

## Polyolefin Compounds And Materials Fundamentals And Industrial Applications Springer Series On Polymer And Composite Materials

Polyolefin Compounds and Materials Fundamentals and Industrial Applications Springer

Mass spectrometric techniques have developed over recent years to offer ever increasing solutions to solving problems in food processing and packaging. Even the smallest amount of contamination in food can cause a problem for food production companies, thus they are keen to find speedy and efficient quality control methods. This book outlines how ingredients and their interrelationship with processing and packaging have developed with the exploitation of mass spectrometry and gives practical protocols to stakeholders showing the flexibility of this technique. With huge relevance worldwide, this book will appeal to food packaging scientists and mass spectrometry practitioners alike.

Novel Fire Retardant Polymers and Composite Materials reviews the latest scientific developments and technological advances in the design and manufacture of fire retardant polymers and composite materials. Fire retardant polymeric materials are used in a broad range of applications in fields such as aviation, automotive, computer, construction, electronics, and telecommunications. It is essential to have a better understanding of the scientific technology used in the design and manufacture of fire-resistant materials and their end products. This book includes the latest developments in fire retardant technologies for different polymeric material systems, such as PU, PP, PE, PLA, epoxy, rubber, textile, phenol resin, and PA, etc. Provides cutting-edge research in flame retardant materials, relevant to both scientific and industrial applications Presents the latest and most up-to-date fire retardant technologies Discusses the most popular fire retardant polymer systems Includes the latest developments in fire retardant technologies for different polymeric material systems, such as PU, PP, PE, PLA, epoxy, rubber, textile, phenol resin, and PA

Handbook of Thermoplastic Elastomers, Second Edition presents a comprehensive working knowledge of thermoplastic elastomers (TPEs), providing an essential introduction for those learning the basics, but also detailed engineering data and best practice guidance for those already involved in polymerization, processing, and part manufacture. TPEs use short, cost-effective production cycles, with reduced energy consumption compared to other polymers, and are used in a range of industries including automotive, medical, construction and many more. This handbook provides all the practical information engineers need to successfully utilize this material group in their products, as well as the required knowledge to thoroughly ground themselves in the fundamental chemistry of TPEs. The data tables included in this book assist engineers and scientists in both selecting and processing the materials for a given product or application. In the second edition of this handbook, all chapters have been reviewed and updated. New polymers and applications have been added — particularly in the growing automotive and medical fields — and changes in chemistry and processing technology are covered. Provides essential knowledge of the chemistry, processing, properties, and applications for both new and established technical professionals in any industry utilizing TPEs Datasheets provide "at-a-glance" processing and technical information for a wide range of commercial TPEs and compounds, saving readers the need to contact suppliers Includes data on additional materials and applications, particularly in automotive and medical industries

The 18th CIRP International Conference on Life Cycle Engineering (LCE) 2011 continues a long tradition of scientific meetings focusing on the exchange of industrial and academic knowledge and experiences in life cycle assessment, product development, sustainable manufacturing and end-of-life-management. The theme "Glocalized Solutions for Sustainability in Manufacturing" addresses the need for engineers to develop solutions which have the potential to address global challenges by providing products, services and processes taking into account local capabilities and constraints to achieve an economically, socially and environmentally sustainable society in a global perspective. Glocalized Solutions for Sustainability in Manufacturing do not only involve products or services that are changed for a local market by simple substitution or the omitting of functions. Products and services need to be addressed that ensure a high standard of living everywhere. Resources required for manufacturing and use of such products are limited and not evenly distributed in the world. Locally available resources, local capabilities as well as local constraints have to be drivers for product- and process innovations with respect to the entire life cycle. The 18th CIRP International Conference on Life Cycle Engineering (LCE) 2011 serves as a platform for the discussion of the resulting challenges and the collaborative development of new scientific ideas.

This book describes industrial applications of polyolefins from the researchers' perspective. Polyolefins constitute today arguably the most important class of polymers and polymeric materials for widespread industrial applications. This book summarizes the present state of the art. Starting from fundamental aspects, such as the polymerization techniques to synthesize polyolefins, the book introduces the topic. Basic knowledge about polyolefin composites and blends is explained, before applications aspects in different industry sectors are discussed. The spectrum comprises a wide range of applications and industry sectors, such as the packaging and food industry, the textile industry, automotive and buildings, and even biomedical applications. Topics, which are addressed in the various chapters, comprise synthesis and processing of the materials; their classification; mechanical, physical and technical requirements and properties; their characterization; and many more. In the end of the book, even the disposal, degradation and recycling of polyolefins are addressed, and light is shed on their commercial significance and economic value. In this way, the book follows the entire 'lifetime' of polyolefin compounds and materials: from their synthesis and processing, over applications, to the recycling and reuse of disposed or degraded polyolefin substrates.

Green and Intelligent Technologies for Sustainable and Smart Asphalt Pavements contains 124 papers from 14 different countries which were presented at the 5th International Symposium on Frontiers of Road and Airport Engineering (IFRAE 2021, Delft, the Netherlands, 12-14 July 2021). The contributions focus on research in the areas of "Circular, Sustainable and Smart Airport and Highway Pavement" and collects the state-of-the-art and state-of-practice areas of long-life and circular materials for sustainable, cost-effective smart airport and highway pavement design and construction. The main areas covered by the book include: • Green and sustainable pavement materials • Recycling technology • Warm & cold mix asphalt materials • Functional pavement design • Self-healing pavement materials • Eco-efficiency pavement materials • Pavement preservation, maintenance and rehabilitation • Smart pavement materials and structures • Safety technology for smart roads • Pavement monitoring and big data analysis • Role of transportation engineering in future pavements Green and Intelligent Technologies for Sustainable and Smart Asphalt Pavements aims at researchers, practitioners, and administrators interested in new materials and innovative technologies for achieving sustainable and renewable pavement materials and design methods, and for those involved or working in the broader field of pavement engineering.

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.

Technology and Development of Self-Reinforced Polymer Composites, by Ben Alcock und Ton Peijs; Recent Advances in High-Temperature Fractionation of Polyolefins, by

Harald Pasch, Muhammad Imran Malik und Tibor Macko ; Antibacterial Peptidomimetics: Polymeric Synthetic Mimics of Antimicrobial Peptides, by Karen Lienkamp, Ahmad E. Madkour und Gregory N. Tew; Collagen in Human Tissues: Structure, Function, and Biomedical Implications from a Tissue Engineering Perspective, by Molamma P. Prabhakaran;

The definitive reference on the properties and applications of polyolefin blends Polyolefins account for more than half of total plastics consumption in the world. In recent years, usage of and research on polyolefin blends have increased significantly due to new applications in medicine, packaging, and other fields and the development of novel polyolefins. With a special emphasis on nano- and micro-structures of crystals and phase morphology, Polyolefin Blends condenses and consolidates current information on polyolefins so that the reader can compare, select, and integrate a material solution. Focusing exclusively on the fundamental aspects as well as applications of polyolefin blends, this authoritative reference: \* Features an introductory chapter that serves as a guide to polyolefin blends \* Includes chapters covering formulation design, processing, characterization, modeling and simulation, engineering performance properties, and applications \* Covers polyolefin/polyolefin blends and polyolefin/non-polyolefin blends \* Discusses miscibility, phase behavior, functionalization, compatibilization, microstructure, crystallization, hierarchical morphology, and physical and mechanical properties \* Covers new research trends including in-situ reactor blending and reactive processing, such as compatibilization/functionalization in the melt \* Contains practical examples from open literature sources and commercial products With chapters contributed by leading experts from several countries, this is a must-have reference for scientists and engineers conducting research on polyolefin blends and for professionals in medical, packaging, and other commodity fields. It is also an excellent text for graduate students studying polymer science and polymer processing.

Surface contamination is of cardinal importance in a host of technologies and industries, ranging from microelectronics to optics to automotive to biomedical. Thus, the need to understand the causes of surface contamination and their removal is very patent. Generally speaking, there are two broad categories of surface contaminants: film-type and particulates. In the world of shrinking dimensions, such as the ever-decreasing size of microelectronic devices, there is an intensified need to understand the behavior of nanoscale particles and to devise ways to remove them to an acceptable level. Particles which were functionally innocuous a few years ago are ôkiller defectsö today, with serious implications for yield and reliability of the components. This book addresses the sources, detection, characterization and removal of both kinds of contaminants, as well as ways to prevent surfaces from being contaminated. A number of techniques to monitor the level of cleanliness are also discussed. Special emphasis is placed on the behaviour of nanoscale particles. The book is amply referenced and profusely illustrated. • Excellent reference for a host of technologies and industries ranging from microelectronics to optics to automotive to biomedical. • A single source document addressing everything from the sources of contamination to their removal and prevention. • Amply referenced and profusely illustrated.

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

The book covers preparation, designing and utilization of nanohybrid materials for biomedical applications. These materials can improve the effectiveness of drugs, promote high cell growth in new scaffolds, and lead to biodegradable surgical sutures. The use of hybrid magneto-plasmonic nanoparticles may lead to non-invasive therapies. The most promising materials are based on silica nanostructures, polymers, bioresorbable metals, liposomes, biopolymeric electrospun nanofibers, graphene, and gelatin. Much research focuses on the development of biomaterials for cell regeneration and wound healing applications. Keywords: Biomedical Materials, Cell Growth, Cell Regeneration, Wound Healing, Surgical Sutures, Non-invasive Therapies , Drug Transport, Tissue Engineering, Cardiovascular Implants, Fracture Repair Implants, Biodegradable Materials, Hybrid Magneto-plasmonic Nanoparticles, Silica Nanostructures, Polymers, Bioresorbable Metals, Liposomes, Biopolymeric Electrospun Nanofibers, Graphene, Gelatin-based Hydrogels.

Additives for Polyolefins is a unique quick-reference resource for those who create or use polyethylene and polypropylene compounds—the most commercially important family of plastic materials, making up close to half of the volume all plastics produced and used. These polymers would be useless without various additives. The book focuses on polyolefin additives that are currently important in the plastics industry, alongside new additives of increasing interest, such as nanofillers and environmentally sustainable materials. As much as possible, each chapter emphasises the performance of the additives in the polymer, and the value each relevant additive brings to polypropylene or polyethylene. Where possible, similar additives are compared by capability and relative cost. In this new edition, product tables have been updated with the most current product

and company names, new case studies have been added, the role of nanofillers is discussed in greater detail, and the book concludes with a discussion on blending and handling additives, along with an entirely new chapter on how engineers can approach the issue of sustainability when choosing an additive. Assesses capabilities and costs of a range of additives to enable engineers and scientists to make the correct selection for their property requirements Provides concise, practical information about the purpose and use of specific additives, fillers, and reinforcements – demystifying the world of additives by providing clear, engineering explanations, and including real-world application case stories Updated to include additional material on nanofillers, blending and handling, and sustainability

This text examines the effect of radiation on polymers and the versatility of its industrial applications. By helping readers understand and solve problems associated with radiation processing of polymers, it serves as an important reference and fills a gap in the literature. Radiation processing can significantly improve important properties of polymers, however, there are still misconceptions about processing polymers by using ionizing radiation. This book explains the radiation processing of polymeric materials used in many industrial products including cars, airplanes, computers, and TVs. It even addresses emerging "green" issues like biomaterials and hydrogels.

The use of reactive polymers enables manufacturers to make chemical changes at a late stage in the production process—these in turn cause changes in performance and properties. Material selection and control of the reaction are essential to achieve optimal performance. The second edition of *Reactive Polymers Fundamentals and Applications* introduces engineers and scientists to the range of reactive polymers available, explains the reactions that take place, and details applications and performance benefits. Basic principles and industrial processes are described for each class of reactive resin (thermoset), as well as additives, the curing process, and applications and uses. The initial chapters are devoted to individual resin types (e.g. epoxides, cyanacrylates, etc.); followed by more general chapters on topics such as reactive extrusion and dental applications. Material new to this edition includes the most recent developments, applications and commercial products for each chemical class of thermosets, as well as sections on fabrication methods, reactive biopolymers, recycling of reactive polymers, and case studies. Injection molding of reactive polymers, radiation curing, thermosetting elastomers, and reactive extrusion equipment are all covered as well. Most comprehensive source of information about reactive polymers Covers basics as well as most recent developments, including reactive biopolymers, recycling of reactive polymers, nanocomposites, and fluorosilicones Indispensable guide for engineers and advanced students alike—providing extensive literature and patent review

*Reactive Polymers: Fundamentals and Applications: A Concise Guide to Industrial Polymers, Third Edition* introduces engineers and scientists to a range of reactive polymers and then details their applications and performance benefits. Basic principles and industrial processes are described for each class of reactive resin (thermoset), as well as additives, the curing process, applications and uses. The initial chapters are devoted to individual resin types (e.g., epoxides, cyanacrylates), followed by more general chapters on topics such as reactive extrusion and dental applications. Injection molding of reactive polymers, radiation curing, thermosetting elastomers, and reactive extrusion equipment are covered as well. The use of reactive polymers enables manufacturers to make chemical changes at a late stage in the production process, which, in turn, cause changes in performance and properties. Material selection and control of the reaction are essential to achieve optimal performance. Material new to this edition includes the most recent developments, applications and commercial products for each chemical class of thermosets, as well as sections on fabrication methods, reactive biopolymers, recycling of reactive polymers and case studies. Covers the basics and most recent developments, including reactive biopolymers, recycling of reactive polymers, nanocomposites and fluorosilicones Offers an indispensable guide for engineers and advanced students alike Provides extensive literature and patent review Reflects a thorough review of all literature published in this area since 2014 Features revised and updated chapters to reflect the latest research in reactive polymers

Polyolefins, such as polyethylene and polypropylene, are among the most widely used commercial polymers. These versatile fibers are durable, chemically resistant, lightweight, economical, and functional. This book provides researchers in materials, as well as product development specialists in industry and biomedical engineering with a comprehensive resource that will assist them with material improvement and product development. The first chapters discuss the structural and chemical properties of different types of polyolefins, as well as production methods. Other chapters delve into functionality improvement and address how polyolefins can be incorporated into specific industrial, medical, and automotive products.

*Advanced Technology for the Conversion of Waste into Fuels and Chemicals: Volume 2: Chemical Processes* is the second of two volumes by the editors (the first volume is *Advanced Technology for the Conversion of Waste into Fuels and Chemicals: Biological Processes*). This volume presents advanced techniques and combined techniques used to convert energy to waste, including combustion, gasification, pyrolysis, anaerobic digestion and fermentation. The title focuses on solid waste conversion to fuel and energy, presenting advances in the design, manufacture and application of conversion technologies. Contributors from physics, chemistry, metallurgy, engineering and manufacturing present a truly trans-disciplinary picture of waste to energy conversion. Huge volumes of solid waste are produced globally while, at the same time, huge amounts of energy are produced from fossil fuels. Waste to energy (WTE) technologies are developing rapidly, holding out the potential to make clean, sustainable power from waste material. These WTE procedures incorporate various methods and blended approaches, and present an enormous opportunity for clean, sustainable energy. Presents the latest advances in waste to energy techniques for converting solid waste to valuable fuel and energy Brings together contributors from physics, chemistry, metallurgy, engineering and the manufacturing industry Includes advanced techniques such as combustion, gasification, pyrolysis, anaerobic digestion and fermentation Goes far beyond municipal waste, including the recouping of valuable energy from a variety of industrial waste materials

*Materials for Biomedical Engineering: Thermoset and Thermoplastic Polymers* presents the newest and most interesting approaches to intelligent polymer engineering in both current and future progress in biomedical sciences. Particular emphasis is placed on the properties needed for each selected polymer and how to increase their biomedical potential in varying applications, such as drug delivery and tissue engineering. These materials are intended for use in diagnoses, therapy and prophylaxis, but are also relatable to other biomedical related applications, such as sensors. Recent developments and future perspectives regarding their use in biomedicine are discussed in detail, making this book an ideal source on the topic. Highlights the most well-known applications of thermoset and thermoplastic polymers in biological and biomedical engineering Presents novel opportunities and ideas for developing or improving technologies in materials for companies, those in biomedical industries, and others Features at least 50% of references from the last 2-3 years

This book describes the past, present and future of dialysis and dialysis-related renal replacement therapies so that the reader can acquire a firm grasp of the medical management of acute and chronic renal failure. By becoming thoroughly conversant with the past and present of dialysis, a health care professional will be in a much better position to provide the best standard of care to patients suffering from renal failure. As the book highlights the unsolved operational obstacles in the field of renal replacement therapies, future innovators may be inspired to develop novel solutions to tackle these problems. This remarkable work is a must-read not only for healthcare providers in the dialysis industry, but also for patients, dialysis equipment manufacturers as well as pharmaceutical companies.

Polymers are used in everything from nylon stockings to commercial aircraft to artificial heart valves, and they have a key role in addressing international competitiveness and other national issues. Polymer Science and Engineering explores the universe of polymers, describing their properties and wide-ranging potential, and presents the state of the science, with a hard look at downward trends in research support. Leading experts offer findings, recommendations, and research directions. Lively vignettes provide snapshots of polymers in everyday applications. The volume includes an overview of the use of polymers in such fields as medicine and biotechnology, information and communication, housing and construction, energy and transportation, national defense, and environmental protection. The committee looks at the various classes of polymers--plastics, fibers, composites, and other materials, as well as polymers used as membranes and coatings--and how their composition and specific methods of processing result in unparalleled usefulness. The reader can also learn the science behind the technology, including efforts to model polymer synthesis after nature's methods, and breakthroughs in characterizing polymer properties needed for twenty-first-century applications. This informative volume will be important to chemists, engineers, materials scientists, researchers, industrialists, and policymakers interested in the role of polymers, as well as to science and engineering educators and students.

Characterization of Polymers and Fibres addresses an integral part of fiber and polymer manufacturing processes that is crucial in helping manufacturers ensure that final products achieve intended specifications. The characterization of fiber and polymers is needed for attributes including molecular weight, morphology, dyeing behavior, tensile, optical and thermal behavior. This book covers a wide range of characterization techniques, including thermal, X-ray diffraction, solubility, tensile, optical, hygroscopic and particle size distribution. Introductions and definitions are provided where beneficial to make topics accessible to a broad range of readers in both academia and industry. Addressing advances from the fields of bioscience, polymer science, material science, and textile science, this book is wide in scope, drawing on the latest research to provide details of characterization techniques and equipment. Provides a thorough description of the material quality control process, including the latest industry practice Presents material characterization at all levels, from the atomic level to surface structure Covers technical advice on natural fiber characterization methods, including XRD, XPS, TGA, SEM, TEM, AFM, Contact angle, Particle size analysis, FTIR, and NMR

Edition for 1983/84- published in 3 vols.: vol. 1, Organization descriptions and index; vol. 2, International organization participation; vol. 3, Global action networks; edition for 2012/2013- published in 5 vols: vol. 4, International organization bibliography and resources; vol. 4, Statistics, visualizations & patterns.

This book provides a systematic and comprehensive account of the recent developments in the recycling of plastic waste material. It presents state-of-the-art procedures for recycling of plastics from different sources and various characterization methods adopted in analyzing their properties. In addition, it looks into properties, processing, and applications of recycled plastic products as one of the drivers for sustainable recycling plastics especially in developing countries. This book proves a useful reference source for both engineers and researchers working in composite materials science as well as the students attending materials science, physics, chemistry, and engineering courses.

Printing on Polymers: Fundamentals and Applications is the first authoritative reference covering the most important developments in the field of printing on polymers, their composites, nanocomposites, and gels. The book examines the current state-of-the-art and new challenges in the formulation of inks, surface activation of polymer surfaces, and various methods of printing. The book equips engineers and materials scientists with the tools required to select the correct method, assess the quality of the result, reduce costs, and keep up-to-date with regulations and environmental concerns. Choosing the correct way of decorating a particular polymer is an important part of the production process.

Although printing on polymeric substrates can have desired positive effects, there can be problems associated with various decorating techniques. Physical, chemical, and thermal interactions can cause problems, such as cracking, peeling, or dulling. Safety, environmental sustainability, and cost are also significant factors which need to be considered. With contributions from leading researchers from industry, academia, and private research institutions, this book serves as a one-stop reference for this field—from print ink manufacture to polymer surface modification and characterization; and from printing methods to applications and end-of-life issues. Enables engineers to select the correct decoration method for each material and application, assess print quality, and reduce costs Increases familiarity with the terminology, tests, processes, techniques, and regulations of printing on plastic, which reduces the risk of adverse reactions, such as cracking, peeling, or dulling of the print Addresses the issues of environmental impact and cost when printing on polymeric substrates Features contributions from leading researchers from industry, academia, and private research institutions

Polyolefin is a major industry that is important for our economy and impacts every aspect of our lives. The discovery of new transition metal-based catalysts is one of the driving forces for the further advancement of this field. Whereas the classical heterogeneous Ziegler-Natta catalysts and homogeneous early transition metal metallocene catalysts remain the workhorses of the polyolefin industry, in roughly the last decade, tremendous progress has been made in developing non-metallocene-based olefin polymerization catalysts. Particularly, the discovery of late transition metal-based olefin polymerization catalysts heralds a new era for this field. These late transition metal complexes not only exhibit high activities rivaling their early metal counterparts, but more importantly they offer unique properties for polymer architectural control and copolymerization with polar olefins. In this book, the most recent major breakthroughs in the development of new olefin polymerization catalysts, including early metal metallocene and non-metallocene complexes and late transition metal complexes, are discussed by leading experts. The authors highlight the most important discoveries in catalysts and their applications in designing new polyolefin-based functional materials.

Written by highly regarded experts in the field, this book covers many of the major themes of chemical and biochemical physics, addressing important issues, from concept to technology to implementation. It provides new research and updates on a variety of issues in physical chemistry and biochemical physics. Many chapters include case studies

and supporting technologies and explain the conceptual thinking behind current uses and potential uses not yet implemented. By providing an applied and modern approach, this volume presents a wide-ranging view of current developments in applied methodologies in chemical and biochemical physics research.

*Polymer Science and Innovative Applications: Materials, Techniques, and Future Developments* introduces the science of innovative polymers and composites, their analysis via experimental techniques and simulation, and their utilization in a variety of application areas. This approach helps to unlock the potential of new materials for product design and other uses. The book also examines the role that these applications play in the human world, from pollution and health impacts, to their potential to make a positive contribution in areas including environmental remediation, medicine and healthcare, and renewable energy. Advantages, disadvantages, possibilities, and challenges relating to the utilization of polymers in human society are included. Presents the latest advanced applications of polymers and their composites and identifies key areas for future development Introduces the simulation methods and experimental techniques involved in the modification of polymer properties, supported by clear and detailed images and diagrams Supports an interdisciplinary approach, enabling readers across different fields to harness the power of new materials for innovative applications

This book focuses on topics in the entire spectrum of fire safety science, targeting research in fires, explosions, combustion science, heat transfer, fluid dynamics, risk analysis, structural engineering, and other subjects. The book contributes to a gain in advanced scientific knowledge and presents or advances new ideas in all topics in fire safety science. Two decades ago, the 1st Asia-Oceania Symposium on Fire Science and Technology was held in Hefei, China. Since then, the Asia-Oceania Symposia have grown in size and quality. This book, reflecting that growth, helps readers to understand fire safety technology, design, and methodology in diverse areas including historical buildings, photovoltaic panels, batteries, and electric vehicles.

This volume covers various aspects of cross-linked polyethylene (XLPE). The contents include manufacture, morphology, structure, properties, applications, early stage development, cross-linking techniques, recycling process, physical and chemical properties as well as the scope and future aspects of XLPE. It focuses on the life cycle analysis of XLPE and their industrial applications and commercial importance. This book will be of use to academic and industry researchers, as well as graduate students working in the fields of polymer science and engineering, materials science, and chemical engineering. .

Derived from the fourth edition of the well-known *Plastics Technology Handbook*, *Plastics Fabrication and Recycling* presents the molding and fabrication processes of plastics as well as several important features of plastics recycling. The book begins with a discussion of different types of molds and dies, including compression molding, injection molding, blow molding, thermoforming, reaction injection molding, extrusion, and pultrusion. It then covers spinning, casting, reinforcing, foaming, compounding, and coating processes as well as powder molding, adhesive bonding, and plastics welding techniques. The authors also explore the decoration of plastics, including painting operations, printing processes, hot stamping, in-mold decorating, embossing, electroplating, and vacuum metallizing. They conclude with an overview on key aspects of plastics recycling, developments in the field, and waste recycling problems.

This book focuses on inorganic nanosheets, including various oxides, chalcogenides, and graphenes, that provide two-dimensional (2D) media to develop materials chemistry in broad fields such as electronics, photonics, environmental science, and biology. The application area of nanosheets and nanosheet-based materials covers the analytical, photochemical, optical, biological, energetic, and environmental research fields. All of these applications come from the low dimensionality of the nanosheets, which anisotropically regulate structures of solids, microspaces, and fluids. Understanding nanosheets from chemical, structural, and application aspects in relation to their "fully nanoscopic" characters will help materials scientists to develop novel advanced materials. This is the first book that accurately and concisely summarizes this field including exfoliation and intercalation chemistries of layered crystals. The book provides perspective on the materials chemistry of inorganic nanosheets. The first section describes fundamental aspects of nanosheets common to diverse applications: how unique structures and properties are obtained from nanosheets based on low dimensionality. The second section presents state-of-the-art descriptions of how the 2D nature of nanosheets is utilized in each application of the materials that are developed.

*Polyolefin Fibres: Structure, Properties and Industrial Applications, Second Edition*, explores one of the most widely used commercial polymers, with a focus on the most important polyolefins, namely polyethylene, polypropylene, and polyolefin bicomponent fibres. These versatile fibres are durable, chemically resistant, lightweight, economical, and functional. This new edition has been updated and expanded to include cutting-edge research on a broad range of advanced applications. Part I covers the structure and properties of polyolefin fibres, incorporating a new chapter on the environmental aspects of polyolefin use. Part II examines the methods for improving the functionality of polyolefins, providing essential information for those engaged in developing high-performance materials. A final group of chapters addresses how polyolefin fibres can be incorporated into specific textile applications, such as automotive, geotextile, biomedical, and hygiene products, and explores potential future development. This book is an essential reference for textile technologists and manufacturers, polymer and fibre scientists, yarn and fabric manufacturers, biomedical and device engineers, and industrialists and researchers. Introduces the types, properties and structure of polyolefin fibers for readers new to the polyolefins field Examines methods to improve the functionality of polyolefin fibers, providing essential information for textile technologists and research and development managers engaged in developing high-performance materials Presents existing and potential applications of polyolefin fibers, exploring how they can expand the range of commercial polyolefin-based products

This informative volume reflects the state of art in the science of color-changeable materials and provides an abundance of in-depth knowledge about the field of colorimetry. The

book describes the facts behind the chromic phenomena from the point of application, spectrophotometry of chromic materials, and instrumentation and testing. The authors begin with a short historical overview of the chromic phenomena, chromic materials, and classification of chromic materials and then go on to provide comprehensive treatises on chromic (or color-changeable) textiles and production techniques. Detailed descriptions of measurement methods that are usable in cases of translucent or opaque materials are provided as well. A number of new concepts are discussed along with standardized CIE (International Commission on Illumination) colorimetry with various CIE color space systems. Chromic materials appear as a dynamic system, which allows for a wide range of potential applications and related research. The authors share their own experiences with measurement of color chromic materials with the view to help fill the huge gap in field of measurement from the point of view in standardization. The authors conclude with an in-depth study of the testing of chromic testing, including testing for color fastness, fatigue resistance, light fastness, wash fastness, and rubbing fastness.

The need for a broad development of the production of polymer materials has become evident. All these materials are subject to various types of aging (destruction); hence, stabilizers which permit the storage, reprocessing, and use of polymer materials without any appreciable change in their properties must be introduced into them. In recent years, this problem of stabilizing polymers has attracted the attention of many scientists and technologists, both in the USSR and abroad. The scientific basis of the foreign studies will be found in a number of theoretical premises, but chiefly the theory of chain reactions with unbranched chains. In the Soviet Union, the concepts of Academician N. N. Semenov on chain reactions with degenerate branches have become the starting point of theoretical studies of the stabilization and destruction of polymers. Soviet scientists have developed a theory of critical concentrations of antioxidants and have shown that the processes of stabilization have a very complex chemical character. The nature of the polymers themselves greatly affects these processes and consequently, different stabilizers are required for polymers of different structures. In addition, it has been shown that the antioxidants used thus far can not only cause chain termination, but can also initiate oxidation and give rise to degenerate branches.

Polymer Green Flame Retardants covers key issues regarding the response of polymers during fire, the mechanisms of their flame retardation, the regulations imposed on their use, and the health hazards arising from their combustion. Presenting the latest research developments, the book focuses in particular on nanocomposites, believed to be the most promising approach for producing physically superior materials with low flammability and ecological impact. The fire properties of nanocomposites of various matrixes and fillers are discussed, the toxicological characteristics of these materials are analyzed, addressing also their environmental sustainability. Edited by distinguished scientists, including an array of international industry and academia experts, this book will appeal to chemical, mechanical, environmental, material and process engineers, upper-level undergraduate and graduate students in these disciplines, and generally to researchers developing commercially attractive and environmentally friendly fire-proof products. Provides recent findings on the manufacture of environmentally sustainable flame retardant polymeric materials Covers legislation and regulations concerning flame retarded polymeric material use Includes tables containing the fire properties of the most common polymeric materials

This book is focused primarily on polymer nanocomposites, based on the author's research experience as well as open literature. The environmental health and safety aspects of nanomaterials and polymer nanocomposites, risk assessment and safety standards, and fire toxicity of polymer nanocomposites, are studied. In the final chapter, a brief overview of opportunities, trends, and challenges of polymer nanocomposites are included. Throughout the book, the theme is developed that polymer nanocomposites are a whole family of polymeric materials whose properties are capable of being tailored to meet specific applications. This volume serves as a general introduction to students and researchers just entering the field and to scholars from other subfields seeking information.

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