

Green Chemistry and Sustainable Technology

Feng-Shou Xiao  
Xiangju Meng *Editors*

# Zeolites in Sustainable Chemistry

Synthesis, Characterization and Catalytic  
Applications

 Springer

# Zeolites In Sustainable Chemistry Synthesis Characterization And Catalytic Applications Green Chemistry And Sustainable Technology

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## **Zeolites In Sustainable Chemistry Synthesis Characterization And Catalytic Applications Green Chemistry And Sustainable Technology:**

*Zeolites in Sustainable Chemistry* Feng-Shou Xiao,Xiangju Meng,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

**Sustainable Nanoscale Engineering** Gyorgy Szekely,Andrew G. Livingston,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 CO<sub>2</sub> sequestration continuous processes waste valorization catalytic processes bioengineering pharmaceutical manufacturing supercritical CO<sub>2</sub> 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

**Nanosponges** Francesco Trotta,Andrea Mele,2019-01-29 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

**Sustainable Materials and Manufacturing Technologies** Navneet Khanna,Kishor Kumar Gajrani,Khaled Giasin,J. Paulo Davim,2023-02-27 Materials and manufacturing techniques are a few of the vital processes in production industries Most of the materials processing and manufacturing techniques currently used in industries are a major cause of environmental pollution and are hence unsustainable This book provides in depth knowledge about challenges faced during the processing of advanced materials and discusses possible ways to achieve sustainability in manufacturing This book Covers advances in cryogenic machining optimization and economical and energy

assessment of machining Provides case studies and numerical design with analysis using computational fluid dynamics of minimum quantity lubrication mist droplets Reviews metalworking fluids laser micro texturing materials and manufacturing in sustainability biofuels additives nano materials and additive manufacturing of waste plastic Explores the use of artificial intelligence and machine learning based manufacturing techniques and Covers the latest challenges and future trends in sustainable manufacturing Sustainable Materials and Manufacturing Technologies is primarily written for senior undergraduate and graduate students as well as researchers in mechanical manufacturing industrial and production engineering and material science     Encyclopedia of Renewable and Sustainable Materials ,2020-01-09 Encyclopedia of Renewable and Sustainable Materials Five Volume Set 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     **Advances in Geopolymer-Zeolite Composites** Petrică Vizureanu,Pavel Krivenko,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     Encyclopedia of Renewable Energy, Sustainability and the Environment ,2024-08-09 Encyclopedia of Renewable Energy Sustainability and the Environment Four Volume Set comprehensively covers all renewable energy resources including wind solar hydro biomass geothermal energy and nuclear power to name a few In addition to covering the breadth of renewable energy resources at a fundamental level this encyclopedia delves into the utilization and ideal applications of each resource and assesses them from environmental economic and policy standpoints This book will serve as an ideal introduction to any renewable energy source for students while also allowing them to learn about a topic in more depth and explore related topics all in a single resource Instructors researchers and industry professionals will also benefit from this comprehensive

reference Covers all renewable energy technologies in one comprehensive resource Details renewable energies processes from production to utilization in a single encyclopedia Organizes topics into concise consistently formatted chapters perfect for readers who are new to the field Assesses economic challenges faced to implement each type of renewable energy Addresses the challenges of replacing fossil fuels with renewables and covers the environmental impacts of each renewable energy

**Green Sustainable Process for Chemical and Environmental Engineering and Science**

Inamuddin, Abdullah M. Asiri, Arun M. Isloor, 2019-10-30 Green Sustainable Processes for Chemical and Environmental Engineering and Science Supercritical Carbon Dioxide as Green Solvent provides an in depth review on the area of green processes for the industry focusing on the separation purification and extraction of medicinal biological and bioactive compounds utilizing supercritical carbon dioxide as a green solvent and their applications in pharmaceuticals polymers leather paper water filtration textiles and more Chapters explore polymerization polymer composite production polymer blending particle production microcellular foaming polymer processing using supercritical carbon dioxide and a method for the production of micro and nano scale particles using supercritical carbon dioxide that focuses on the pharmaceutical industry A brief introduction and limitations to the practical use of supercritical carbon dioxide as a reaction medium are also discussed as are the applications of supercritical carbon dioxide in the semiconductor processing industry for wafer processing and its advantages and obstacles Reviews available green solvents for extraction separation purification and synthesis Outlines environmentally friendly chemical processes in many applications i e organic reactions metal recovery etc Includes numerous real industrial applications such as polymers pharmaceuticals leather paper water filtration textiles food oils and fats and more Gives detailed accounts of the application of supercritical CO<sub>2</sub> in polymer production and processing Provides a process for extraction separation and purification of compounds of biological medicinal importance Gives methods for nanoparticle production using supercritical carbon dioxide Provides a systematic discussion on the solubility of organic and organometallic compounds

**Heterogeneous Catalysis in Sustainable Synthesis** Bela Torok, Christian

Schaefer, Anne Kokel, 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 *Green Chemical* Iyad Karamé, Hassan Srouf, 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 **Solid Base Catalysts** K. K. Pant, Ramesh Chandra, Ravi Tomar, 2025-02-03 Foundational knowledge and practical approaches of an interesting catalyst class for greener and cleaner chemical synthesis Solid Base Catalysts provides insights and information on cutting edge heterogeneous catalysis technologies and approaches of non corrosive and easy to use solid catalysts that can replace conventional liquid catalysts that are known to pose operational problems Edited by three highly qualified authors with contributions from experts in industry and academia Solid Base Catalysts includes Latest and most advanced studies in the characterization of solid catalysts with applications in various organic transformations Versatile reaction types where solid catalysts can be used as well as the multidisciplinary nature of solid base catalyst research and its connections to other fields Multicomponent reactions for eco compatible heterocyclic synthesis over solid catalysts and synthesis routes experimental protocols and other considerations for optimizing catalyst properties Advanced methodologies and applications for analyzing solid catalysts and challenges and future prospects in the field Solid Base Catalysts is a complete reference on the subject for researchers and professionals in materials science green chemistry surface chemistry and chemical engineering *Research Anthology on Synthesis, Characterization, and Applications of Nanomaterials* Management Association, Information Resources, 2021-03-19 The use of nanotechnologies continues to grow as nanomaterials have proven their versatility and use in many different fields and industries within the scientific profession Using nanotechnology materials can be made lighter more durable more reactive and more efficient leading nanoscale materials to enhance many everyday products and processes With many different sizes shapes and internal structures the applications are endless These uses range from pharmaceuticals to materials such as cement or cloth electronics environmental sustainability and more Therefore there has been a recent surge of research focused on the synthesis and characterizations of these nanomaterials to better understand how they can be used their applications and the many different types The Research Anthology on Synthesis Characterization and Applications of

Nanomaterials seeks to address not only how nanomaterials are created used or characterized but also to apply this knowledge to the multidimensional industries fields and applications of nanomaterials and nanoscience This includes topics such as both natural and manmade nanomaterials the size shape reactivity and other essential characteristics of nanomaterials challenges and potential effects of using nanomaterials and the advantages of nanomaterials with multidisciplinary uses This book is ideally designed for researchers engineers practitioners industrialists educators strategists policymakers scientists and students working in fields that include materials engineering engineering science nanotechnology biotechnology microbiology drug design and delivery medicine and more

**Circular Economy and Sustainable Management** Siddhartha Pandey,Nitin Kumar Singh,Tuhin Sengupta,Sanchita Roy Chowdhury,2025-09-30

This book summarizes both conventional and emerging waste management approaches for fly ash particularly with a focus on sustainability dimension including its applicability scope methods and challenges of bio coal production It covers the sustainability aspects of fly ash management and recent developments in methods processes and scope of bio coal production as an alternative to conventional coal along with its implications for industrial ecosystems It focuses on climate change sustainability and circular economy aspects of fly ash management approaches Comprehensively covers all the dimensions related to coal and bio coal fly ash and circular economy associated with it Discusses cradle to grave technology for bio coal Emphasizes the efficient economically viable and environmentally sustainable use of coal and bio coal fly ash Explores renewable fuel solutions and circular economy associated with it Encourages the use of bio coal for boosting sustainability and circular economy This book is aimed at researchers and graduate students in environmental and civil engineering as well as those working in clean technologies

**Industrial Arene Chemistry** Jacques Mortier,2023-03-17 Industrial Arene Chemistry Explore the wide array of uses for aromatic hydrocarbons in this comprehensive reference Aromatics are a class of compounds normally but not exclusively organic which tend to be produced as by products of various industrial processes Their importance as petrochemical materials in themselves along with the range of inter relations between different aromatic chemicals creates a complex and opportunity filled market for aromatics Industrial Arene Chemistry provides a thorough look at the conventional techniques required to use and produce these aromatic hydrocarbons Beginning with an overview of the global aromatic market including but not limited to manufacturers markets of BTX and downstream functional aromatics aromatics derived from renewable sources and economic forecasts the book will also explore the impact shifting environmental factors will have on the future of aromatic chemistry The text further explores BTX production processes differentiated according to the raw materials used Importantly this will establish the importance and growth of the biobased chemical industry Industrial Arene Chemistry readers will also find Case studies that describe major elements of specific technologies prototyped by contributors companies as part of ongoing market development efforts Process chapters that include summaries of the conventional techniques and a more detailed discussion of recent high impact studies Recent

advances in conventional aromatic reactions including alkylation acylation and carboxylation hydrogenation reduction oxidation nitration amination sulfonation and halogenation Industrial Arene Chemistry is a useful reference for chemists and chemical engineers who work with aromatics

**Sustainable Catalytic Production of Bio-Based**

**Heteroatom-Containing Compounds** Hu Li, Song Yang, Yaqiong Su, 2021-02-02 **Biomass for Environmental**

**Remediation** Yasser Vasseghian, 2025-03-29 Biomass for Environmental Remediation explores the pivotal role of biomass in revolutionizing environmental remediation From wastewater treatment to air pollution control and soil remediation this book delves into the myriad applications of biomass including the synthesis of advanced nanomaterials for sustainable solutions Users will find the latest advancements in harnessing organic resources for a cleaner and greener future while also uncovering the diverse sources of biomass and the innovative techniques transforming them into powerful tools for environmental restoration With insightful chapters on phytoremediation microbial applications and the production of biomass derived nanomaterials this book serves as a vital guide for professionals researchers and students at the forefront of environmental sustainability Covers the entire biomass lifecycle allowing readers to gain a holistic understanding of how biomass can be seamlessly integrated into environmental projects Includes real world case studies that provide readers with practical insights into successful biomass applications Explores the synthesis of advanced nanomaterials from biomass and their applications in environmental remediation

*Zeolite Chemistry and Applications* Benoit Louis, Marcelo Maciel Pereira, Qiang Wang, 2020-04-20

**Infrared Spectroscopy** Marwa El-Azazy, 2019-03-06 Delving into Infrared Spectroscopy Principles Advances and Applications and with basic knowledge of IR spectroscopy will provide the reader with a synopsis of fundamentals and groundbreaking advances in the field Readers will see a variety of MIR applications and difficulties encountered especially in an industrial environment Competency in FT IR spectroscopy in biomedical research and early stage diagnosis of obesity is shown Challenges associated with VIS NIR applications are shown through application of the technique in assessing quality parameters of fruits Moreover IR spectroscopic studies of radiation stimulated processes and the influence of using IR in developing an ideal catalyst and hence an efficient catalysis process are discussed The impact of coupling multivariate data analysis techniques to IR is shown in almost every chapter

**Nano-(Bio)Catalysis in Lignocellulosic Biomass Valorization** Rafael Luque, Christophe Len, Konstantinos Triantafyllidis, 2019-03-01

The valorization of lignocellulosic biomass in the form of forest and agricultural wastes industrial processing side streams and dedicated energy crops toward chemicals fuels and added value products has become a major research area with increasing exploitation potential The efficient and tailored depolymerization of biomass or its primary structural components hemicellulose cellulose and lignin to platform chemicals i.e. sugars phenolics furans ketones organic acids etc is highly dependent on the development of novel or modified chemo and bio catalytic processes that take into account the peculiarities and recalcitrance of biomass as feedstock compared for example to petroleum fractions The present Research Topic in



Frontiers in Chemistry Section of Green and Sustainable Chemistry entitled Nano bio catalysis in lignocellulosic biomass valorization aims to further contribute to the momentum of research and development in the bio catalytic conversion of biomass by featuring original research papers as well as two review papers authored and reviewed by experts in the field The Research Topic addresses various representative reactions and processes in biomass valorization highlighting the importance of developing novel efficient and stable nano bio catalysts with tailored properties according to the nature of the reactant feedstock and the targeted products *Nano- and Biocatalysts for Biodiesel Production* Avinash P. Ingle, 2021-06-22

Reviews recent advances in catalytic biodiesel synthesis highlighting various nanocatalysts and nano bio catalysts developed for effective biodiesel production Nano and Biocatalysts for Biodiesel Production delivers an essential reference for academic and industrial researchers in biomass valorization and biofuel industries The book covers both nanocatalysts and biocatalysts bridging the gap between homogenous and heterogeneous catalysis Readers will learn about the techno economical and environmental aspects of biodiesel production using different feedstocks and catalysts They will also discover how nano bio catalysts can be used as effective alternatives to conventional catalysts in biodiesel production due to their unique properties including reusability high activation energy and rate of reaction easy recovery and recyclability Readers will benefit from the inclusion of Introductions to CaO nanocatalysts zeolite nanocatalysts titanium dioxide based nanocatalysts and zinc based in biodiesel production An exploration of carbon based heterogeneous nanocatalysts for the production of biodiesel Practical discussions of bio based nano catalysts for biodiesel production and the application of nanoporous materials as heterogeneous catalysts for biodiesel production An analysis of the techno economical considerations of biodiesel production using different feedstocks Nano and Biocatalysts for Biodiesel Production focuses on recent advances in the field and offers a complete and informative guide for academic researchers and industrial scientists working in the fields of biofuels and bioenergy catalysis biotechnology bioengineering nanotechnology and materials science

## Reviewing **Zeolites In Sustainable Chemistry Synthesis Characterization And Catalytic Applications Green Chemistry And Sustainable Technology**: Unlocking the Spellbinding Force of Linguistics

In a fast-paced world fueled by information and interconnectivity, the spellbinding force of linguistics has acquired newfound prominence. Its capacity to evoke emotions, stimulate contemplation, and stimulate metamorphosis is really astonishing. Within the pages of "**Zeolites In Sustainable Chemistry Synthesis Characterization And Catalytic Applications Green Chemistry And Sustainable Technology**," an enthralling opus penned by a highly acclaimed wordsmith, readers embark on an immersive expedition to unravel the intricate significance of language and its indelible imprint on our lives. Throughout this assessment, we shall delve into the book's central motifs, appraise its distinctive narrative style, and gauge its overarching influence on the minds of its readers.

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### **Zeolites In Sustainable Chemistry Synthesis Characterization And Catalytic Applications Green Chemistry And Sustainable Technology Introduction**

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