Degradable Polymers Recycling And Plastics Waste Management Plastics Engineering

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Degradable Polymers - G. Scott 2012-12-06

Few scientific developments in recent years have captured the popular imagination like the subject of'biodegradable' plastics. The reasons for this are complex and lie deep in the human subconscious. Discarded plastics are an intrusion on the sea shore and in the countryside. The fact that nature's litter abounds in the sea and on land is acceptable because it is biodegradable - even though it may take many years to be bioassimilated into the ecosystem. Plastics litter is not seen to be biodegradable and is aesthetically unacceptable because it does not blend into the natural environment. To the environmentally aware but often scientifically naive, biodegradation is seen to be the ecologically acceptable solution to the problem of plastic packaging waste and litter and some packaging manufacturers have exploited the 'green' consumer with exaggerated claims to 'environmentally friendly' biodegradable packaging materials. The principles underlying environmental degradation are not understood even by some manufacturers of 'biodegradable' materials and the claims made for them have been categorized as 'deceptive' by USA legislative authorities. This has set back the acceptance of plastics with controlled biodegradability as part of the overall waste and litter control strategy. At the opposite end of the commercial spectrum, the polymer manufactur ing industries, through their trade associations, have been at pains to discount the role of degradable materials in waste and litter management. This negative campaign has concentrated on the supposed incompatibility of degradable plastics with aspects of waste management strategy, notably materials recycling.

Plastics and the Environment - Anthony L. Andrady 2003-02-20

Plastics offer a variety of environmental benefits. However, their production, applications, and disposal present many environmental concerns. Plastics and the Environment provides state-of-the-art technical and research information on the complex relationship between the plastic and polymer industry and the environment, focusing on the sustainability, environmental impact, and cost—benefit tradeoffs associated with different technologies. Bringing together the field's leading researchers, Anthony Andrady's innovative collection not only covers how plastics affect the environment, but also how environmental factors affect plastics. The relative benefits of recycling, resource recovery, and energy recovery are also discussed in detail. The first of the book's four sections represents a basic introduction to the key subject matter of plastics and the environment; the second explores several pertinent applications of plastics with environmental implications–packaging, paints and coatings, textiles, and agricultural film use. The third section discusses the behavior of plastics in some of the environments in which they are typically used, such as the outdoors, in biotic environments, or in fires. The final section consists of chapters on recycling and thermal treatment of plastics waste. Chapters include: Commodity Polymers Plastics in Transportation Biodegradation of Common Polymers Thermal Treatment of Polymer Waste Incineration of Plastics The contributors also focus on the effectiveness of recent technologies in mitigating environmental impacts, particularly those for managing plastics in the solid waste stream. Plastic and design engineers, polymer chemists, material scientists, and ecologists will find Plastics and the Environment to be a vital resource to this critical industry.

Biopolymers: Reuse, Recycling, and Disposal - Michael Niaounakis 2013-06-20

Biopolymers Reuse, Recycling and Disposal is the first book covering all aspects of biopolymer waste management and post-usage scenarios, embracing existing technologies, applications, and the behavior of biopolymers in various waste streams. The book investigates the benefits and weaknesses, social, economic and environmental impacts, and regulatory aspects of each technology. It covers different types of recycling and degradation, as well as life cycle analysis, all supported by case studies, literature references, and detailed information about global patents. Patents in particular—comprising 80% of published technical literature in this emerging field, widely scattered, and often available in Japanese only—are a key source of information. Dr. Niaounakis draws on disciplines such as polymer science, management, biology and microbiology, organic chemistry, environmental chemistry, and patent law to produce a reference guide for engineers, scientists and other professionals involved in the development and production of biopolymers, waste management, and recycling. This information is also valuable for regulators, patent attorneys and academics working in this field. Explores techniques and technologies involved in managing biopolymers in the waste stream, including recycling and upcycling Provides waste management and recycling professionals the knowledge they need to plan for the exponential growth in biopolymer waste Helps engineers and product designers fully consider the end-of-life aspects of their environmentally sustainable 'green' products and solutions

Plastic and Polymer Industry by Region - Ololade Olatunji 2022-08-27

This book addresses the need for a technical guided thought on production, consumption, and waste management of plastic and polymers in the African continent. Issues such as resource availability, processing technologies, plastic policies, and much more are covered in the book. While Africa is made up of several different countries which might be different from each other in many ways, these countries within the African continent have some commonalities such as region, some shared history, resources, and some shared policies through organizations such as the African Union, African Free trade Zone, and ECOWAS. With a population of over a billion, the African continent has become an attractive market for various businesses. Several publications in recent years have pushed for the advancement of the African continent toward increased manufacturing as a road to development. This inevitably includes the plastics and other polymers industry. Careful consideration must be taken to ensure that this growth will focus on more sustainable and greener manufacturing; otherwise, this anticipated growth in the plastics and polymer industry will only spell increased pollution and worsening of the environment.

Handbook on Recycling and Disposal of • Hospital Waste • Municipal Solid Waste • Biomedical Waste • Plastic Waste - NIIR Board of Consultants & Engineers 2018-03-02

Waste can be almost anything, including food, leaves, newspapers, bottles, construction debris, and chemicals from a factory, candy wrappers, disposable diapers, old cars, or radioactive materials. People have always produced waste, but as industry and technology have evolved and the human population has grown, waste management has become increasingly complex. Waste recycling involves the collection of waste materials and the separation and clean-up of those materials. Recycling waste means that fewer new products and consumables need to be produced, saving raw materials and reducing energy consumption. Waste reduction and recycling are very important elements of the local waste management framework. They help both to conserve natural resources and to reduce demand for valuable landfill space. The waste recycling services has become the one of the fastest growing industry. The growth of the waste recycling services is driven by the technology development for waste recycling. The waste management market is expected to be worth US$ 13.62 billion by 2025. Indian municipal solid waste (MSW) management market is expected to grow at a CAGR of 7.14% by 2025. India has planned to achieve a capacity of 2.9 million hospital beds by 2025 which will help bio medical waste management market to grow at a CAGR of 8.41%. The concern for bio medical waste management has been felt globally with the rise in infectious diseases and indiscriminate disposal of waste. It is to be understood that management of bio medical waste is an integral part of health care. There is a clear need for the current approach of waste disposal in India that is focussed on municipalities and uses high energy/high technology, to move more towards waste processing and waste recycling (that involves public private partnerships, aiming for eventual waste minimization driven at the community level, and using low energy/low technology resources. This book basically deals with characterization of Medical Waste, Medical Waste Data Collection Activities, Medical Waste Treatment Effectiveness, Gas Sterilization, Municipal Solid Waste, Bio-Medical Waste, Hospital Waste Incineration, Production, Use, and Disposal of Plastics and Plastic Products, Medical Waste Reuse, Recycling and Reduction, Disposal on Land, municipal and plastic waste management, Plastic Waste, incineration and number of recycling methods. The book is highly recommended to new entrepreneurs, existing units who wants to get more information of Waste Disposal & Recycling.

Selecting Thermoplastics for Engineering Applications, Second Edition, - Macdermott 2020-08-26

"Combines fundamental theory, systematic experimentation, disciplined research, and logical procedures to simplify the thermoplastic selection process as well as reduce production cost and time. Second Edition contains new features such as rheology property data, recycling in resin selection, and more and more."

Principles of Polymer Systems - Ferdinand Rodriguez 2014-12-09

Maintaining a balance between depth and breadth, the Sixth Edition of Principles of Polymer Systems continues to present an integrated approach to polymer science and engineering. A classic text in the field, the new edition offers a comprehensive exploration of polymers at a level geared toward upper-level undergraduates and beginning graduate stu

Introduction to Plastics Recycling - Vannessa Goodship 2007

As in the successful first edition, this book provides straightforward information on plastic materials and technology, including the options for recycling plastics, with special focus on mechanical recycling. This new edition reflects the great strides that have been made to increase recycling rates worldwide in recent years. It considers the expansion of infrastructure in the UK to support plastic recycling and major achievements that have been made in gaining widespread public support and participation for recycling schemes; specifically the need to manage waste on an individual household level. Current issues surrounding council recycling of plastic bottles, and the practice of providing free plastic carrier bags by supermarkets, are also considered. Biopolymers are expected to have a major impact on plastic markets in the future and therefore some of the issues of biodegradability versus recycling are expanded in this second edition, as is the wider context of life cycle analysis and legislation.

Advances in Plastics, Volume I and II - Kurt C. Frisch 2001-01-10

Recycling of Polyurethanes, the first volume in the Advances in Plastics Recycling series, is focused on the physical and chemical recycling of polyurethanes, with attention given to energy conversion. A compilation of the present ongoing studies on recycling of urethane and, in general, isocyanate-based polymers, the focus is on thermosetting urethane polymers. The series, Advances in Plastics Recycling is concerned with the importance of recycling of polymers and the economic value of recyclates in different commercial applications. While such recycling has made great strides in the last decade, the number of commercial recyclers is still very small. From the Preface Options of technologies for waste disposal of plastics are: recycling, reuse and incineration (waste-energy). Among these, the best option from the environmental standpoint is recycling. Recycling of industrial thermoplastic waste is practiced throughout the plastics industry, although it has certain limitations with regard to the number of recycles and the type of plastic. The recycling of thermosets presents a different problem since they cannot be reprocessed in general by conventional melting processes such as extrusion or injection molding. However, today even thermosets such as polyurethanes have been successfully recycled by both chemical and physical processes. This book will be of interest to all those involved in recycling of thermoplastic waste in the plastics industry. Included are corporate officials interested in plastics recycling, plastics engineers who work with thermosets, recycling and reclamation plastics engineers, and waste management engineers dealing with degradable plastics.

Bio-based Plastics for Food Packaging Applications - Vimal Katiyar 2017-07-19

This book discusses the development of bio-based plastics and associated nanocomposites in order to achieve targeted structural morphologies, and physical and chemical properties for use in food-packaging applications. In line with bio-based and/or biodegradable plastic matrices, the current status of the development of multifaceted bionanofillers is also explored in detail.This book begins by addressing the past, present and future prospects of bio-based and/or biodegradable polymers in specific food-packaging applications, and the importance and advantages of such packaging over fossil polymer-based packaging materials. Furthermore, this book also examines the current commercial overview of bio-based and/or biodegradable polymers and nanocomposites, and the structure-property relationship required for various advanced applications.Individual chapters detail bio-based polymers, bio-derived and microbial-derived plastics, which include exclusive investigations on the most promising polymers, such as polylactic acid (PLA) and polyhydroxyalkanoates (PHA), and their bionanocomposites, for food-packaging applications. Detailed discussions highlight the various properties of polymers for food-packaging applications including bio-based and/or biodegradable polymers and nanocomposites. The processing of blends using bio-based and/or biodegradable polymers and non-degradable polymers for food-packaging applications are also featured.In addition, extensive discussions include different edible biopolymer-based coatings on food items which can act as effective carriers for improving the shelf life of food. Moreover, various end-of-life solutions of plastics such as recycling, reuse, composting and so on, for the safe disposal of plastic waste are reviewed. Finally, this book discusses migration studies, and safety legislation and regulations of such packages in contact with food, which are currently being performed by various organisations across the world. Throughout the book, detailed case studies are included on sustainable polymers, and associated nanocomposites, along with different perspectives on their industrial applications, and critical challenges and opportunities for developing biopolymer nanocomposites for food-packaging applications.

Compostable Polymer Materials - Ewa Rudnik 2016-03

The book deals with an environmentally important family of polymers designed to be disposed of in industrial and municipal compost facilities after their useful life. These compostable plastics undergo degradation and leave no visible, distinguishable or toxic residue. Environmental concerns and legislative measures taken in different regions of the world make composting an increasingly attractive route for the disposal of redundant polymers. This book provides up-to-date results and information about compostable polymer materials in a coherent and comprehensive manner. It covers the entire spectrum of preparation, properties, degradation, and environmental issues. The emphasis is on recent studies concerning compostability and ecotoxicological assessment of polymer materials--important issues from the ecological point of view. Moreover, the thermal behavior of compostable polymers is described. Their price evolution over the past decade, an estimation of the market and future perspectives are presented. Focus on the composting process, compostability standards, compost quality and composting studiesCoherent and uniformly presented information about methods of preparation; properties, processing and applicationsUp-to-date information on ecotoxicity testing and studies of polymersOverview of thermal stability and thermal degradation process of compostable polymer materialsPresents future perspectives of compostable polymers, including evolution of price during last decadeInformation about waste management evolution in Europe, USA and Asia (China) with emphasis on composting during the last decade

Recycling of Flexible Plastic Packaging - Michael Niaounakis 2019-12-04

Recycling of Flexible Plastic Packaging presents thorough and detailed information on the management and recycling of flexible plastic packaging, focusing on the latest actual/potential methods and techniques and offering actionable solutions that minimize waste and increase product efficiency and sustainability. Sections cover flexible plastic packaging and its benefits, applications and challenges. This is followed by in-depth coverage of the materials, types and forms of flexible packaging. Other key discussions cover collection and pre-treatment, volume reduction, separation from other materials, chemical recycling, post-processing and reuse, current regulations and policies, economic aspects and immediate trends. This information will be highly valuable to engineers, scientists and R&D professionals across industry. In addition, it will also be of great interest to researchers in academia, those in government, or anyone with an interest in recycling who is looking to further advance and implement recycling methods for flexible plastic packaging. Presents state-of-the-art methods and technologies regarding the processing of flexible plastic packaging waste Addresses the challenges currently associated with both waste management and available recycling methods Opens the door to innovation, supporting improved recycling methods, manufacturing efficiency and industrial sustainability

Lightweight and Sustainable Materials for Automotive Applications - Omar Faruk 2017-06-01

Automotive manufacturers are required to decrease CO2 emissions and increase fuel economy while assuring driver comfort and safety. In recent years, there has been rapid development in the application of lightweight and sustainable materials in the automotive industry to help meet these criteria. This book provides critical reviews and the latest research results of various lightweight and sustainable materials in automotive applications. It discusses current applications and future trends of lightweight materials in the automotive area. While there are a few books published mainly focusing on automotive applications of metallic lightweight materials, to date there is no available book focusing on a broad spectrum of lightweight materials, including metal, plastic, composites, bio-fiber, bio-polymer, carbon fiber, glass fiber, nanomaterials, rubber materials, and foaming materials, as this work does. The book also includes case studies of commercial lightweight automotive parts from sustainable lightweight materials, providing an invaluable resource to those involved in this in-demand research and commercialization area.

Sustainable Plastics - Joseph P. Greene 2022-11-08

Enables Readers to Understand the What, Why, and How Behind Using Sustainable Plastics in Manufacturing Operations The impact of 50 years of unbridled plastics production, use, and disposal is now becoming well known and documented. Plastics made from non-renewable petroleum and natural gas resources threaten the environment, human health, species maintenance, and the very life of the ocean. This book helps readers understand the ability of plastics to be sustainable and goes over the plastic products which have a lower carbon footprint, lower waste, and lower pollution. The well-qualified author's unique perspective puts a special focus on comprehensive coverage of environmental impacts of plastics including Life Cycle Assessments (LCA) and sustainability strategies related to biobased plastics (e.g., corn), recycled plastics, and petroleum-based plastics. Other samples topics covered in the book include: End-of-life options for petroleum and biobased plastics including mechanical recycling, chemical recycling, and composting ASTM biodegradation standards for compost, marine, anaerobic digestion, and landfill environments Polymer processing, including injection molding, blow molding, extrusion, and compression molding Environmental data and coverage of petroleum plastics, sustainable composites, and new information on bio-based plastics The book serves as an invaluable resource for plastics engineers, materials engineers, and all professionals in related disciplines looking to understand and apply the usage of sustainable plastics in many different types of manufacturing operations.

Handbook of Applied Polymer Processing Technology - Nicholas P. Cheremisinoff 2020-10-07

"Offers detailed coverage of applied polymer processing--presenting a wide range of technologies and furnishing state-of-the-art data on polymer components, properties, and processibility. Reviews fundamental rheological concepts. Contains over 1600 bibliographic citations, some 450 equations, and over 400 tables, drawings, and photographs."

Oligomer Technology and Applications - Uglea 1998-01-05

Details laboratory and industrial synthesis and applications of oligomers-suggesting practical solutions to the on-the-job problems as well as exploring processing devices and techniques for industrial-scale production of new oligomer types.

Handbook of Polyolefins - Cornelia Vasile 2000-06-21

A handbook on polyolefins. This second edition includes new material on the structure, morphology and properties of polyolefin (PO) synthesis. It focuses on synthetic advances, the use of additives, special coverage of PO blends, composites and fibres, and surface treatments. It also addresses the problem of interfacial and superficial phenomena.

Photonic Polymer Systems - Donald L. Wise 1998-07-10

"Furnishes the necessary background information, methods of characterization, and applications of optic and photonic systems based on polymers. Provides detailed tutorial chapters that offer in-depth explanations of optic and photonic

fundamentals and synthesis techniques."

Biodegradability of Conventional Plastics - Anjana Sarkar 2022-09-30

Biodegradability of Conventional Plastics: Opportunities, Challenges, and Misconceptions brings together innovative research on the biodegradability of conventional plastics, providing an extensive overview of approaches and strategies that may be implemented, while also highlighting other methods for alleviating the eventual environmental impact of plastics. The book begins by providing a lifecycle assessment of plastics, the environmental impact of plastic waste, and the factors that affect the biodegradability of plastics. The different categories and terminologies surrounding bio-based plastics and biodegradable plastics are then defined and explained in detail, as are the issues surrounding bioplastics. Other sections discuss biodegradability, approaches for enhanced biodegradability of various major types of plastics, including polyolefins, polyethylene terephthalate (PET), polystyrene, poly(vinyl chloride), automotive plastics and composites, and agricultural plastic waste. The final part of the book focuses on further techniques and emerging areas, including the utilization of chemical additives, nanomaterials, the role of microbes in terms of microbial degradation and microbial attaching, revalorization of plastic waste through industrial biotechnology, and future opportunities and challenges. Explains the fundamentals of plastic waste, lifecycle assessment and factors that influence the biodegradability of plastics Provides novel techniques for improved biodegradability, exploring areas such as pre-treatment, chemical additives, nanomaterials and microbial degradation Addresses current challenges and limitations in relation to bio-based and biodegradable plastics, microplastics and nanoplastics from bioplastics and plastic waste

Management of Marine Plastic Debris - Michael Niaounakis 2017-07-04

Management of Marine Plastic Debris gives a thorough and detailed presentation of the global problem of marine plastics debris, covering every aspect of its management from tracking, collecting, treating and commercial exploitation for handing this anthropogenic waste. The book is a unique, essential source of information on current and future technologies aimed at reducing the impact of plastics waste in the oceans. This is a practical book designed to enable engineers to tackle this problem—both in stopping plastics from getting into the ocean in the first place, as well as providing viable options for the reuse and recycling of plastics debris once it has been recovered. The book is essential reading not only for materials scientists and engineers, but also other scientists involved in this area seeking to know more about the impact of marine plastics debris on the environment, the mechanisms by which plastics degrade in water and potential solutions. While much research has been undertaken into the different approaches to the increasing problem of plastics marine debris, this is the first book to present, evaluate and compare all of the available techniques and practices, and then make suggestions for future developments. The book also includes a detailed discussion of the regulatory environment, including international conventions and standards and national policies. Reviews all available processes and techniques for recovering, cleaning and recycling marine plastic debris Presents and evaluates viable options for engineers to tackle this growing problem, including the use of alternative polymers Investigates a wide range of possible applications of marine plastics debris and opportunities for businesses to make a positive environmental impact Includes a detailed discussion of the regulatory environment, including international conventions and standards and national policies

Handbook of Polymer Testing - Roger Brown 1999-01-21

The Handbook of Polymer Testing: Physical Methods provides virtually currently used techniques for measuring and testing the physical properties of polymers. A concise but detailed technical guide to the physical testing methods of synthetic polymers in plastics, rubbers, cellular materials, textiles, coated fabrics, and composites, the book analys

Prediction of Polymer Properties - Jozef Bicerano 2002-08-01

Highlighting a broad range multiscale modeling and methods for anticipating the morphologies and the properties of interfaces and multiphase materials, this reference covers the methodology of predicting polymer properties and its potential application to a wider variety of polymer types than previously thought possible. A comprehensive source, the

A TEXTBOOK OF ENGINEERING CHEMISTRY - SYAMALA SUNDAR DARA 2008

Any good text book,particularly that in the fast changing fields such as engineering & technology,is not only expected to cater to the current curricular requirments of various institutions but also should provied a glimplse towards the latest developments in the concerned subject and the relevant disciplines.It should guide the periodic review and updating of the curriculum.

Plastics and Sustainability - Lee Tin Sin 2022-11-26

Plastics and Sustainability: Practical Approaches provides a broad overview of sustainability as applied to plastics, offering a range of opportunities and solutions to be applied in an academic or industrial setting. The book begins by introducing the challenges and opportunities relating to plastics and environmental sustainability. This is followed by detailed eco-profiles organized by polymer category. Subsequent chapters explore various approaches to plastics sustainability, with in-depth coverage of incineration technology for energy recovery, pyrolysis for chemical recovery, blending technology, design, packaging, circular economy, and biopolymers. Finally, international policies are summarized. The book aims to provide a broad source of information and a range of options to readers on how to evaluate and improve the sustainability of plastics, with analyses of the advantages and drawbacks of different technologies and materials. Authored by two professional engineers with substantial experience in industry and consultancy, this is a valuable resource for all those looking for a wide-ranging overview of sustainability as applied to plastics, including researchers and advanced students from a range of materials science and engineering disciplines, and engineers, manufacturers, scientists, and R&D professionals from a range of industries. Offers detailed information on plastics eco-profiles, biopolymers, related challenges, and design and circular economy considerations Presents the latest processing technologies for plastic waste, covering incineration and energy recovery, pyrolysis and chemical recovery, and blending Includes practical guidance on recycling technology, supply chain management, costs, societal impact and international policy

The Complete Book on Biodegradable Plastics and Polymers (Recent Developments, Properties, Analysis, Materials & Processes) - NIIR Board of Consultants & Engineers 2006-10-01

Biodegradable plastics made with plant based materials have been available for many years. The term biodegradable means that a substance is able to be broken down into simpler substances by the activities of living organisms, and therefore is unlikely to persist in the environment. There are many different standards used to measure biodegradability, with each country having its own. The requirements range from 90 per cent to 60 per cent decomposition of the product within 60 to 180 days of being placed in a standard composting environment. They may be composed of either bio plastics, which are plastics whose components are derived from renewable raw materials, or petroleum based plastics which contain additives. Biodegradability of plastics is dependent on the chemical structure of the material and on constitution of the final product, not just on the raw materials used for its production. Polyesters play a predominant role as biodegradable plastics due to their potentially hydrolysable ester bonds. Bio based polymers are divided into three categories based on their origin and production; polymer directly extracted from biomass, polymers produced by classical chemical synthesis using renewable biomass monomer and polymers produces by microorganisms or genetically modified bacteria. In response to public concern about the effects of plastics on the environment and in particular the damaging effects of sea litter on animals and birds, legislation is being enacted or is pending in many countries to ban non degradable packing, finishing nets etc. This book basically deals with biodegradable plastics developments and environmental impacts, hydro biodegradable and photo biodegradable, starch synthetic aliphatic polyester blends, difference between standards for biodegradation, polybutylene succinate (pbs) and polybutylene, recent developments in the biopolymer industry, recent advances in synthesis of biopolymers by traditional methodologies, polymers, environmentally degradable synthetic biodegradable polymers as medical devices, polymers produced from classical chemical synthesis from bio based monomers, potential bio based packaging materials, conventional packaging materials, environmental impact of bio based materials: biodegradability and compostability, etc. Environmentally acceptable degradable polymers have been defined as polymers that degrade in the environment by several mechanisms and culminate in complete biodegradation so that no residue remains in the environment. The present book gives thorough information to biodegradable plastic and polymers. This is an excellent book for scientists engineers, students and industrial researchers in the field of bio based materials.

Sustainable Plastics - Joseph P. Greene 2014-09-22

Providing guidelines for implementing sustainable practices for traditional petroleum based plastics, biobased plastics, and recycled plastics, Sustainable Plastics and the Environment explains what sustainable plastics are, why sustainable plastics are needed, which sustainable plastics to use, and how manufacturing companies can integrate them into their manufacturing operations. A vital resource for practitioners, scientists, researchers, and students, the text includes impacts of plastics including Life Cycle Assessments (LCA) and sustainability strategies related to biobased plastics and petroleum based plastics as well as end-of-life options for petroleum and biobased plastics.

Economic Policy Instruments for Plastic Waste - Magnus Hennlock 2015-03-18

Achieving a high quality of waste plastic materials and recycling processes is a key challenge in closing the resource loops for plastics. This report reviews the status and trends for plastic waste flows and treatment in Denmark, Finland, Norway and Sweden. Furthermore, it gives an overview of existing policy instruments and the main challenges for designing policy instruments for improved recycling of plastic waste in these Nordic countries. The report identifies potential market failures associated with closing the resource loops for plastics. It reviews the economics research literature on policy instrument design for achieving optimal recycling rates and makes policy recommendations from the Nordic perspective. Finally, it presents results from a survey on market conditions to managers in the recycling and plastic manufacturing industry in Sweden.

Handbook of Elastomers - Anil K. Bhowmick 2000-11-02

"Provides the latest authoritative research on the developments, technology, and applications of rubbery materials. Presents structures, manufacturing techniques, and processing details for natural and synthetic rubbers, rubber-blends, rubber composites, and thermoplastic elastomers. 80% revised and rewritten material covers major advances since pu

Plastics Equipment Survey - TSS Consultants 1989

Plastic Waste and Recycling - Trevor M. Letcher 2020-03-10

Plastic Waste and Recycling: Environmental Impact, Societal Issues, Prevention, and Solutions begins with an

introduction to the different types of plastic materials, their uses, and the concepts of reduce, reuse and recycle before examining plastic types, chemistry and degradation patterns that are organized by non-degradable plastic, degradable and biodegradable plastics, biopolymers and bioplastics. Other sections cover current challenges relating to plastic waste, explain the sources of waste and their routes into the environment, and provide systematic coverage of plastic waste treatment methods, including mechanical processing, monomerization, blast furnace feedstocks, gasification, thermal recycling, and conversion to fuel. This is an essential guide for anyone involved in plastic waste or recycling, including researchers and advanced students across plastics engineering, polymer science, polymer chemistry, environmental science, and sustainable materials. Presents actionable solutions for reducing plastic waste, with a focus on the concepts of collection, re-use, recycling and replacement Considers major societal and environmental issues, providing the reader with a broader understanding and supporting effective implementation Includes detailed case studies from across the globe, offering unique insights into different solutions and approaches

Plastics and Sustainability - Michael Tolinski 2011-11-16

Clearly lays out the issues related to plastics' effects on theenvironment, while also serving as a practical, non-academic guidefor making sustainability decisions about plastics recyclingand the newest bio-based plastics Company managers, product developers, policy makers,environmental researchers, and plastics industry engineers areunder increasing pressure to find ways of minimizing theenvironmental footprint of plastic products. This accessible bookis designed to help readers understand the life-cycle impacts ofvarious plastics, clarifying the technical research and practicalarguments to show when bio-based and recycled plastics might beuseful options for reducing the overall energy consumption,greenhouse gas emissions, and waste associated with traditionalplastics. Plastics and Sustainability compares traditional fossilfuel-based plastics with bio-based plastics in terms of properties,environmental impacts, and costs -- indicating what the mosteffective approaches could be for using recycled, biodegradable, orvarious bio-based materials. The book makes objective comparisonsbetween bioplastics and all commonly used plastics, focusing on howthey affect production economics, product requirements, andretailer and consumer needs. It incorporates research concerninglife-cycle assessment, production techniques, and commercialapplications, and presents "green" guidelines about product design,recycling, processing efficiency, and material selection. The bookalso reports on recent industry developments and commercial trendsin an effort to synthesize conclusions that are necessary forfinding the right balance between bio-based and fossil-fuel basedplastic products. Check out the author's blog at spanstyle="line-height: 115%; font-family: 'Calibri','sans-serif'; color: black; font-size: 11pt; mso-ascii-theme-font: minor-latin; mso-fareast-font-family: 'Times New Roman'; mso-hansi-theme-font: minor-latin; mso-bidi-font-family: 'Cordia New'; mso-bidi-theme-font: minor-bidi; mso-ansi-language: EN-US; mso-fareast-language: ZH-CN; mso-bidi-language: TH;"spanstyle="font-family: 'Times New Roman','serif';"http://www.plastech.biz/blog/span./span

Recycled Materials for Construction Applications - Lu? s Eduardo Pimentel Real 2022-10-27

This book presents the state of the art on the topic of recycling of plastic building materials, comprising a synthetic market analysis, and presenting the latest developments in plastic recycling technologies. The book also makes recommendations to optimize the success of recycling and encourage the circular economy, while acknowledging the environmental and sustainability implications of plastic recycling for building construction. The distinctive features of this book are the variety of topics covered on sustainable plastic recycling, the discussion of advances in plastic recycling technology, detailed illustrations, and summarized descriptions of separation processes. This book is a guide for both technical and non-technical readers, and for anyone involved in plastic waste or recycling, including researchers and students in plastics engineering, polymer science, polymer chemistry, environmental science, and sustainable materials.

Degradation of Plastics - Inamuddin 2021-05-20

The degradation of plastics is most important for the removal and recycling of plastic wastes. The book presents a comprehensive overview of the field. Topics covered include plastic degradation methods, mechanistic actions, biodegradation, involvement of enzymes, photocatalytic degradation and the use of cyanobacteria. Also covered are the market of degradable plastics and the environmental implications. Keywords: Degradable Plastics, Bioplastics, Biodegradable Plastics, Enzymes, Cyanobacteria, Photocatalytic Degradation, Wastewater Treatment, Degradable Plastic Market, Polyethylene, Polypropylene, Polystyrene, Polyvinyl Chloride, Polyurethane, and Polyethylene Terephthalate.

Life Cycle Engineering of Plastics - L. Lundquist 2001-01-23

"This book adds much to the already evolving field of Design for Environment; but it goes far beyond most works on this subject by surrounding the central notions of life cycle assessment with a scientific body of knowledge and with a more practical slant reflecting the reality of the organizations in which product development occurs. Through a focus on plastic products, the authors show the importance of making ties between basic technical knowledge and the process of life cycle engineering. Their approach offers a practical, deliberate way to make ecologically and economically sensible decisions about product reuse and recycling and other critical dimensions of product life behavior. They demonstrate a positive approach to designing products that fits into a sustainable economy through down-to-earth cases. While the book focuses on the life cycle engineering of plastics, it is only a short step to other materials and products. Beyond contributing to the technology of life cycle engineering, this text adds to the growing body of knowledge that argues for an fundamentally new way of thinking about economic and social activity--a new paradigm for sustainable social and industrial problem solving. Industrial ecology is such a new system for thinking about and implementing sustainability that draws its core set of ideas from the ecological world. Industrial ecology brings to the surface the idea of interdependence among members of a community-- natural or economic, and notes the material cycles that are central to a stable ecosystem. The life cycle engineering framework, coupled with sound scientific knowledge of materials behavior as articulated in this book, makes a giant step towards bringing the model of industrial ecology into everyday practice." From the Preface by John R. Ehrenfeld Director, MIT Technology, Business and Environment Program Center for Technology, Policy, and Industrial Development

Degradable Polymers, Recycling, and Plastics Waste Management - Albertsson 1995-07-07

Based on the International Workshop on Controlled Life-Cycle of Polymeric Materials held in Stockholm, this work examines degradable polymers and the recycling of plastic materials. It highlights recent results on recycling and waste management, including topics such as renewable resources, degradation, processing and products, and environmental is

Plastics to Energy - Sultan Al-Salem 2018-11-05

Plastics to Energy: Fuel, Chemicals, and Sustainability Implications covers important trends in the science and technology of polymer recovery, such as the thermo-chemical treatment of plastics, the impact of environmental degradation on mechanical recycling, incineration and thermal unit design, and new options in biodegradable plastics. The book also introduces product development opportunities from waste materials and discusses the main processes and pathways of the conversion of polymeric materials to energy, fuel and chemicals. A particular focus is placed on industrial case studies and academic reviews, providing a practical emphasis that enables plastics practitioners involved in end-of-life aspects to employ these processes. Final sections examine lifecycle and cost analysis of different plastic waste management processes, exploring the potential of various techniques in modelling, optimization and simulation of waste management options. Introduces new pathways for the end-of-life treatment of plastics and polymers, including conversion to energy, fuel and other chemicals Compares different options to assist materials scientists, engineers and waste management practitioners to choose the most effective and sustainable option Covers the latest trends in the science and technology of polymer energy recovery

Electrical and Optical Polymer Systems - Donald L. Wise 1998-03-27

"Offers background information, methods of characterization, and applications for electrical and optical polymers, including biopolymers, and tutorial sections that explain how to use the techniques."

Biodegradable Polymers in the Circular Plastics Economy - Michiel Dusselier 2022-05-06

Biodegradable Polymers in the Circular Plastics Economy A comprehensive overview of the burgeoning field of biodegradable plastics As the lasting impact of humanity's reliance on plastics comes into focus, scholars have begun to seek out solutions to plastic litter. In Biodegradable Polymers in the Circular Plastics Economy, an accomplished team of researchers delivers a focused guide (1) to understand plastic degradation and its role in waste hierarchy besides recycling, and (2) to create and use biodegradable plastics where appropriate. Created preferably from renewable resources, these eco-friendly polymers provide an opportunity to create sustainable and lasting solutions to the growing plastic-driven pollution problem. The broad approach to this handbook allows the authors to cover all aspects of these emerging materials, ranging from the problems present in the current plastics cycle, to the differences in type, production, and chemistry available within these systems, to end-of-life via recycling or degradation, and to life-cycle assessments. It also delves into potential commercial and policy issues to be addressed to successfully deploy this technology. Readers will also find: A thorough introduction to biodegradable polymers, focusing not only on the scientific aspects, but also addressing the larger political, commercial, and consumer concerns Mechanisms of biodegradation and the environmental impact of persistent polymers An in-depth discussion of degradable/hydrolysable polyesters, polysaccharides, lignin-based polymers, and vitrimers Management of plastic waste and life cycle assessment of bio-based plastics Biodegradable Polymers in the Circular Plastics Economy is the perfect overview of this complicated but essential research field and will appeal to polymer chemists, environmental chemists, chemical engineers, and bioengineers in academia and industry. The book is intended as a step towards a circular plastics economy that relies heavily on degradable plastics to sustain it.

Plastics Waste Management - Muralisrinivasan Natamai Subramanian 2019-09-02

The book provides clear explanations for newcomers to the subject as well as contemporary details and theory for the experienced user in plastics waste management. It is seldom that a day goes by without another story or photo regarding the problem of plastics waste in the oceans or landfills. While important efforts are being made to clear up the waste, this book looks at the underlying causes and focuses on plastics waste management. Plastics manufacturers have been slow to recognize their environmental impact compared with more directly polluting industries. However, the environmental pressures concerning plastics have forced the industry to examine their own recycling operations and implement plastics waste management. Plastics Waste Management realizes two ideals: That all plastics should be able to persist for as long as plastics are required, and that all plastics are recycled in a uniform manner regardless of the length of time for which it persists. The book examines plastics waste management and

systems for the environment, as well the management approaches and techniques which are appropriate for managing the environment. It serves as an excellent and thoughtful plastics waste management handbook. This groundbreaking book: Identifies deficiencies in plastics waste management Extrapolates from experiences to draw some conclusions about plastics waste for persistence Describes methods how the waste related processing techniques should be used in recycling Shows how the consumer and industry can assess the performance of plastics waste management Explains waste utilization by recycling techniques as well as waste reduction Life cycle assessment as an important technique for recycling of persistent plastics waste.

Fundamentals of Polymer Engineering, Revised and Expanded - Anil Kumar 2003-01-21

Exploring the characterization, thermodynamics and structural, mechanical, thermal and transport behavior of polymers as melts, solutions and solids, this text covers essential concepts and breakthroughs in reactor design and polymer production and processing. It contains modern theories, end-of-chapter problems and real-world examples for a clear understanding of polymer function and development. Fundamentals of Polymer Engineering, Second Edition provides a thorough grounding in the fundamentals of polymer science for more advanced study in the field of polymers. Topics include reaction engineering of step-growth polymerization, emulsion polymerization, and polymer diffusion.