

Syngas From Waste Emerging Technologies Green Energy And Technology

This book provides a scientific framework for integrated solutions to complex energy problems. It adopts a holistic, systems-based approach to demonstrate the potential of an energy systems engineering approach to systematically quantify different options at various levels of complexity (technology, plant, energy supply chain, mega-system). Utilizing modeling, simulation and optimization-based frameworks, along with a number of real-life applications, it focuses on advanced energy systems including energy supply chains, integrated biorefineries, energy planning and scheduling approaches and urban energy systems. Featuring contributions from leading researchers in the field, this work is useful for academics, researchers, industry practitioners in energy systems engineering, and all those who are involved in model-based energy systems.

Sustainable Resource Recovery and Zero Waste Approaches covers waste reduction, biological, thermal and recycling methods of waste recovery, and their conversion into a variety of products. In addition, the social, economic and environmental aspects are also explored, making this a useful

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textbook for environmental courses and a reference book for both universities and companies. Provides a novel approach on how to achieve zero wastes in a society Shows the roadmap on achieving Sustainable Development Goals Considers critical aspects of municipal waste management Covers recent developments in waste biorefinery, thermal processes, anaerobic digestion, material recycling and landfill mining

The first volume of the "Handbook of Polyhydroxyalkanoates (PHA): Microbial Biosynthesis and Feedstocks" focusses on feedstock aspects, enzymology, metabolism and genetic engineering of PHA biosynthesis. It addresses better understanding the mechanisms of PHA biosynthesis in scientific terms and profiting from this understanding in order to enhance PHA biosynthesis in bio-technological terms and in terms of PHA microstructure. It further discusses making PHA competitive for outperforming established petrol-based plastics on industrial scale and obstacles for market penetration of PHA. Aimed at professionals and graduate students in Polymer (plastic) industry, wastewater treatment plants, food industry, biodiesel industry, this book Covers the intracellular on-goings in PHA-accumulating bacteria Assesses diverse feedstocks to be used as carbon source for PHA production including current knowledge on PHA biosynthesis starting from inexpensive waste

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feedstocks Summarizes recent relevant results dealing with PHA production from various organic by-products Presents the key elements to understand and fine-tune the microstructure and sequence-controlled molecular architecture of PHA copolyesters Discusses the use of CO-rich syngas, sourced from various organic waste materials, for PHA biosynthesis

This book explores the use of recent advanced multiple stage conversion technologies. These applications combine conventional fluidised bed systems with new plasma technologies to efficiently generate different energy outputs from waste materials with minimum cleaning effort. Using a mix of modelling and experimental approaches, the author provides fundamental insights into how the key operating variables of the two-stage process may impact the final quality of syngas. This thesis serves as a useful reference guide on the modelling and design of single and multiple-stage systems for thermal waste treatment. Its extended section on plant configuration and operation of waste gasification plants identifies the main technical challenges, and is of use to researchers entering the field.

Solid Waste professionals know the ins-and-outs of their municipal solid waste program, but does their constituency? The newly revised Responsible Solid Waste Management Booklet is designed to bridge

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the gap between the Solid Waste professional and the people they serve. This booklet will help you educate both the general public and elected officials about the basics of responsible solid waste management. With colorful infographics and easy-to-grasp explanations, readers will come away with an understanding of solid waste management from beginning to end, from waste generation to landfill destination—and everything in between.

A technical and economic review of emerging waste disposal technologies Intended for a wide audience ranging from engineers and academics to decision-makers in both the public and private sectors, *Municipal Solid Waste to Energy Conversion Processes: Economic, Technical, and Renewable Comparisons* reviews the current state of the solid waste disposal industry. It details how the proven plasma gasification technology can be used to manage Municipal Solid Waste (MSW) and to generate energy and revenues for local communities in an environmentally safe manner with essentially no wastes. Beginning with an introduction to pyrolysis/gasification and combustion technologies, the book provides many case studies on various waste-to-energy (WTE) technologies and creates an economic and technical baseline from which all current and emerging WTE technologies could be compared and evaluated. Topics include: Pyrolysis/gasification technology, the most suitable

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and economically viable approach for the management of wastes Combustion technology Other renewable energy resources including wind and hydroelectric energy Plasma economics Cash flows as a revenue source for waste solids-to-energy management Plant operations, with an independent case study of Eco-Valley plant in Utashinai, Japan Extensive case studies of garbage to liquid fuels, wastes to electricity, and wastes to power ethanol plants illustrate how currently generated MSW and past wastes in landfills can be processed with proven plasma gasification technology to eliminate air and water pollution from landfills.

The Handbook of Polyhydroxyalkanoates (PHA) focusses on and addresses varying facets of PHA biosynthesis and processing, spread across three volumes. The first volume discusses feedstock aspects, enzymology, metabolism and genetic engineering of PHA biosynthesis. It addresses better understanding the mechanisms of PHA biosynthesis in scientific terms and profiting from this understanding in order to enhance PHA biosynthesis in bio-technological terms and in terms of PHA microstructure. It further discusses making PHA competitive for outperforming established petrol-based plastics on industrial scale and obstacles for market penetration of PHA. This second volume focusses on thermodynamic and mathematical considerations of PHA biosynthesis, bioengineering

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aspects regarding bioreactor design and downstream processing for PHA recovery from microbial biomass. It covers microbial mixed culture processes and includes a strong industry-focused section with chapters on the economics of PHA production, industrial-scale PHA production from sucrose, next generation industrial biotechnology approaches for PHA production based on novel robust production strains, and holistic techno-economic and sustainability considerations on PHA manufacturing. Third volume is on the production of functionalized PHA bio-polyesters, the post-synthetic modification of PHA, processing and additive manufacturing of PHA, development and properties of PHA-based (bio)composites and blends, the market potential of PHA and follow-up materials, different bulk- and niche applications of PHA, and the fate and use of spent PHA items. Divided into fourteen chapters, it describes functionalized PHA and PHA modification, processing and their application including degradation of spent PHA-based products and fate of these bio-polyesters during compositing and other disposal strategies. Aimed at professionals and graduate students in Polymer (plastic) industry, wastewater treatment plants, food industry, biodiesel industry, this set: Presents comprehensive and holistic consideration of these microbial bioplastics in the volumes. Enables reader to learn about microbiological,

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enzymatic, genetic, synthetic biology, and metabolic aspects of PHA biosynthesis based on the latest scientific discoveries. Discusses design and operate a PHA production plant. Strong focus on post-synthetic modification, preparation of functional PHA and follow-up products, and PHA processing. Covers all related engineering considerations

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To reduce the dependence on dwindling crude oil reserves, the rational design of heterogeneous catalysts for the selective conversion of syngas into valuable fuels and chemicals is considered a principal scientific and industrial target. Syngas is an important intermediate for manufacturing clean fuels and chemicals, which can be derived from a variety of carbonaceous resources such as coal, natural gas, shale gas, municipal solid waste (MSW) or lignocellulosic biomass feedstocks through gasification or reforming technologies. The use of biomass feedstock and its derivatives (biomass-derived syngas) to produce renewable energy, carbon neutral and clean fuels and chemicals is gaining increasing interests because these resources can supplement existing supplies of raw materials and have less net environmental impact. This book provides recent

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research on the production, emerging technologies and ecological impacts of syngas.

This book focuses on the ways in which military installations and small cities can implement and integrate triple net planning and energy, water, and waste sustainability strategies into broad installation operational management, arrive at the best decision, create policy and communicate effectively to stakeholders. It explores current and emerging technologies, methods, and frameworks for energy conservation, efficiency, and renewable energy within the context of triple net zero implementation practice. Recognizing that the challenge extends beyond finding technological solutions to achieve triple net zero outcomes, the contributions also address the need for a systemic view in the planning phase, as well as adequate communication and policy measures and incentives.

Catalysis, Green Chemistry and Sustainable Energy: New Technologies for Novel Business Opportunities offers new possibilities for businesses who want to address the current global transition period to adopt low carbon and sustainable energy production. This comprehensive source provides an integrated view of new possibilities within catalysis and green chemistry in an economic context, showing how these potential new technologies may become useful to business.

Fundamentals and specific examples are included to guide the transformation of idea to innovation and business. Offering an overview of the new possibilities for creating business in catalysis, energy and green chemistry, this book is a beneficial tool for students,

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researchers and academics in chemical and biochemical engineering. Discusses new developments in catalysis, energy and green chemistry from the perspective of converting ideas to innovation and business Presents case histories, preparation of business plans, patent protection and IP rights, creation of start-ups, research funds and successful written proposals Offers an interdisciplinary approach combining science and business

Achieving environmental sustainability with rapid industrialization is a major challenge of current scenario worldwide. As globally evident, industries are the key economic drivers, but are also the major polluters as untreated/partially treated effluents discharged from the industries is usually thrown into the aquatic resources and also dumped unattended. Industrial effluents are considered as the major sources of environmental pollution as these contains highly toxic and hazardous pollutants, which reaches far off areas due to the medium of dispersion and thus, create ecological nuisance and health hazards in living beings. Hence, there is an urgent to find ecofriendly solution to deal with industrial waste, and develop sustainable methods for treating/detoxifying wastewater before its release into the environment. Being a low cost and eco-friendly clean technology, bioremediation can be a sustainable alternative to conventional remediation technologies for treatment and management of industrial wastes to protect public health and environment. Therefore, this book (Volume I) covers the bioremediation of different industrial wastes viz. tannery wastewater, pulp and

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paper mill wastewater, distillery wastewater, acid mine tailing wastes, and many more; which are lacking in a comprehensive manner in previous literature at one place. A separate chapter dedicated to major industries and type of waste produced by them is also included. This book will appeal to students, researchers, scientists, industry persons and professionals in field of microbiology, biotechnology, environmental sciences, eco-toxicology, environmental remediation and waste management and other relevant areas, who aspire to work on the biodegradation and bioremediation of industrial wastes for environmental safety.

The collection, transportation and subsequent processing of waste materials is a vast field of study which incorporates technical, social, legal, economic, environmental and regulatory issues. Common waste management practices include landfilling, biological treatment, incineration, and recycling – all boasting advantages and disadvantages. Waste management has changed significantly over the past ten years, with an increased focus on integrated waste management and life-cycle assessment (LCA), with the aim of reducing the reliance on landfill with its obvious environmental concerns in favour of greener solutions. With contributions from more than seventy internationally known experts presented in two volumes and backed by the International Waste Working Group and the International Solid Waste Association, detailed chapters cover: Waste Generation and Characterization Life Cycle Assessment of Waste Management Systems Waste Minimization Material Recycling Waste Collection

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Mechanical Treatment and Separation Thermal Treatment Biological Treatment Landfilling Special and Hazardous Waste Solid Waste Technology & Management is a balanced and detailed account of all aspects of municipal solid waste management, treatment and disposal, covering both engineering and management aspects with an overarching emphasis on the life-cycle approach.

Emerging Technologies and Biological Systems for Biogas Upgrading systematically summarizes the fundamental principles and the state-of-the-art of biogas cleaning and upgrading technologies, with special emphasis on biological processes for carbon dioxide (CO₂), hydrogen sulfide (H₂S), siloxane, and hydrocarbon removal. After analyzing the global scenario of biogas production, upgrading and utilization, this book discusses the integration of methanation processes to power-to-gas systems for methane (CH₄) production and physiochemical upgrading technologies, such as chemical absorption, water scrubbing, pressure swing adsorption and the use of membranes. It then explores more recent and sustainable upgrading technologies, such as photosynthetic processes using algae, hydrogen-mediated microbial techniques, electrochemical, bioelectrochemical, and cryogenic approaches. H₂S removal with biofilters is also covered, as well as removal of siloxanes through polymerization, peroxidation, biological degradation and gas-liquid absorption. The authors also thoroughly consider issues of mass transfer limitation in biomethanation from waste gas, biogas upgrading and life cycle assessment of

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upgrading technologies, techno-economic aspects, challenges for upscaling, and future trends. Providing specific information on biogas upgrading technology, and focusing on the most recent developments, Emerging Technologies and Biological Systems for Biogas Upgrading is a unique resource for researchers, engineers, and graduate students in the field of biogas production and utilization, including waste-to-energy and power-to-gas. It is also useful for entrepreneurs, consultants, and decision-makers in governmental agencies in the fields of sustainable energy, environmental protection, greenhouse gas emissions and climate change, and strategic planning. Explores all major technologies for biogas upgrading through physiochemical, biological, and electrochemical processes Discusses CO₂, H₂S, and siloxane removal techniques Provides a systematical approach to discuss technologies, including challenges to gas–liquid mass transfer, life cycle assessment, technoeconomic implications, upscaling and systems integration Integrated Gasification Combined Cycle (IGCC) Technologies discusses this innovative power generation technology that combines modern coal gasification technology with both gas turbine and steam turbine power generation, an important emerging technology which has the potential to significantly improve the efficiencies and emissions of coal power plants. The advantages of this technology over conventional pulverized coal power plants include fuel flexibility, greater efficiencies, and very low pollutant emissions. The book reviews the current status and future

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developments of key technologies involved in IGCC plants and how they can be integrated to maximize efficiency and reduce the cost of electricity generation in a carbon-constrained world. The first part of this book introduces the principles of IGCC systems and the fuel types for use in IGCC systems. The second part covers syngas production within IGCC systems. The third part looks at syngas cleaning, the separation of CO₂ and hydrogen enrichment, with final sections describing the gas turbine combined cycle and presenting several case studies of existing IGCC plants. Provides an in-depth, multi-contributor overview of integrated gasification combined cycle technologies Reviews the current status and future developments of key technologies involved in IGCC plants Provides several case studies of existing IGCC plants around the world

Most coveted energy forms nowadays are gas in nature and electricity due to their environmental cleanness and convenience. Recently, gasification market trend is starting to switch to low-grade feedstock such as biomass, wastes, and low-rank coal that are still not properly utilized. In this sense, the most promising area of development in gasification field lies in low-grade feedstock that should be converted to more user-friendly gas or electricity form in utilization. This book tried to shed light on the works on gasification from many parts of the world and thus can feel the technology status and the areas of interest regarding gasification for low-grade feedstock.

Gasification of Waste Materials: Technologies for Generating Energy, Gas and Chemicals from MSW,

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Biomass, Non-recycled Plastics, Sludges and Wet Solid Wastes explores the most recent gasification technologies developing worldwide to convert waste solids to energy and synthesis gas and chemical products. The authors examine the thermodynamic aspects, accepted reaction mechanisms and kinetic constraints of using municipal solid waste (MSW), biomass, non-recycled plastics (NRP), sludges and wet solid wastes as feedstock. They identify the distinctions between pyrolysis, gasification, plasma, hydrothermal gasification, and supercritical systems. A comprehensive summary of laboratory and demonstration activities is presented, as well as field scale systems that have been in operation using solid waste streams as input, highlighting their areas of disconnect and alignment. The book also provides a summary of information on emissions from the stack, comparing them with other thermal conversion systems using similar feedstock. It then goes on to assess the areas that must be improved to ensure gasification systems become as successful as combustion systems operating on waste streams, ranging from feedstock processing to gasifier output gas clean-up, downstream system requirements and corrosion. The economics and future projections for waste gasification systems are also discussed. For its consolidation of the current technical knowledge, this text is recommended for engineering researchers, graduate students, industry professionals, municipal engineers and decision makers when planning, designing and deploying waste to energy projects, especially those using MSW as feedstock. Provides field demonstrations

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of large scale systems, their results and the challenges that need to be overcome when developing commercial applications and possible solutions Presents the most recent technologies in lab and demonstration scale Examines the critical development needs and real life challenges for the deployment of waste to energy technologies Provides information on the economics and sustainability of these technologies, as well as their future perspectives

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Environmental public health is an interdisciplinary approach to the study of the direct and indirect impact of exposure to environmental hazards on the public's health and wellbeing. Assessing and addressing the risks of chemical, ionising and non-ionising radiation, and noise hazards requires a sound knowledge of toxicology, environmental epidemiology, environmental science, health risk assessment, and public health principles.

Essentials of Environmental Science for Public Health provides practical guidance on the technical aspects of environmental and public health investigations. Written by leaders in the field, the authors provide practical, expert advice on a range of topics from key concepts and framework for investigation to contaminated land and waste management. Case studies are used to aid learning and understanding of the topics discussed.

Produced by Health Protection England, Essentials of Environmental Science for Public Health offers a comprehensive and structured approach to understanding environmental public health issues and

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will be essential reading for all students and professionals in environmental public health. Sustainable Food Waste-to-Energy Systems assesses the utilization of food waste in sustainable energy conversion systems. It explores all sources of waste generated in the food supply chain (downstream from agriculture), with coverage of industrial, commercial, institutional and residential sources. It provides a detailed analysis of the conventional pathways for food waste disposal and utilization, including composting, incineration, landfilling and wastewater treatment. Next, users will find valuable sections on the chemical, biochemical and thermochemical waste-to-energy conversion processes applicable for food waste and an assessment of commercially available sustainable food waste-to-energy conversion technologies. Sustainability aspects, including consideration of environmental, economic and social impacts are also explored. The book concludes with an analysis of how deploying waste-to-energy systems is dependent on cross-cutting research methods, including geographical information systems and big data. It is a useful resource for professionals working in waste-to-energy technologies, as well as those in the food industry and food waste management sector planning and implementing these systems, but is also ideal for researchers, graduate students, energy policymakers and energy analysts interested in the most recent advances in the field. Provides guidance on how specific food waste characteristics drive possible waste-to-energy conversion processes Presents methodologies for

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selecting among different waste-to-energy options, based on waste volumes, distribution and properties, local energy demand (electrical/thermal/steam), opportunities for industrial symbiosis, regulations and incentives and social acceptance, etc. Contains tools to assess potential environmental and economic performance of deployed systems Links to publicly available resources on food waste data for energy conversion

Substitute Natural Gas from Waste: Technical Assessment and Industrial Applications of Biochemical and Thermochemical Processes provides an overview of the science and technology of anaerobic digestion and thermal gasification for the treatment of biomass and unrecyclable waste residues. The book provides both the theoretical and practical basis for the clean and high-efficiency utilization of waste and biomass to produce Bio-Substitute Natural Gas (SNG). It examines different routes to produce bio-SNG from waste feedstocks, detailing solutions to unique problems, such as scale up issues and process integration. Final sections review waste sourcing and processing. This book is an ideal and practical reference for those developing, designing, scaling and managing bio-SNG production and utilization systems. Engineering students will find this to be a comprehensive resource on the application of fundamental concepts of bio-SNG production that are illustrated through innovative, recent case studies. Presents detailed scientific and technical information Describes up-to-date concepts, processes and plants for efficient anaerobic digestion and gasification of wastes

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and syngas utilization Compares gasification with anaerobic digestion for different situations Proposes alternative strategies to increase efficiency and overcome energy balance limitations Includes benchmarking data and industrial real-life examples to demonstrate the main process features and implementation pathways of bio-SNG systems from dry and wet waste, both in developed and developing countries

The Special Issue/book introduces advanced techniques and research that have helped to reduce CO₂ emissions and to use CO₂ for the manufacturing of valuable products. This book refers the research trends and emerging technologies contributing to the mitigation of current climate change. It covers multidisciplinary research topics such as carbon mineralization, solid waste management, and convergence technologies for sustainable solutions for climate change.

Sustainability of environment is an emerging global issue at present. Unsustainable or deteriorating environment is a matter of concern as it has threatened the survival of living creatures. Recently, climate change has been matter of great concern at a global platform owing to imbalances in natural environment. Increasing population has increased the demand for energy, which has ultimately put pressure on natural resources and caused a paradigm shift from resource generation to exploitation. Emerging Energy Alternatives for Sustainable Environment aims to address the role of sustainable technologies in energy generation options for clean environment. It covers a wide spectrum of energy

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generation approaches, with an emphasis on five key topics: (i) renewable energy sources and recent advances, (ii) emerging green technologies for sustainable development, (iii) assessment of biomass for sustainable bioenergy production, (iv) solid waste management and its potential for energy generation, and (v) solar energy applications, storage system, and heat transfer. This book provides essential and comprehensive knowledge of green energy technologies with different aspects for engineers, technocrats and researchers working in the industry, universities, and research institutions. The book is also very useful for undergraduate and graduate students of science and engineering who are keen to know about the development of renewable energy products and their corresponding processes.

In 1974, a scientific conference covering marine automation group and large vessels issues was organized under the patronage of the Technical Naval Studies Centre (CETENA) and the Italian National Research Council (CNR). A later collaboration with the Marine Technical Association (ATENA) led to the renaming of the conference as NAV, extending the topics covered to the technical field previously covered by ATENA national conferences. The NAV conference is now held every 3 years, and attracts specialists from all over the world. This book presents the proceedings of NAV 2018, held in Trieste, Italy, in June 2018. The book contains 70 scientific papers, 35 technical papers and 16 reviews, and subjects covered include: comfort on board; conceptual and practical ship design; deep sea mining

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and marine robotics; protection of the environment; renewable marine energy; design and engineering of offshore vessels; digitalization, unmanned vehicles and cyber security; yacht and pleasure craft design and inland waterway vessels. With its comprehensive coverage of scientific and technical maritime issues, the book will be of interest to all those involved in this important industry.

The gradual increase of population and the consequential rise in the energy demands in the recent years have led to the overwhelming use of fossil fuels. Hydrogen has recently gained substantial interest because of its outstanding features to be used as clean energy carrier and energy vector. Moreover, hydrogen appears to be an effective alternative to tackle the issues of energy security and greenhouse gas emissions given that it is widely recognized as a clean fuel with high energy capacity. Hydrogen can be produced by various techniques such as thermochemical, hydrothermal, electrochemical, electrolytic, biological and photocatalytic methods as well as hybrid systems. *New Dimensions in Production and Utilization of Hydrogen* emphasizes on the research, development and innovations in the production and utilization of hydrogen in the industrial biorefining, hydrotreating and hydrogenation technologies, fuel cells, aerospace sector, pharmaceuticals, metallurgy, as well as bio-oil upgrading. Moreover, the supply chain analysis, lifecycle assessment, techno-economic analysis, as well as strengths and threats of global hydrogen market are covered in the book. This book provides many significant insights and scientific findings of key technologies for hydrogen production, storage and emerging applications. The book serves as a reference material for chemical and biochemical engineers, mechanical engineers, physicists,

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chemists, biologists, biomedical scientists and scholars working in the field of sustainable energy and materials. Discusses the efficient usage of hydrogen as standalone fuel or feedstock in downstream processing Outlines key technologies for hydrogen production and their emerging applications Includes innovative approaches to the research and applications of hydrogen, including hydrotreating technologies, fuel cell vehicles and green fuel synthesis, the aerospace sector, pharmaceuticals, carbon dioxide hydrogenation, and bio-oils upgrading Serves as a reference for chemical, biochemical, and mechanical engineers, physicists, chemists, biologists, and biomedical scientists working in sustainable energy and materials

This book introduces advanced or emerging technologies for conversion of wastes into a variety of high-value chemicals and materials. Energy and resources can be recovered from various residential, industrial and commercial wastes, such as municipal wastewater and sludge, e-waste, waste plastics and resins, crop residues, forestry residues and lignin. Advanced waste-to-resource and energy technologies like pyrolysis, hydrothermal liquefaction, fractionation, depolymerization, gasification and carbonization are also introduced. The book serves as an essential guide to dealing with various types of wastes and the methods of disposal, recovery, recycling and re-use. As such it is a valuable resource for a wide readership, including graduate students, academic researchers, industrial researchers and practitioners in chemical engineering, waste management, waste to energy and resources conversion and biorefinery. Dwindling global supplies of conventional energy and materials resources are widely thought to severely constrain, or even render impossible, a "first-world" lifestyle for the bulk of Earth's inhabitants. This bleak prospect, however, is wrong. Current energy resources are used grotesquely

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inefficiently as heat ("fuels," after all, are "burned"), so that well over half of the energy is simply dissipated into the environment. In turn, conventional materials resources, particularly of metals, are geologically anomalous deposits that also are typically processed by the prodigious application of raw heat. Simultaneously, rising levels of pollution worldwide are a challenge to remediate as they require the extraction of pollutants at low concentration. Nanotechnology, the structuring of matter at near-molecular scales, offers the prospect of solving all these problems at a stroke. Non-thermal use of energy, in broad emulation of what organisms do already, will not only lead to more efficient use but make practical diffuse sources such as sunlight. Pollution control and resource extraction become two aspects of the same fundamental problem, the low-energy extraction of particular substances from an arbitrary background of other substances, and this also is in emulation of what biosystems carry out already. This book sketches out approaches both for the efficient, non-thermal use of energy and the molecular extraction of solutes, primarily from aqueous solution, for purification, pollution control, and resource extraction. Some long-term implications for resource demand are also noted. In particular, defect-free fabrication at the molecular level is ultimately likely to make structural metals obsolete. Syngas from Waste presents the most recent concepts, methods and techniques for the preliminary design of a promising emerging technology: production of clean syngas from waste materials. An in-depth account is given of the steps necessary to achieve the optimum design and up-to-date tools are presented to support the designer's decision-making tasks: modelling, simulation and optimization. Numerous illustrations and tables are included to facilitate the reader's understanding, as well as suggestions for further reading. The text is complemented with practical examples

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and industrial applications ranging from clean power generation to complex combined heat and power systems and high purity hydrogen for use in fuel cells. Syngas from Waste contains high-quality contributions from leading experts in the field. It is intended for academics at MSc or PhD level, researchers and industry practitioners in syngas production and applications, who are involved in the design, retrofit design and evaluation activities of alternative scenarios. It contains valuable teaching material for lecturers and provides industry professionals with the know-how to evaluate and improve existing installations or even to design a new one.

This book analyses 'zero-waste' (ZW) as an emerging waste management strategy for the future, which considers waste prevention through innovative design and sustainable consumption practices. Drawing on a diverse range of case studies from Australia, Bangladesh, Japan, New Zealand, Sweden, and the USA, this book explores why urban waste management systems still remain a major challenge for almost all cities around the world. Rejecting waste as an 'end-of-life' problem, Atiq Zaman and Tahmina Ahsan instead consider waste prevention through the ZW model, in which resources are utilized and consumed with minimum environmental degradation. In addition, the authors give extended discussion on why embracing the ZW concept will be beneficial for the circular economy (CE). Providing a strategic zero-waste framework and an evaluation tool to measure waste management performance aimed towards ZW goals, this book will be of great relevance to students, scholars, and policymakers with an interest in waste management, sustainable consumption, urban planning, and sustainable development.

With more than 40 contributions from expert authors, this is an extensive overview of all important research topics in the

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field of bioengineering, including metabolic engineering, biotransformations and biomedical applications. Alongside several chapters dealing with biotransformations and biocatalysis, a whole section is devoted to biofuels and the utilization of biomass. Current perspectives on synthetic biology and metabolic engineering approaches are presented, involving such example organisms as *Escherichia coli* and *Corynebacterium glutamicum*, while a further section covers topics in biomedical engineering including drug delivery systems and biopharmaceuticals. The book concludes with chapters on computer-aided bioprocess engineering and systems biology. This is a part of the Advanced Biotechnology book series, covering all pertinent aspects of the field with each volume prepared by eminent scientists who are experts on the topic in question. Invaluable reading for biotechnologists and bioengineers, as well as those working in the chemical and pharmaceutical industries. A guide to the wide-variety of waste valorisation techniques related to various biomass, waste materials and by products Waste Valorisation provides a comprehensive review of waste chemistry and its application to the generation of value-added products. The authors – noted experts on the topic – offer a clear understanding of waste diversity, drivers and policies governing its valorisation based on the location. The book provides information on the principles behind various valorisation schemes and offers a description of general treatment options with their evaluation guidelines in terms of cost, energy consumption and waste generation. Each of the book's chapters contain an introduction which summarises the current production and processing methods, yields, energy sources and other pertinent information for each specific type of waste. The authors focus on the most relevant novel technologies for value-added processing of waste streams or industrial by-products which can readily be

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integrated into current waste management systems. They also provide the pertinent technical, economic, social and environmental evaluations of bioconversions as future sustainable technologies in a biorefinery. This important book: Presents the most current technologies which integrate waste and/or by-product valorisation Includes discussions on end-product purity and life-cycle assessment challenges Explores relevant novel technologies for value-added processing of waste streams or industrial by-products which can be integrated into current waste management systems Offers a guide to waste reuse, a key sustainability goal for existing biorefineries wishing to reduce material and environmental costs Written for academic researchers and industrial scientists working in agricultural and food production, bioconversions and waste management professionals, Waste Valorisation is an authoritative guide to the chemistry and applications of waste materials and provides an overview of the most recent developments in the field.

FOCAPD-19/Proceedings of the 9th International Conference on Foundations of Computer-Aided Process Design, July 14 - 18, 2019, compiles the presentations given at the Ninth International Conference on Foundations of Computer-Aided Process Design, FOCAPD-2019. It highlights the meetings held at this event that brings together researchers, educators and practitioners to identify new challenges and opportunities for process and product design. Combines presentations from the Ninth International Conference on Foundations of Computer-Aided Process Design, FOCAPD-2019

"Cities are the world's future. Today, more than half of the global population lives in urban areas, and that number is expected to double by 2050. There is no question that cities are growing; the only debate is over how they will grow. Will we invest in the physical and social infrastructure necessary for livable, equitable, and sustainable cities? In the latest

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edition of State of the World, the flagship publication of the Worldwatch Institute, experts from around the globe examine the core principles of sustainable urbanism and profile cities that are putting these principles into practice. From Portland, Oregon to Ahmedabad, India, local people are acting to improve their cities, even when national efforts are stalled. Issues examined range from the nitty-gritty of handling waste and developing public transportation to civic participation and navigating dysfunctional government. Throughout, readers discover the most pressing challenges facing communities and the most promising solutions currently being developed. The result is a snapshot of cities today and a vision for global urban sustainability tomorrow."-- Back cover.

The interactions between human activities and the environment are complicated and often difficult to quantify. In many occasions, judging where the optimal balance should lie among environmental protection, social well-being, economic growth, and technological progress is complex. The use of a systems engineering approach will fill in the gap contributing to how we understand the intricacy by a holistic way and how we generate better sustainable solid waste management practices. This book also aims to advance interdisciplinary understanding of intertwined facets between policy and technology relevant to solid waste management issues interrelated to climate change, land use, economic growth, environmental pollution, industrial ecology, and population dynamics.

As a follow-up to the Handbook of Gasification Technology, also from Wiley-Scrivener, Synthesis Gas goes into more depth on how the products from this important technology can reduce our global carbon footprint and lead the United States, and other countries, toward energy independence. The environmental benefits are very high, and, along with carbon capture and renewable fuels, synthesis gas (or syngas) is a

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huge step toward environmental sustainability. Synthesis gas is one of the most important advancements that has ever occurred in energy production. Using this technology, for example, coal, biomass, waste products, or a combination of two or more of these can be gasified into a product that has roughly half the carbon footprint of coal alone. Used on a massive scale, just think of the potential for reducing carbon emissions! Synthesis Gas covers all aspects of the technology, from the chemistry, processes, and production, to the products, feedstocks, and even safety in the plant. Whether a veteran engineer or scientist using it as a reference or a professor using it as a textbook, this outstanding new volume is a must-have for any library. Energy Technology is an integral part of the degree, postgraduate & diploma curriculum of various branches of engineering. besides, it is also a compulsory paper for various associate membership examination conducted by professional bodies like institution of engineering (AMIE), Indian Institute of Metals (AMIIM), Indian Institute of Chemical Engineering (AMIIChE), BEE etc. This book has been prepared strictly as per the syllabus of these examinations. Short questions & answer and multiple-choice questions & answers drawn from the examination papers of various engineering colleges and professional bodies examinations given at the end of the book enhances its utility for the student.

This book summarizes recent advances in the processing of waste biomass resources to produce biofuels and biochemicals. Worldwide interest in clean energy sources, environmental protection, and mitigating global warming is rapidly gaining momentum and spurring on the search for alternative energy sources, especially for the transportation and industrial sectors. This book reviews the opportunities presented by low-cost organic waste materials, discussing

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their suitability for alternative fuel and fine chemical production, physicochemical characterization, conversion technologies, feedstock and fuel chemistry, refining technologies, fuel upgrading, residue management, and the circular economy. In addition, it explores applied aspects of biomass conversion by highlighting several significant thermochemical, hydrothermal and biological technologies. In summary, the book offers comprehensive and representative descriptions of key fuel processing technologies, energy conversion and management, waste valorization, eco-friendly waste remediation, biomass supply chain, lifecycle assessment, techno-economic analysis and the circular bioeconomy.

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