalysts.

Zeolites in Catalysis-Jiří Čejka 2017-06-07

Covering the breadth of zeolite chemistry and catalysis, this book provides the reader with a complete introduction to the field, covering synthesis, structure, characterisation and applications. Beginning with the history of natural and synthetic zeolites, the reader will learn how zeolite structures are formed, synthetic routes, and experimental and theoretical structure determination techniques. Their industrial applications are covered in-depth, from their use in the petrochemical industry, through to fine chemicals and more specialised clinical applications. Novel zeolite materials are covered, including hierarchical zeolites and two-dimensional zeolites, showcasing modern developments in the field. This book is ideal for newcomers who need to get up to speed with zeolite chemistry, and also experienced researchers who will find this a modern, up-to-date guide.