[DOC] Heterogeneous Catalytic Materials Solid State Chemistry Surface Chemistry And Catalytic Behaviour

Yeah, reviewing a book heterogeneous catalytic materials solid state chemistry surface chemistry and catalytic behaviour could build up your near connections listings. This is just one of the solutions for you to be successful. As understood, ability does not recommend that you have extraordinary points.

Comprehending as capably as arrangement even more than other will provide each success. bordering to, the notice as skillfully as acuteness of this heterogeneous catalytic materials solid state chemistry surface chemistry and catalytic behaviour can be taken as capably as picked to act.

of inorganic and organic materials, heterogeneous catalysis, surface science

Heterogeneous Catalytic Materials - Guido Busca - 2014-05-23
Heterogeneous Catalytic Materials discusses experimental methods and the latest developments in three areas of research: heterogeneous catalysis, surface chemistry of catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effectively. This book provides you with all necessary information to synthesize, characterize, and relate the properties of a catalyst to its behavior, enabling you to select the appropriate catalyst for the process and reactor system. Oxides (used both as catalysts and as supports for catalysts), mixed and complex oxides and salts, halides, sulfides, carbides, and unsupported and supported metals are all considered. The book encompasses applications in industrial chemistry, refinery, petrochemistry, biomass conversion, energy production, and environmental protection technologies. Provides a systematic and clear approach of the synthesis, solid state chemistry and surface chemistry of all solid state catalysts. Catalytic materials are those solids that allow the chemical reaction to occur efficiently and cost-effective...
as carbon materials, metal–organic frameworks, zeolites, and mesoporous materials. Oxide catalysts, namely, heteropolyoxometalates and perovskites, are taken as typical examples and discussed in detail. These two materials have several advantages: 1. They are, respectively, typical examples of salts of oxoacids and double oxide, that is, the two main categories of mixed oxides in solid state chemistry. 2. Both exhibit excellent catalytic performance in nearly crystalline state and are used in several industrial applications. 3. They have studied for over a dozen years. In addition, metal oxides functioning as a catalyst support (carrier) are included. Although the supports are very important in practical applications, and tremendous progress has been made in the past decades, few systematic reviews exist. It is notable that heteropolyoxometalates and perovskite exhibit unique performance when used as a support. Fundamental catalytic science and technology and solid state chemistry necessary is presented for the proper understanding of mixed oxide catalysts as well as for R&D. For the latter, the concept of design of practical catalysts is very important. This is considered throughout the book. Systematically describes design principles of mixed oxide catalysts. Shows how catalysis and solid-state chemistry of metal oxides are inter-related. Covers all useful basic concepts of mixed oxide catalysis.

Characterization of Solid Materials and Heterogeneous Catalysts - Michel Che - 2012-04-16

This two-volume book provides an overview of physical techniques used to characterize the structure of solid materials, on the one hand, and to investigate the reactivity of their surface, on the other. Therefore this book is a must-have for anyone working in fields related to surface reactivity. Among the latter, and because of its most important industrial impact, catalysis has been used as the directing thread of the book. After the preface and a general introduction to physical techniques by M. Che and J.C. Védrine, two overviews on physical techniques are presented by G. Ertl and Sir J.M. Thomas for investigating model catalysts and porous catalysts, respectively. The book is organized into four parts: Molecular/Local Spectroscopies, Macroscopic Techniques, Characterization of the Fluid Phase (Gas and/ or Liquid), and Advanced Characterization. Each chapter focuses upon the following important themes: overview of the technique, most important parameters to interpret the experimental data, practical details, applications of the technique, particularly during chemical processes, with its advantages and disadvantages, conclusions.

Characterization of Solid Materials and Heterogeneous Catalysts - Michel Che - 2012-04-16

This two-volume book provides an overview of physical techniques used to characterize the structure of solid materials, on the one hand, and to investigate the reactivity of their surface, on the other. Therefore this book is a must-have for anyone working in fields related to surface reactivity. Among the latter, and because of its most important industrial impact, catalysis has been used as the directing thread of the book. After the preface and a general introduction to physical techniques by M. Che and J.C. Védrine, two overviews on physical techniques are presented by G. Ertl and Sir J.M. Thomas for investigating model catalysts and porous catalysts, respectively. The book is organized into four parts: Molecular/Local Spectroscopies, Macroscopic Techniques, Characterization of the Fluid Phase (Gas and/ or Liquid), and Advanced Characterization. Each chapter focuses upon the following important themes: overview of the technique, most important parameters to interpret the experimental data, practical details, applications of the technique, particularly during chemical processes, with its advantages and disadvantages, conclusions.

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, theirs conversion 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.

Advanced Catalytic Materials: Current Status and Future Progress - José Manuel Domínguez-Espuiguel - 2019-10-02

This book presents advances in computational methods, experimental synthesis, and advanced characterizations for novel catalytic materials. The authors show how catalytical materials can be used for various engineering oil & gas applications – mainly in low contaminants fuel production. All contributors, describe in detail novel experimental and theoretical techniques and concepts for synthesis, evaluation and scaling catalytic materials and research advances in evaluation, extensive characterization and theoretical modeling using computer assisted methods and algorithms. Describes computational methods, experimental synthesis and advanced characterization for novel catalytic materials; Examines catalytic materials and corresponding engineering applications with a focus on low contaminant fuel production and derivatives; Covers the application of computer assisted quantum mechanical for fundamental understanding of electronic structure of molecular dimension catalytic materials.

Advanced Catalytic Materials: Current Status and Future Progress - José Manuel Domínguez-Espuiguel - 2019-10-02

This book presents advances in computational methods, experimental synthesis, and advanced characterizations for novel catalytic materials. The authors show how catalytical materials can be used for various engineering oil & gas applications – mainly in low contaminants fuel production. All contributors, describe in detail novel experimental and theoretical techniques and concepts for synthesis, evaluation and scaling catalytic materials and research advances in evaluation, extensive characterization and theoretical modeling using computer assisted methods and algorithms. Describes computational methods, experimental synthesis and advanced characterization for novel catalytic materials; Examines catalytic materials and corresponding engineering applications with a focus on low contaminant fuel production and derivatives; Covers the application of computer assisted quantum mechanical for fundamental understanding of electronic structure of molecular dimension catalytic materials.

From Solid State Chemistry to Heterogeneous Catalysis - Svetlana Ivanova - 2021-10

Heterogeneous catalysis is deeply founded on solid state chemistry, but the relationship between the two often appears to be elusive in many cases. It is generally difficult to relate the allusion of symmetry to the crystal structure and the defect chemistry or acid-base properties to the surface reconstruction and extended defects that in most cases are the basis of physical-chemical properties and applications. This book provides insights into solid state chemistry in order to widen the vision of heterogeneous catalysis. It covers a broad range of solid state related topics, including symmetry and structure organization, bonding, and methods for structure elucidation, as well as defects formation and their implications in heterogeneous catalysis.

From Solid State Chemistry to Heterogeneous Catalysis - Svetlana Ivanova - 2021-10
nanotechnology by structural and reactive topology. The objective of this
Heterogeneous catalysis is deeply founded on solid state chemistry, but the
relationship between these two fields often appears to be very complex. It is
generally difficult to relate the allusion of symmetry to the crystal structure
and the defect chemistry or acid-base properties to the surface
reconstruction and extended defects that in most cases are the basis of
physicochemical properties and solids applications. This book provides
insights into solid state chemistry in order to widen the vision of
heterogeneous catalysis and its application. It covers a broad range of solid state related
topics, including symmetry and structure organization, bonding, and
methods for structure elucidation, as well as defects formation and their
implications in heterogeneous catalysis.

Solid-State NMR Characterization of Heterogeneous Catalysts and Catalytic Reactions provides a comprehensive account of state-of-the-art solid-state NMR techniques and the application of these techniques in heterogeneous catalysts and related catalytic reactions. It includes an introduction to the basic theory of solid-state NMR and various frequently used techniques. Special emphasis is placed on characterizing the framework and pore structure, active site, guest-host interaction, and synthesis mechanisms of heterogeneous catalysts using multinuclear one- and two-dimensional solid-state NMR spectroscopy. Additionally, various in-situ solid-state NMR techniques and their applications in investigation of the mechanism of industrially important catalytic reactions are also discussed. Both the fundamentals and the latest research results are covered, making the book suitable as a reference guide for both experienced researchers in and newcomers to this field. Feng Deng is a Professor at Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences.

Solid-State NMR Characterization of Heterogeneous Catalysts and Catalytic Reactions provides a comprehensive account of state-of-the-art solid-state NMR techniques and the application of these techniques in heterogeneous catalysts and related catalytic reactions. It includes an introduction to the basic theory of solid-state NMR and various frequently used techniques. Special emphasis is placed on characterizing the framework and pore structure, active site, guest-host interaction, and synthesis mechanisms of heterogeneous catalysts using multinuclear one- and two-dimensional solid-state NMR spectroscopy. Additionally, various in-situ solid-state NMR techniques and their applications in investigation of the mechanism of industrially important catalytic reactions are also discussed. Both the fundamentals and the latest research results are covered, making the book suitable as a reference guide for both experienced researchers in and newcomers to this field. Feng Deng is a Professor at Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences.

Principles and Practice of Heterogeneous Catalysis - John Meurig Thomas - 2015-02-09
This long-awaited second edition of the successful introduction to the fundamentals of heterogeneous catalysis is now completely revised and updated. Written by internationally acclaimed experts, this textbook includes fundamentals of adsorption, characterizing catalysts and their surfaces, the significance of pore structure and surface area, solid-state and surface chemistry, poisoning, promotion, deactivation and selectivity of catalysts, as well as catalytic process engineering. A final section provides a number of examples and case histories. With its color and numerous graphics plus references to help readers to easily find further reading, this is a pivotal work for an understanding of the principles involved.

Principles and Practice of Heterogeneous Catalysis - John Meurig Thomas - 2015-02-09
This long-awaited second edition of the successful introduction to the fundamentals of heterogeneous catalysis is now completely revised and updated. Written by internationally acclaimed experts, this textbook includes fundamentals of adsorption, characterizing catalysts and their surfaces, the significance of pore structure and surface area, solid-state and surface chemistry, poisoning, promotion, deactivation and selectivity of catalysts, as well as catalytic process engineering. A final section provides a number of examples and case histories. With its color and numerous graphics plus references to help readers to easily find further reading, this is a pivotal work for an understanding of the principles involved.

New Frontiers in Nanotechnology: Concepts, Theories, and Trends, Volume 2: Topological Nanochemistry is the second of the new three-volume set that explains and explores the important basic and advanced modern concepts in multidisciplinary chemistry. Under the broad expertise of the editor, this second volume explores the rich research areas of nanotechnology with a specific focus on the design and control of particular volume is to emphasize the application of nanotechnology. With 46 entries from eminent international scientists and scholars, the content in this volume spans concepts from A-to-Z—from entries on the atom-bond connectivity index to the Zagreb indices, from connectivity to vapor phase epityax, and from fullerenes to topological reactivity—and much more. The definitions within the text are accompanied by brief but comprehensive explicative essays as well as figures, tables, etc., providing a holistic understanding of the concepts presented.

Electron Microscopy in Heterogeneous Catalysis - P.L Gai - 2003-01-14
Electron Microscopy in Heterogeneous Catalysis provides a coherent account of heterogeneous catalytic processes and catalyst surface structure at the atomic scale as elucidated by electron microscopy techniques. The book addresses a number of issues that are fundamental to the understanding of heterogeneous catalysis by oxides and supported metals. The properties of a catalyst are governed by its microstructure and chemistry on an atomic scale, and electron microscopy methods are essential to directly analyze these properties. The book provides important information about active sites, support interactions, reconstruction and extended defects that in most cases are the basis of the allusion of symmetry to the crystal structure and the defect chemistry or acid-base properties to the surface reconstruction and extended defects that in most cases are the basis of physicochemical properties and solids applications. This book provides insights into solid state chemistry in order to widen the vision of heterogeneous catalysis by structuring a basic theory of solid-state NMR and various frequently used techniques. Special emphasis is placed on characterizing the framework and pore structure, active site, guest-host interaction, and synthesis mechanisms of heterogeneous catalysts using multinuclear one- and two-dimensional solid-state NMR spectroscopy. Additionally, various in-situ solid-state NMR techniques and their applications in investigation of the mechanism of industrially important catalytic reactions are also discussed. Both the fundamentals and the latest research results are covered, making the book suitable as a reference guide for both experienced researchers in and newcomers to this field. Feng Deng is a Professor at Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences.

Selective Oxidation by Heterogeneous Catalysis - Gabriele Centi - 2012-12-06
Selective Oxidation by Heterogeneous Catalysis covers one of the major areas of industrial petrochemical production, outlining open questions and new opportunities. It gives keys for the interpretation and analysis of data and design of new catalysts and reactions, and provides guidelines for future research. A distinctive feature of this book is the use of concept by example. Rather than reporting an overview of the literature results, the authors have selected some representative examples, the in-depth analysis of which makes it possible to clarify the fundamental, but new concepts necessary for a better understanding of the new opportunities in this field and the design of new catalysts or catalytic reactions. Attention is not only to the catalyst itself, but also to the use of the catalyst inside the process, thus evidencing the relationship between catalyst design and engineering aspects of the process. This book provides suggestions for new innovative directions of research and indications on how to reconsider the field of selective oxidation from different perspectives, outlining that is not a matter of finding of new important breakthroughs that can be derived from fundamental and applied research. Suggestions are offered on
Selective Oxidation by Heterogeneous Catalysis - Gabriele Centi - 2012-12-06
Selective Oxidation by Heterogeneous Catalysis covers one of the major areas of industrial petrochemical production, outlining open questions and new opportunities. It gives keys for the interpretation and analysis of data and design of new catalysts and reactions, and provides guidelines for future research. A distinctive feature of this book is the use of concept by example. Rather than reporting an overview of the literature results, the authors have selected some representative examples, in the in-depth analysis of which makes it possible to firmly the fundamental, but new concepts necessary for a better understanding of the new opportunities in this field and the design of new catalysts or catalytic reactions. Attention is given not only to the catalyst itself, but also to the use of the catalyst inside the process, thus evidencing the relationship between catalyst design and engineering aspects of the process. This book provides suggestions for new innovative directions of research and indications on how to reconsider the field of selective oxidation from different perspectives, outlining that not is a mature field of research, but that new important breakthroughs can be derived from fundamental and applied research. Suggestions are offered on how to use less conventional approaches in terms of both catalyst design and analysis of the data.

Advances in Catalysis - - 2020-11-25
Advances in Catalysis, Volume 67, fills the gap between journal papers and textbooks across the diverse areas of catalysis research. For more than 60 years, this series has dedicated itself to record and present the latest progress in the field of catalysis, providing the scientific community with comprehensive and authoritative reviews. This series is an invaluable and comprehensive resource for chemical engineers and chemists working in the field of catalysis in both academia and industry, with this release focusing on solid acids, surface acidity and heterogeneous acid catalysis. Contains authoritative reviews written by experts in the field explores topics that reflect progress in the field, such as catalyst synthesis, catalyst characterization, catalytic chemistry, reaction engineering, computational chemistry and physics Provides insightful and critical articles that are fully edited to suit various backgrounds

Advances in Catalysis - - 2020-11-25
Advances in Catalysis, Volume 67, fills the gap between journal papers and textbooks across the diverse areas of catalysis research. For more than 60 years, this series has dedicated itself to record and present the latest progress in the field of catalysis, providing the scientific community with comprehensive and authoritative reviews. This series is an invaluable and comprehensive resource for chemical engineers and chemists working in the field of catalysis in both academia and industry, with this release focusing on solid acids, surface acidity and heterogeneous acid catalysis. Contains authoritative reviews written by experts in the field explores topics that reflect progress in the field, such as catalyst synthesis, catalyst characterization, catalytic chemistry, reaction engineering, computational chemistry and physics Provides insightful and critical articles that are fully edited to suit various backgrounds

Characterization of Solid Materials and Heterogeneous Catalysts - Michael Che -
Characterization of Solid Materials and Heterogeneous Catalysts - Michael Che -
Springer Handbook of Surface Science - Mario Rocca - 2020
This handbook delivers an up-to-date, comprehensive and authoritative coverage of the broad field of surface science, encompassing a range of important materials such metals, semiconductors, insulators, ultrathin films and supported nanoobjects. Over 100 experts from all branches of experiment and theory review in 39 chapters all major aspects of solid-state surfaces, from basic principles to applications, including the latest, ground-breaking research results. Beginning with the fundamental background of kinetics and thermodynamics at surfaces, the handbook leads the reader through the basics of crystallographic structures and electronic properties, to the advanced topics at the forefront of current research. These include but are not limited to novel applications in nanoelectronics, nanomechanical devices, plasmonics, carbon films, catalysis, astrochemistry and biology. The handbook is an ideal reference guide and instructional aid for a wide range of physicists, chemists, materials scientists and engineers active throughout academic and industrial research.

Springer Handbook of Surface Science - Mario Rocca - 2020
This handbook delivers an up-to-date, comprehensive and authoritative coverage of the broad field of surface science, encompassing a range of important materials such metals, semiconductors, insulators, ultrathin films experiment and theory review in 39 chapters all major aspects of solid-state surfaces, from basic principles to applications, including the latest, ground-breaking research results. Beginning with the fundamental background of kinetics and thermodynamics at surfaces, the handbook leads the reader through the basics of crystallographic structures and electronic properties, to the advanced topics at the forefront of current research. These include but are not limited to novel applications in nanoelectronics, nanomechanical devices, plasmonics, carbon films, catalysis, astrochemistry and biology. The handbook is an ideal reference guide and instructional aid for a wide range of physicists, chemists, materials scientists and engineers active throughout academic and industrial research.

Turning Points in Solid-state, Materials and Surface State - Kenneth D. M. Harris - 2008
The scientific exploration of solid materials represents one of the most important, fascinating and rewarding areas of scientific endeavour in the present day, not only from the viewpoint of advancing fundamental understanding but also from the industrial perspective, given the immense diversity of applications of solid materials across the full range of commercial sectors. Turning Points in Solid-State, Materials and Surface Science provides a state-of-the-art survey of some of the most important recent developments across the spectrum of solid-state, materials and surface sciences, while at the same time reflecting on key turning points in the evolution of this scientific discipline and projecting into the directions for future research progress. The book serves as a timely tribute to the life and work of Professor Sir John Meurig Thomas FRS, who has made monumental contributions to this field of science throughout his distinguished 50-year career in research, during which he has initiated, developed and exploited many important branches of this field. Indeed, the depth and breadth of his contributions towards the evolution and advancement of this scientific discipline, and his critical role in elevating this field to the important position that it now occupies within modern science, are demonstrated recurrently throughout the chapters of this book. Individual chapters are contributed by internationally leading experts in their respective fields, and the topics covered include solid-state chemistry of inorganic and organic materials, heterogeneous catalysis, surface science and materials science, with one section of the book focusing on modern developments in electron microscopy and its contributions to chemistry and materials science. The book serves as a modern and up-to-date monograph in these fields, and provides a valuable resource to researchers in academia and industry who require a comprehensive source of information on this important and rapidly developing subject.

Turning Points in Solid-state, Materials and Surface State - Kenneth D. M. Harris - 2008
The scientific exploration of solid materials represents one of the most important, fascinating and rewarding areas of scientific endeavour in the present day, not only from the viewpoint of advancing fundamental understanding but also from the industrial perspective, given the immense diversity of applications of solid materials across the full range of commercial sectors. Turning Points in Solid-State, Materials and Surface Science provides a state-of-the-art survey of some of the most important recent developments across the spectrum of solid-state, materials and surface sciences, while at the same time reflecting on key turning points in the evolution of this scientific discipline and projecting into the directions for future research progress. The book serves as a timely tribute to the life and work of Professor Sir John Meurig Thomas FRS, who has made monumental contributions to this field of science throughout his distinguished 50-year career in research, during which he has initiated, developed and exploited many important branches of this field. Indeed, the depth and breadth of his contributions towards the evolution and advancement of this scientific discipline, and his critical role in elevating this field to the important position that it now occupies within modern science, are demonstrated recurrently throughout the chapters of this book. Individual chapters are contributed by internationally leading experts in their respective fields, and the topics covered include solid-state chemistry of inorganic and organic materials, heterogeneous catalysis, surface science and materials science, with one section of the book focusing on modern developments in electron microscopy and its contributions to chemistry and materials science. The book serves as a modern and up-to-date monograph in these fields, and provides a valuable resource to researchers in academia and industry who require a comprehensive source of information on this important and rapidly developing subject.

The Physical Basis for Heterogeneous Catalysis - Edmund Drauglis - 2013-11-21
THE PHYSICAL BASIS FOR HETEROGENEOUS CATALYSIS is the proceedings of the ninth Battelle Colloquium in the Materials Sciences, held in Gstaad, Switzerland, September 2-6, 1974. It took as its theme the application of modern theoretical and experimental surface physics to

rely on for the future. Materials for the 21st Century serves as a useful resource for undergraduate and high school students preparing for a career in physical sciences, life sciences, or engineering, by helping them identify new areas of interest. It is also an excellent reference for readers interested in learning more about the diverse range of materials that underlie key aspects of our economy and everyday lives.

Materials Science in Photocatalysis - Elisa I. Garcia Lopez - 2021-08-27
Materials Science in Photocatalysis provides a complete overview of the different semiconductor materials, from titania to third-generation photocatalysts, examining the increasing complexity and novelty of the materials science in photocatalytic materials. The book describes the most recommended synthesis procedure for each of them and the suitable characterization techniques for determining the optical, structural, morphological, and physical-chemical properties. The most suitable applications of the photocatalysts are described in detail, as well as their environmental applications for wastewater treatment, gaseous effluents depollution, water splitting, CO2 fixation, selective organic synthesis, coupling reactions, and other selective transformations under both UV light and visible-light irradiation. This book offers a useful reference for a wide audience from students studying chemical engineering and materials chemistry to experienced researchers working on chemical engineering, materials science, materials engineering, environment engineering, nanotechnology, and green chemistry. - Includes a complete overview of the different semiconductor materials used as photocatalysts - Describes methods of preparation and characterization of photocatalysts and their applications - Examines new possibilities to prepare effective photocatalysts

For far too long chemists and industrialists have relied on the use of aggressive reagents such as nitric and sulphuric acids, permanganates and dichromates to prepare the massive quantities of both bulk and fine chemicals that are needed for the maintenance of civilised life — materials such as fuels, fabrics, foodstuffs, fertilisers and pharmaceuticals. Such aggressive reagents generate vast quantities of environmentally harmful and often toxic by-products, including the oxides of nitrogen, of metal oxides and carbon dioxide. Now, owing to recent advances made in the synthesis of nanoporous solids, it is feasible to design new solid catalysts that enable benign, mild oxidants to be used, frequently without utilising solvents, to manufacture the products that the chemical, pharmaceutical, agro- and biochemical industries require. New solid reagents, the so-called single-site heterogeneous catalysts (SSHCs), are particularly great. The Organizing Committee thought it might be possible to accelerate progress by the application of the powerful techniques evolved in recent years for studying atomically clean surfaces. However, the translation of ideas derived from clean single crystal surfaces with well characterized chemisorbed layers to real catalysts with high ratios of surface to mass on which reactions were taking place and requiring transport of mass and energy is a giant step, raising many questions and requiring thorough discussion by surface physicists on the one hand and catalytic chemists on the other. The 1974 Battelle Colloquium provided a forum for this exchange. As its usual custom, the Colloquium started the first day of introductory lectures by three distinguished scientists who have contributed impor tantly over many years to this field.

Dynamic Nuclear Polarization Solid-state NMR in Heterogeneous Catalysis Research - - 2015
In this study, a revolution in solid-state nuclear magnetic resonance (SSNMR) spectroscopy is taking place, attributable to the rapid development of high-field dynamic nuclear polarization (DNP), a technique yielding sensitivity improvements of 2-3 orders of magnitude. This higher sensitivity in SSNMR has already impacted materials research, and the implications of new methods on catalytic sciences are expected to be profound.

Dynamic Nuclear Polarization Solid-state NMR in Heterogeneous Catalysis Research - - 2015
In this study, a revolution in solid-state nuclear magnetic resonance (SSNMR) spectroscopy is taking place, attributable to the rapid development of high-field dynamic nuclear polarization (DNP), a technique yielding sensitivity improvements of 2-3 orders of magnitude. This higher sensitivity in SSNMR has already impacted materials research, and the implications of new methods on catalytic sciences are expected to be profound.

Materials for the 21st Century - David Segal - 2017-05-19
What does cotton candy, which dissolves at the touch, have in common with Kevlar, used for bullet-proof vests? How can our understanding of such materials help us to tackle essential problems of the 21st century? Materials for the 21st Century serves as a useful resource for undergraduate and high school students preparing for a career in physical sciences, life sciences, or engineering, by helping them identify new areas of interest. It is also an excellent reference for readers interested in learning more about the diverse range of materials that underlie key aspects of our economy and everyday lives.

Materials for the 21st Century - David Segal - 2017-05-19
What does cotton candy, which dissolves at the touch, have in common with Kevlar, used for bullet-proof vests? How can our understanding of such materials help us to tackle essential problems of the 21st century? Materials for the 21st Century serves as a useful resource for undergraduate and high school students preparing for a career in physical sciences, life sciences, or engineering, by helping them identify new areas of interest. It is also an excellent reference for readers interested in learning more about the diverse range of materials that underlie key aspects of our economy and everyday lives.
heterogeneous catalytic materials solid state chemistry surface chemistry and catalytic behaviour

Sustainability - John Meurig Thomas - 2012-04-16

For too long, performance and industrial requirements based on the use of aggressive reagents such as nitric and sulphuric acids, permananates and dichromates to prepare the massive quantities of both bulk and fine chemicals that are needed for the maintenance of civilised life — materials such as fuels, fabrics, foodstuffs, fertilisers and pharmaceuticals. Such aggressive reagents generate vast quantities of environmentally harmful and often toxic by-products, including the oxides of nitrogen, of metal oxides and carbon dioxide.

Now, owing to recent advances made in the synthesis of nanoporous solids, it is feasible to design new solid catalysts that enable benign, mild oxidants to be used, frequently without utilising solvents, to manufacture the products that the chemical, pharmaceutical, agro- and biochemical industries require. These new solid catalysts are designated single-site heterogeneous catalysts (SSHCs). Their principal characteristics are that all the active sites present in the high-area solids are identical in their atomic environment and hence in their energy of interaction with reactants, just as in enzymes. Single-site heterogeneous catalysts now occupy a position of growing importance both academically and in their potential for commercial exploitation.

The text dwells both on principles of design and on applications, such as the benign synthesis of nylon 6 and vitamin B3. It equips the reader with unifying insights required for future catalytic adventures in the quest for sustainability in the materials used by humankind. Anyone acquainted with the language of molecules, including undergraduates in the physical and biological sciences, as well as graduates in engineering and materials science, should be able to assimilate the principles and examples presented in this book. Inter alia, it describes how clean technology and 'green' processes may be carried out in an environmentally responsible manner.

Modern Heterogeneous Catalysis - Rutger A. van Santen - 2017-06-19

Written by one of the world's leading experts on the topic, this advanced textbook is the perfect introduction for newcomers to this exciting field.

Concise and clear, the text focuses on such key aspects as kinetics, reaction mechanism and surface reactivity, concentrating on the essentials. The author also covers various catalytic systems, catalysis by design, and activation-deactivation. A website with supplementary material offers additional figures, original material and references.

Modern Heterogeneous Catalysis - Rutger A. van Santen - 2017-06-19

Written by one of the world's leading experts on the topic, this advanced textbook is the perfect introduction for newcomers to this exciting field.

Concise and clear, the text focuses on such key aspects as kinetics, reaction mechanism and surface reactivity, concentrating on the essentials. The author also covers various catalytic systems, catalysis by design, and activation-deactivation. A website with supplementary material offers additional figures, original material and references.

Modern Applications of High Throughput R&D in Heterogeneous Catalysis - Alfred Hagemeyer - 2014-04-04

This eBook covers the application of high-throughput R&D to both fundamental and applied catalysis including catalyst synthesis, characterization, and testing in various reactor types. Chapters include topics such as applications ranging from optimizations of established industrial catalysis to the discovery of innovative new materials, examples of the development of innovative parallel characterization methods, and cases of real catalyst testing in small scale reactor systems. Readers will also find chapters that cover commodity chemicals produced using continuous gas phase processes as well as fine chemicals produced in liquid phase batch reactors. The potential industrial applications of such processes for biomass and bioconverted feedstock conversion. The book offers a unique combination of contributions from experts working on both lab-scale and industrial catalytic processes and provides insights into the use of various catalytic materials (e.g., mineral acids, heteropolyacid, metal catalysts, zeolites, metal oxides) for clean energy production and environmental sustainability.

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 insights into the use of various catalytic materials (e.g., mineral acids, heteropolyacid, metal catalysts, zeolites, metal oxides) for clean energy production and environmental sustainability.

Emerging Carbon Materials for Catalysis - Samahie Sadjadi - 2020-09-24

Emerging Carbon Materials for Catalysis covers various carbon-based materials with a focus on their utility for catalysis. Each chapter examines the photo and electrocatalytic applications of a material, including hybrid systems composed of carbon materials. The range of chemical reactions that can be catalyzed with each material—as well as the potential drawbacks of each—are discussed. Covering nanostructured systems, as well as other microstructured materials, the book reviews emerging carbon-based catalysts for biomass conversion, refining, and petrochemical processes. The book surveys emerging carbon-based

Environment Catalyses Serves as an ideal reference for graduate students and researchers working in organic chemistry, catalysis, nanotechnology, and nanomaterials. Introduces novel and emerging carbon materials with utility for photocatalysis and electrocatalysis Covers a wide range of photochemical and electrochemical processes that can be catalyzed by carbon-based catalysts Addresses the hybrid systems composed of carbon materials for catalysis Serves as an ideal reference for graduate students and researchers working in organic chemistry, catalysis, nanotechnology, and nanomaterials.

Emerging Carbon Materials for Catalysis - Samahie Sadjadi - 2020-09-24

Emerging Carbon Materials for Catalysis covers various carbon-based materials with a focus on their utility for catalysis. Each chapter examines the photo and electrocatalytic applications of a material, including hybrid systems composed of carbon materials. The range of chemical reactions that can be catalyzed with each material—as well as the potential drawbacks of each—are discussed. Covering nanostructured systems, as well as other microstructured materials, the book reviews emerging carbon-based catalysts for biomass conversion, refining, and petrochemical processes. The book surveys emerging carbon-based
New Materials for Catalytic Applications - Vasile I. Parvulescu - 2016-01-28

New Materials for Catalytic Applications proposes the use of both new and existing materials for catalytic applications, such as zeolites, metal oxides, microporous and mesoporous materials, and monocrystals. In addition, metal-oxides are discussed from a new perspective, i.e. nano- and photocatalytic applications. The material presents these concepts with a new focus on strategies in synthesis, synthesis based on a rational design, the correlation between basic properties/potential applications, and new catalytic solutions for acid-base, redox, hydrogenation, photocatalytic reactions, etc. Presents organometallic concepts for the synthesis of nanocatalysts Provides a synthesis of new materials following the fluoroletic sol-gel concept Covers electronic and photocatalytic properties via synthesis of nano-oxide materials Details the nature of sites in MOFs generating catalytic properties immobilization of triflates in solid matrices for organic reactions New Materials for Catalytic Applications - Vasile I. Parvulescu - 2016-01-28

New Materials for Catalytic Applications proposes the use of both new and existing materials for catalytic applications, such as zeolites, metal oxides, microporous and mesoporous materials, and monocrystals. In addition, metal-oxides are discussed from a new perspective, i.e. nano- and photocatalytic applications. The material presents these concepts with a new focus on strategies in synthesis, synthesis based on a rational design, the correlation between basic properties/potential applications, and new catalytic solutions for acid-base, redox, hydrogenation, photocatalytic reactions, etc. Presents organometallic concepts for the synthesis of nanocatalysts Provides a synthesis of new materials following the fluoroletic sol-gel concept Covers electronic and photocatalytic properties via synthesis of nano-oxide materials Details the nature of sites in MOFs generating catalytic properties immobilization of triflates in solid matrices for organic reactions

Heterogeneous Photocatalysis - M. Schiavello - 1997-10-09

Photocatalysis is a reaction which is accelerated by light while a heterogeneous reaction consists of two phases (a solid and a liquid for example). Heterogeneous Photocatalysis is a fast developing science which to date has not been fully detailed in a monograph. This title discusses the basic principles of heterogeneous photocatalysis and describes the bulk and surface properties of semiconductors. Applications of various types of photocatalysis are described and the problems related to the modeling and design of photocatalysts are covered.

Heterogeneous Photocatalysis - M. Schiavello - 1997-10-09

Photocatalysis is a reaction which is accelerated by light while a heterogeneous reaction consists of two phases (a solid and a liquid for example). Heterogeneous Photocatalysis is a fast developing science which to date has not been fully detailed in a monograph. This title discusses the basic principles of heterogeneous photocatalysis and describes the bulk and surface properties of semiconductors. Applications of various types of photocatalysis are described and the problems related to the modeling and design of photocatalysts are covered.

Nano-catalyst for Energy Applications - Rohit Srivastava - 2021-07-30

This book comprises of chapters based on design of various advanced nano-catalysts and offers a development of novel solutions for a better sustainable energy future. This book includes all aspects of physical chemistry, chemical engineering and material science. The advances in nanoscience and nanotechnology help to find cost-effective and environmentally sound methods of converting naturally inspired resources into fuels, chemicals and energy. The book leads the scientific community to the most significant development in the focus research area. It provides a broad and in-depth coverage of design and development advanced nano-catalyst for various energy applications.

Petrochemical Catalyst Materials, Processes, and Emerging Technologies - Al-Megren, Hamid - 2016-02-17

Heterogeneous Catalysis - Giovanni Palmisano - 2022-01-15

Heterogeneous Catalysis: Fundamentals, Engineering and Characterizations provides a comprehensive introduction to the theory of heterogeneous catalysis, including thermodynamic and kinetic aspects, adsorption mechanisms, catalytic reactors and catalyst characterization, with an introduction to sustainable catalysis. Representing a reference source for students and researchers working in this rapidly advancing field, the text reflects the many facets of the discipline, linking fundamental concepts with their applications. Beginning with a step-by-step look at the thermodynamics and energetics of catalysis, from basic concepts to the more complex aspects, the book goes on to cover reaction engineering and modeling, ending with sustainable catalysis and characterization techniques typically used for solid catalysts. Including presentation slides to support research and learning as well as aid quick understanding of the key concepts, this book will be of interest to postgraduate students and researchers working in chemical engineering, chemistry and materials science as well as industrial researchers. Includes an accompanying presentation slides aid for easy understanding of key concepts Covers the modeling of catalytic reactors and sustainable catalysis Includes adsorption/desorption thermodynamics and kinetics Details characterization techniques for the assessment of textural, structural, morphological, optical and chemical properties of the catalysts

Heterogeneous Catalysis - Giovanni Palmisano - 2022-01-15

Heterogeneous Catalysis: Fundamentals, Engineering and Characterizations provides a comprehensive introduction to the theory of heterogeneous catalysis, including thermodynamic and kinetic aspects, adsorption mechanisms, catalytic reactors and catalyst characterization, with an introduction to sustainable catalysis. Representing a reference source for students and researchers working in this rapidly advancing field, the text reflects the many facets of the discipline, linking fundamental concepts with their applications. Beginning with a step-by-step look at the thermodynamics and energetics of catalysis, from basic concepts to the more complex aspects, the book goes on to cover reaction engineering and modeling, ending with sustainable catalysis and characterization techniques typically used for solid catalysts. Including presentation slides to support research and learning as well as aid quick understanding of the key concepts, this book will be of interest to postgraduate students and researchers working in chemical engineering, chemistry and materials science as well as industrial researchers. Includes an accompanying presentation slides aid for easy understanding of key concepts Covers the modeling of catalytic reactors and sustainable catalysis Includes adsorption/desorption thermodynamics and kinetics Details characterization techniques for the assessment of textural, structural, morphological, optical and chemical properties of the catalysts

Basic Principles in Applied Catalysis - Manfred Baers - 2013-03-09

Written by a team of internationally recognized experts, this book addresses the most important types of catalytic reactions and catalysts as used in industrial practice. Both applied aspects and the essential scientific principles are described. The main topics can be summarized as follows: heterogeneous, homogeneous and biocatalysis, catalyst preparation and characterization, catalytic reaction engineering and kinetics, catalyst deactivation and industrial perspective.

Basic Principles in Applied Catalysis - Manfred Baers - 2013-03-09
Heterogeneous Catalysis - Moises Romolos Cesario - 2022-05-15

Heterogeneous Catalysis: Materials and Applications focuses on heterogeneous catalysis applied to the elimination of atmospheric pollutants, as alternative solution for producing clean energy as well as valorization of chemical products. The book shows how heterogeneous catalysis applications can be used to solve environmental problems, convert/store energy through electrocatalytic reactions and chemical valorization. The book covers subjects such as: nanomaterials for heterogeneous catalysis, heterogeneous catalysis mechanisms, SOX adsorption, chlorine chemistry, greenhouse gases conversion, reforming reactions for hydrogen production, valorization of hydrogen energy, energy conversion and storage, and biomass valorization. This new information has increased interest to society such as valorization of biomass, use of polluting gases to produce value-added products, optimization of catalytic materials for water splitting, batteries, supercapacitors, fuel cells and other devices. Discussions pollutant adsorption by industrial fumes desulphurization processes help in improving processes in obtaining chemicals from oxychlorination reactions.

Heterogeneous Catalysis - Moises Romolos Cesario - 2022-05-15

Heterogeneous Catalysis: Materials and Applications focuses on heterogeneous catalysis applied to the elimination of atmospheric pollutants, as alternative solution for producing clean energy as well as valorization of chemical products. The book helps you understand the properties of catalytic materials and catalysis phenomena governing electrocatalytic/catalytic reactions, and more specifically - the study of surface and interface chemistry. Heterogeneous Catalysis: Materials and Applications clusters knowledge in these fields, and as such makes it available to the academic/industrial community. The book shows how heterogeneous catalysis applications can be used to solve environmental problems, convert/store energy through electrocatalytic reactions and chemical valorization. The book covers subjects such as: nanomaterials for heterogeneous catalysis, heterogeneous catalysis mechanisms, SOX adsorption, chlorine chemistry, greenhouse gases conversion, reforming reactions for hydrogen production, valorization of hydrogen energy, energy conversion and storage, and biomass valorization. Addressed topics of increasing interest to society such as valorization of biomass, use of polluting gases to produce value-added products, optimization of catalytic materials for water splitting, batteries, supercapacitors, fuel cells and other devices. Discusses pollutant adsorption by industrial fumes desulphurization processes help in improving processes in obtaining chemicals from oxychlorination reactions.

Spectroscopic Properties of Inorganic and Organometallic Compounds - Jack Yarwood - 2012-07-01

Spectroscopic Properties of Inorganic and Organometallic Compounds: Techniques, Materials and Applications provide a unique source of information in an important area of chemistry. Since Volume 40 the nature and ethos of this series have been altered to reflect a change of emphasis towards “Techniques, Materials and Applications.” Researchers will now find up-to-date critical reviews which provide in-depth analyses of the latest papers in the field, with authors commenting on the quality and value of the work in a wider context. Focus areas will include structure-function relationships, photochemistry and spectroscopy of inorganic complexes, and catalysis; materials such as ceramics, cements, pigments, glasses and corrosion products; techniques such as advanced laser spectroscopy and theoretical methods.

Spectroscopic Properties of Inorganic and Organometallic Compounds - Jack Yarwood - 2012-07-01

Spectroscopic Properties of Inorganic and Organometallic Compounds: Techniques, Materials and Applications provide a unique source of information in an important area of chemistry. Since Volume 40 the nature and ethos of this series have been altered to reflect a change of emphasis towards “Techniques, Materials and Applications.” Researchers will now find up-to-date critical reviews which provide in-depth analyses of the latest papers in the field, with authors commenting on the quality and value of the work in a wider context. Focus areas will include structure-function relationships, photochemistry and spectroscopy of inorganic complexes, and catalysis; materials such as ceramics, cements, pigments, glasses and corrosion products; techniques such as advanced laser spectroscopy and theoretical methods.

Characterization of Catalytic Materials - Israel E. Wachs - 2010

Heterogeneous catalysis has undergone a revolutionary change in the past two decades due to the development of sophisticated characterization methods that provide fundamental information about the catalytic bulk structures, surfaces, and their properties. For the first time, these characterization methods have allowed researchers to “see” the surfaces of catalytic materials, their bulk structures (crystalline as well as amorphous phases), the influence of the process conditions on the catalytic material, as well as the effect of different synthesis methods. This new information has tremendously advanced our understanding of catalytic materials and their properties. These characterization methods have become our “eyes” and are indispensable in the development of new catalytic materials. It is hard to conceive of a modern heterogeneous catalysis activity, be it research or manufacturing, without the aid of these new characterization techniques.

Characterization of Catalytic Materials - Israel E. Wachs - 2010

Heterogeneous catalysis has undergone a revolutionary change in the past two decades due to the development of sophisticated characterization methods that provide fundamental information about the catalytic bulk structures, surfaces, and their properties. For the first time, these characterization methods have allowed researchers to “see” the surfaces of catalytic materials, their bulk structures (crystalline as well as amorphous phases), the influence of the process conditions on the catalytic material, as well as the effect of different synthesis methods. This new information has tremendously advanced our understanding of catalytic materials and their properties. These characterization methods have become our “eyes” and are indispensable in the development of new catalytic materials. It is hard to conceive of a modern heterogeneous catalysis activity, be it research or manufacturing, without the aid of these new characterization techniques.

Heterogeneous Photocatalysis - Juan Carlos Colmenares - 2015-12-24

The book explains the principles and fundamentals of photocatalysis and highlights the current developments and future potential of the green-chemistry-oriented applications of various inorganic, organic, and hybrid photocatalysts. The book consists of eleven chapters, including the principles and fundamentals of photocatalysis; research on TiO2-based composites with unique nanostructures; the latest developments and advances in exploiting photocatalyst alternatives to TiO2; and photocatalytic materials for applications other than the traditional degradation of pollutants, such as carbon dioxide reduction, water oxidation, a complete spectrum of selective organic transformations and water splitting by photocatalytic reduction. In addition, heterogeneous polyoxometalate materials for photocatalytic purposes and the proper design of photocatalytic reactors and modeling of light are also discussed. This book appeals to a wide readership of the academic and industrial researchers and can also be used in the classroom for undergraduate and graduate students focusing on heterogeneous photocatalysis, sustainable chemistry, energy conversion and storage, nanotechnology, chemical engineering, environmental protection, optoelectronics, sensors, and surface and interface science. Juan Carlos Colmenares is a Professor at the Institute of Physical Chemistry, Polish Academy of Sciences, Poland. Yi-Jun Xu is a Professor at the State Key Laboratory of Photocatalysis on Energy and Environment, College of Chemistry, Fuzhou University, China.

Heterogeneous Photocatalysis - Juan Carlos Colmenares - 2015-12-24

The book explains the principles and fundamentals of photocatalysis and highlights the current developments and future potential of the green-chemistry-oriented applications of various inorganic, organic, and hybrid photocatalysts. The book consists of eleven chapters, including the principles and fundamentals of photocatalysis; research on TiO2-based composites with unique nanostructures; the latest developments and advances in exploiting photocatalyst alternatives to TiO2; and photocatalytic materials for applications other than the traditional degradation of pollutants, such as carbon dioxide reduction, water oxidation, a complete spectrum of selective organic transformations and water splitting by photocatalytic reduction. In addition, heterogeneous polyoxometalate materials for photocatalytic purposes and the proper design of photocatalytic reactors and modeling of light are also discussed. This book appeals to a wide readership of the academic and industrial researchers and can also be used in the classroom for undergraduate and graduate students focusing on heterogeneous photocatalysis, sustainable chemistry, energy conversion and storage, nanotechnology, chemical engineering, environmental protection, optoelectronics, sensors, and surface and interface science. Juan Carlos Colmenares is a Professor at the Institute of
Heterogeneous Catalytic Redox Reactions - Vladimir Sadykov - 2019-10-21
The current book brings together cutting-edge research in the area of heterogeneous catalytic redox processes. The first part of the book covers the catalytic properties of transition metal oxides and the techniques for catalysts preparation, such as mechanochemistry, plasmochemistry, hydrothermal treatment, etc. Further the authors focus on mechanisms of heterogeneous redox reactions followed by the overview of industrial applications.

Heterogeneous Catalytic Redox Reactions - Vladimir Sadykov - 2019-10-21
The current book brings together cutting-edge research in the area of heterogeneous catalytic redox processes. The first part of the book covers the catalytic properties of transition metal oxides and the techniques for catalysts preparation, such as mechanochemistry, plasmochemistry, hydrothermal treatment, etc. Further the authors focus on mechanisms of heterogeneous redox reactions followed by the overview of industrial applications.