

Multilayer Flexible Packaging Technology And Applications For The Food Personal Care And Over The Counter Pharmaceutical Industries Plastics Design Library

Multilayer Flexible Packaging, Second Edition, provides a thorough introduction to the manufacturing and applications of flexible plastic films, covering materials, hardware and processes, and multilayer film designs and applications. The book gives engineers and technicians a better understanding of the capability and limitations of multilayer flexible films and how to use them to make effective packaging. It includes contributions from world renowned experts and is fully updated to reflect the rapid advances made in the field since 2009, also including an entirely new chapter on the use of bio-based polymers in flexible packaging. The result is a practical, but detailed reference for polymeric flexible packaging professionals, including product developers, process engineers, and technical service representatives. The materials coverage includes detailed sections on polyethylene, polypropylene, and additives. The dies used to produce multilayer films are explored in the hardware section, and the process engineering of film manufacture is explained, with a particular focus on meeting specifications and targets. In addition, a new chapter has been added on regulations for food packaging – including both FDA and EU regulations. Provides a complete introduction to multilayer flexible packaging, assisting plastics practitioners with the development, design, and manufacture of flexible packaging for food, cosmetics, pharmaceuticals, and more Presents thorough, well-written, and up-to-date reviews of the current technology by experts in the field, making this an essential reference for any engineer or manager Includes discussion and analysis of the latest rules and regulations governing food packaging

The complete and authoritative guide to modern packaging technologies —updated and expanded From A to Z, The Wiley Encyclopedia of Packaging Technology, Third Edition covers all aspects of packaging technologies essential to the food and pharmaceutical industries, among others. This edition has been thoroughly updated and expanded to include important innovations and changes in materials, processes, and technologies that have occurred over the past decade. It is an invaluable resource for packaging technologists, scientists and engineers, students and educators, packaging material suppliers, packaging converters, packaging machinery manufacturers, processors, retailers, and regulatory agencies. In addition to updating and improving articles from the previous edition, new articles are also added to cover the recent advances and developments in packaging. Content new to this edition includes: Advanced packaging materials such as antimicrobial materials, biobased materials, nanocomposite materials, ceramic-coated films, and perforated films Advanced packaging technologies such as active and intelligent packaging, radio frequency identification (RFID), controlled release packaging, smart blending, nanotechnology, biosensor technology, and package integrity inspection Various aspects important to packaging such as sustainable packaging, migration, lipid oxidation, light protection, and intellectual property Contributions from experts in all-important aspects of packaging Extensive cross-referencing and easy-to-access information on all subjects Large, double-column format for easy reference

This book is a printed edition of the Special Issue "Food Packaging Based on Nanomaterials" that was published in Nanomaterials

Thermoforming of Single and Multilayer Laminates explains the fundamentals of lamination and plastics thermoforming technologies along with current and new developments. It focuses on properties and thermoforming mechanics of plastic films and in particular single and multilayered laminates, including barrier films. For environmental and economic reasons, laminates are becoming increasingly important as a replacement for solid sheets and paint finishes in many industries, including transportation, packaging, and construction. Yet the processes of film formability during the extensive deformation and elevated temperatures experienced in conventional processing technologies, such as thermoforming, are poorly understood by most engineers. This book covers production processes, such as extrusion, calendaring, and casting, as well as mechanical and impact testing methods. It also describes how testing protocols developed for metals can be leveraged for plastic films and laminates, and includes a thorough discussion on methods for performing optical strain analysis. Applications in transportation vehicles and packaging, including packaging for food, medical and electronics applications, sports equipment, and household appliances, are discussed. Safety, recycling and environmental aspects of thermoforming and its products complete the book. First comprehensive source of information and hands-on guide for the thermoforming of multilayered laminates Covers applications across such sectors as automotive, packaging, home goods, and construction Introduces new testing methods leveraging protocols used for metals

Manufacturing and Novel Applications of Multilayer Polymer Films discusses the advancements in multilayer technology, including its capability to produce hundreds of layers in a single film by a melt coextrusion process. These engineered films can have significantly enhanced performance properties, allowing films to be made thinner, stronger, and with better sealing properties. As recent developments in feedstocks and materials have opened up a range of new possibilities, this book discusses different feedstocks, and viscosity and material considerations. It is the first comprehensive summary of the latest technology in multilayer film processing and related applications, and is written from a practical perspective, translating research into commercial production and real world products. The book provides fundamental knowledge on microlayer coextrusion processing technology, how to fabricate such structures, structure and properties of such microlayers, and potential applications, thus helping research scientists and engineers develop products which not only fulfill their primary function, but can also be manufactured reliably, safely, and economically. Provides a fundamental knowledge of microlayer coextrusion processing, including how to fabricate microlayer structures, the properties of microlayers, and potential applications, including optics, polymer film capacitors, and semiconductors Includes an in-depth analysis of all technologies used for producing multilayered films and structures by coextrusion processing Thoroughly assesses potential

future trends in multilayer coextrusion technology, thus enabling engineers and scientists to stay ahead of the curve in this rapidly advancing area

The second edition of Extrusion is designed to aid operators, engineers, and managers in extrusion processing in quickly answering practical day-to-day questions. The first part of the book provides the fundamental principles, for operators and engineers, of polymeric materials extrusion processing in single and twin screw extruders. The next section covers advanced topics including troubleshooting, auxiliary equipment, and coextrusion for operators, engineers, and managers. The final part provides applications case studies in key areas for engineers such as compounding, blown film, extrusion blow molding, coating, foam, and reprocessing. This practical guide to extrusion brings together both equipment and materials processing aspects. It covers basic and advanced topics, for reference and training, in thermoplastics processing in the extruder. Detailed reference data are provided on such important operating conditions as temperatures, start-up procedures, shear rates, pressure drops, and safety. A practical guide to the selection, design and optimization of extrusion processes and equipment Designed to improve production efficiency and product quality Focuses on practical fault analysis and troubleshooting techniques

Pharmaceutical packaging requires a greater knowledge of materials and a greater intensity of testing than most other packed products, not to mention a sound knowledge of pharmaceutical products and an understanding of regulatory requirements. Structured to meet the needs of the global market, this volume provides an assessment of a wide range of issues. It covers the entire supply chain from conversion of raw materials into packaging materials and then assembled into product packs. Integrating information from many drug delivery systems, the author discusses testing and evaluation and emphasizes traceability and the need to for additional safeguards.

The value of the groceries purchases in the USA is over \$500 billion annually, most of which is accounted for by packaged foods. Plastic packaging of foods is not only ubiquitous in developed economies, but increasingly commonplace in the developing world, where plastic packaging is instrumental in decreasing the proportion of the food supply lost to spoilage. This new handbook is a combination of new material and updated chapters, chosen by Dr. Sina Ebnesajjad, from recently published books on this subject. Plastic Films in Food Packaging offers a practical handbook for engineers, scientists and managers working in the food packaging industry, providing a tailor-made package of science and engineering fundamentals, best practice techniques and guidance on new and emerging technologies. By covering materials, design, packaging processes, machinery and waste management together in one book, the authors enable the reader to take a lifecycle approach to food packaging. The Handbook addresses questions related to film grades, types of packages for different types of foods, packaging technologies, machinery and waste management. Additionally the book provides a review of new and emerging technologies. Two chapters cover the development of barrier films for food packaging and the regulatory and safety aspects of food packaging. Essential information and practical guidance for engineers and scientists working at all stages of the food packaging lifecycle: from design through manufacture to recycling Includes key published material on plastic films in food packaging, updated specifically for this Handbook, and new material on the regulatory framework and safety aspects Coverage of materials and applications together in one handbook enables engineers and scientists to make informed design and manufacturing decisions

A comprehensive and highly practical survey of the materials, hardware, processes and applications of flexible plastic films. Aimed at a wide audience of engineers, technicians, managers, purchasing agents and users, Multilayer Flexible Packaging provides a thorough introduction to the manufacturing and applications of flexible plastic films, covering: Materials Hardware and Processes Multilayer film designs and applications The materials coverage includes detailed sections on polyethylene, polypropylene and additives. The dies used to produce multilayer films are explored in the hardware section, and the process engineering of film manufacture explained, with a particular focus on meeting specifications and targets. The section includes unique coverage of the problematic area of bending technology, providing a unique explanation of the issues involved in the blending of viscoelastic non-Newtonian polymeric materials. About the author John R. Wagner, Jr. is President of Crescent Associates, Inc., a consulting firm that specializes in plastic films and flexible packaging. He graduated from the University of Notre Dame with a BS and MS in Chemical Engineering.

Plastics are the most important class of packaging materials. This successful handbook, now in its second edition, covers all important aspects of plastic packaging and the interdisciplinary knowledge needed by food chemists, pharmaceutical chemists, food technologists, materials scientists, process engineers, and product developers alike. This is an indispensable resource in the search for the optimal plastic packaging. Materials characteristics, additives and their effects, mass transport phenomena, quality assurance, and recent regulatory requirements from FDA and European Commission are covered in detail with ample data.

MEMS sensors and actuators are enabling components for smartphones, AR/VR, and wearable electronics. MEMS packaging is recognized as one of the most critical activities to design and manufacture reliable MEMS. A unique challenge to MEMS packaging is how to protect moving MEMS devices during manufacturing and operation. With the introduction of wafer level capping and encapsulation processes, this barrier is removed successfully. In addition, MEMS devices should be integrated with their electronic chips with the smallest footprint possible. As a result, 3D packaging is applied to connect the devices vertically for the most effective integration. Such 3D packaging also paves the way for further heterogenous integration of MEMS devices, electronics, and other functional devices. This book consists of chapters written by leaders developing products in a MEMS industrial setting and faculty members conducting research in an academic setting. After an introduction chapter, the practical issues are covered: through-silicon vias (TSVs), vertical interconnects, wafer level packaging, motion sensor-to-CMOS bonding, and use of printed circuit board technology to fabricate MEMS. These chapters are written by leaders developing MEMS products. Then, fundamental issues are discussed, topics including encapsulation of MEMS, heterogenous integration, microfluidics, solder bonding, localized sealing, microsprings, and reliability. Contents: Introduction to MEMS Packaging (Y C Lee, Ramesh Ramadoss and Nils Hoivik)Silex's TSV Technology: Overview of Processes and MEMS Applications (Tomas Bauer and Thorbjörn Ebefors)Vertical Interconnects for High-end MEMS (Maaik

M Visser Taklo and Sigurd Moe) Using Wafer-Level Packaging to Improve Sensor Manufacturability and Cost (Paul Pickering, Collin Twanow and Dean Spicer) Nasiri Fabrication Process for Low-Cost Motion Sensors in the Consumer Market (Steven Nasiri, Ramesh Ramadoss and Sandra Winkler) PCB Based MEMS and Microfluidics (Ramesh Ramadoss, Antonio Luque and Carmen Aracil) Single Wafer Encapsulation of MEMS Resonators (Janna Rodriguez and Thomas Kenny) Heterogeneous Integration and Wafer-Level Packaging of MEMS (Masayoshi Esashi and Shuji Tanaka) Packaging of Membrane-Based Polymer Microfluidic Systems (Yu-Chuan Su) Wafer-Level Solder Bonding by Using Localized Induction Heating (Hsueh-An Yang, Chiung-Wen Lin and Weileun Fang) Localized Sealing Schemes for MEMS Packaging (Y T Cheng, Y C Su and Liwei Lin) Microsprings for High-Density Flip-Chip Packaging (Eugene M Chow and Christopher L Chua) MEMS Reliability (Chien-Ming Huang, Arvind Sai Sarathi Vasan, Yunhan Huang, Ravi Doraiswami, Michael Osterman and Michael Pecht) Readership: Researchers and graduate students participating in research, R&D, and manufacturing of MEMS products; professionals associated with the integration for systems represented by smartphones, AR/VR, and wearable electronics. Keywords: MEMS; Packaging; Microelectromechanical Systems; Reliability; Microstructures; Sensors; Actuators Review: Key Features: The book covers engineering topics critical to product development as well as research topics critical to integration for future MEMS-enabled systems It is a major resource for those participating in MEMS and for every professional associated with the integration for systems represented by smartphones, AR/VR and wearable electronics

Plastic films are high-performance materials which play an essential part in modern life. The plastics films industry uses state-of-the-art manufacturing processes and is continuously seeking out new technologies to improve its performance. The understanding of the nature of plastic films, their production techniques, applications and their characterisation is essential for producing new types of plastic films. This handbook has been written to discuss the production and main uses of plastic films. Plastic films are high-performance materials which play an essential part in modern life. Plastic films are mostly used in packaging applications but as will be seen from this book they are also used in the agricultural, medical and engineering fields. The plastics films industry uses state-of-the-art manufacturing processes and is continuously seeking out new technologies to improve its performance. The understanding of the nature of plastic films, their production techniques, applications and their characterisation is essential for producing new types of plastic films. This handbook has been written to discuss the production and main uses of plastic films.

Finally, a comprehensive book about packaging machinery. The Packaging Machinery Handbook is the first book covering the range of packaging machinery in common use. It includes chapters on filling, capping, labeling, cartoning, inspecting and more. The chapter on packaging line design provides a framework for developing a new packaging line from initial idea to production. More than 120 illustrations allow readers to see inside the machines and what makes them tick. A companion website at www.packmachbook.com includes links to hundreds of videos of these machines in action. The book is designed for the newcomer who wants to learn about machinery, for the package designer who needs to understand how their package will be produced and for the seasoned professional who wants a handy reference. What the experts are saying: "Experience is the best teacher. But if you can't wait 10 years and don't want to learn the hard way, read John Henry's Packaging Machinery Handbook Through a fast-moving conversational writing style - from big-picture "here's why it's done" to nitty-gritty "here's how it's done" - John transfers his extensive packaging knowledge nearly as effortlessly as a Vulcan mind-meld." Lisa McTigue Pierce, packaging journalist since 1982 "From his wealth of practical experience, John has put together a great resource for anyone who is thinking about buying a piece of packaging machinery or who is engaged in putting together a packaging operation. It will help even the most seasoned veterans avoid some common pitfalls." Larry Luciano, President, Luciano Packaging Technology "John Henry's Packaging Machinery Handbook will be the definitive work he day it is published. This is the book we in the field will reach for when we need insight into packaging machinery. His technical integrity gives us a book of great utility. This book is first rate and badly needed. Bravo to John Henry!" Iver Phallen, President, Oden Corporation

Nanotechnology for Food Packaging: Materials, Processing Technologies, and Safety Issues showcases the latest research in the use of nanotechnology in food packaging, providing an in-depth and interdisciplinary overview of the field. Nanoscale advances in materials science, processing technology and analytical techniques have led to the introduction of new, cheaper and safer packaging techniques. Simultaneously, the increasing use of renewable nanomaterials has made food packaging more sustainable. Chapters provide a comprehensive review on materials used, their structure–function relationship, and new processing technologies for the application and production of nanotechnology-based packaging materials. In addition, the book discusses the use of functional materials for the development of active, smart and intelligent packaging, possible migration and toxicity of nanomaterials for foods and regulatory aspects, and commercial applications. Provides detailed information on the use of nanomaterials and methodologies in food packaging, possible applications and regulatory barriers to commercialization Presents an interdisciplinary approach that brings together materials science, bioscience, and the industrial and regulatory aspects of the creation and uses of food packaging Helps those undertaking research and development in food packaging gain a cogent understanding on how nanotechnology is leading to the emergence of new packaging technologies

The protection and preservation of a product, the launch of new products or re-launch of existing products, perception of added-value to products or services, and cost reduction in the supply chain are all objectives of food packaging. Taking into consideration the requirements specific to different products, how can one package successfully meet all of these goals? Food Packaging Technology provides a contemporary overview of food processing and packaging technologies. Covering the wide range of issues you face when developing innovative food packaging, the book includes: Food packaging strategy, design, and development Food biodeterioration and methods of preservation Packaged product quality and shelf life Logistical packaging for food marketing systems Packaging materials and processes The battle rages over which type of container should be used for which application. It is therefore necessary to consider which materials, or combination of materials and processes will best serve the market and enhance brand value. Food Packaging Technology gives you the tools to determine which form of packaging will meet your business goals without compromising the safety of your product.

This book systematically discusses the modeling and application of transfer manipulation for flexible electronics packaging, presenting multiple processes according to the geometric sizes of the chips and devices as well as the detailed modeling and computation steps for each process. It also illustrates the experimental design of the equipment to help readers easily learn how to use it. This book is a valuable resource for scholars and graduate students in the research field of microelectronics.

Food Packaging: Nanotechnology in the Agri-Food Industry, Volume 7, focuses on the development of novel nanobiomaterials, the enhancement of barrier performance of non-degradable and biodegradable plastics, and their fabrication and application in food packaging. The book brings together fundamental information and the most recent advances in the synthesis, design, and impact of alternative food packaging. Special attention is offered on smart materials and nanodevices that are able to detect quality parameters in packaged food, such as freshness, degradation, and contamination, etc. In addition, ecological approaches aiming to obtain bioplastics packages from waste materials are highlighted and discussed as a novel approach in modern food packaging. Nonetheless, this volume presents the advances made in biodegradable and bioactive packaging utilized for preserving flavor, nutritious ingredients, and therapeutic food compounds. Includes fabrication techniques, such as nanofiber films, nanocoating, nanocompositing, multi-layered structures, and layer-by-layer nanoassemblies based on synthetic and bio-based polymers. Presents the latest information on new biodegradable materials using fabrication of new high barrier plastics to enhance research. Provides examples of risk assessment for nanomaterials for food safety and the benefits of antimicrobial food packaging. Packaging, Eco-Friendly Packaging For Exports, Export Packaging, Corrugated Board, Plastics, Bopp Films, Plastic Woven Sacks, Expanded Polystyrene, Fl Exible Packaging, Glass Containers, Aluminium Foil, Adhesive Tapes, Wooden Containers, Systems Packaging, Aseptic Packaging, Vacuum Packaging, Aerosol Packaging, Packaging Of Horticultural Crops, Meat Fish & Poultry, Dairy Products, Biscuits, Bread & Confectionery, Fruit Juices, Ready To Eat Foods, Pharmaceutical Products, Cosmetic, Soaps & Detergents, Fertilizers & Pesticides Industry, Handicrafts For Export, Packaging Of Textiles Etc. And Many More Etc.

This second, comprehensive edition of the pioneering book in this field has been completely revised and extended, now stretching to two volumes. The result is a comprehensive summary of layer-by-layer assembled, truly hybrid nanomaterials and thin films, covering organic, inorganic, colloidal, macromolecular, and biological components, as well as the assembly of nanoscale films derived from them on surfaces. These two volumes are essential for anyone working in the field, as well as scientists and researchers active in materials development, who needs the key knowledge provided herein for linking the field of molecular self-assembly with the bio- and materials sciences.

This handbook provides an exhaustive description of polyethylene. The 50+ chapters are written by some of the most experienced and prominent authors in the field, providing a truly unique view of polyethylene. The book starts with a historical discussion on how low density polyethylene was discovered and how it provided unique opportunities in the early days. New catalysts are presented and show how they created an expansion in available products including linear low density polyethylene, high density polyethylene, copolymers, and polyethylene produced from metallocene catalysts. With these different catalyst systems a wide range of structures are possible with an equally wide range of physical properties. Numerous types of additives are presented that include additives for the protection of the resin from the environment and processing, fillers, processing aids, anti-fogging agents, pigments, and flame retardants. Common processing methods including extrusion, blown film, cast film, injection molding, and thermoforming are presented along with some of the more specialized processing techniques such as rotational molding, fiber processing, pipe extrusion, reactive extrusion, wire and cable, and foaming processes. The business of polyethylene including markets, world capacity, and future prospects are detailed. This handbook provides the most current and complete technology assessments and business practices for polyethylene resins.

Efficiently and profitably delivering quality flexible packaging to the marketplace requires designing and manufacturing products that are both "fit-to-use" and "fit-to-make". The engineering function in a flexible packaging enterprise must attend to these dual design challenges. Flexible Packaging discusses the basic processes used to manufacture flexible packaging products, including rotogravure printing, flexographic printing, adhesive lamination, extrusion lamination/coating; and finishing/splitting. These processes are then related to the machines used to practice them, emphasizing the basics of machines' control systems, and options to minimize wasted time and materials between production jobs. Raw materials are also considered, including the three basic forms: Rollstock (paper, foil, plastic films); Resin; and Wets (inks, varnishes, primers). Guidance is provided on both material selection, and on adding value through enhancement or modification of the materials' physical features. A 'measures' section covers both primary material features – such as tensile, elongation, modulus and elastic and plastic regions – and secondary quality characteristics such as seal and bond strengths, coefficient of friction, oxygen barrier and moisture vapour barrier. Helps engineers improve existing raw material selection and manufacturing processes for manufacturing functional flexible packaging materials. Covers all aspects of delivering high value packaging to the customer – from the raw materials, to the methods of processing them, the machines used to do it, and the measures required to gauge the characteristics of the product. Helps engineers to minimize waste and unproductive time in production.

Recent developments in multifunctional and nanoreinforced polymers have provided the opportunity to produce high barrier, active and intelligent food packaging which can help ensure, or even enhance, the quality and safety of packaged foods. Multifunctional and nanoreinforced polymers for food packaging provides a comprehensive review of novel polymers and polymer nanocomposites for use in food packaging. After an introductory chapter, Part one discusses nanofillers for plastics in food packaging. Chapters explore the use of passive and active nanoclays and hydrotalcites, cellulose nanofillers and electrospun nanofibers and nanocapsules. Part two investigates high barrier plastics for food packaging. Chapters assess the transport and high barrier properties of food packaging polymers such as ethylene-norbornene copolymers and advanced single-site polyolefins, nylon-MXD6 resins and ethylene-vinyl alcohol copolymers before going on to explore recent advances in various plastic packaging technologies such as modified atmosphere packaging (MAP), nanoscale inorganic coatings and functional barriers against migration. Part three reviews active and bioactive plastics in food packaging. Chapters investigate silver-based antimicrobial polymers, the incorporation of antimicrobial/antioxidant natural extracts into polymeric films, and bioactive food packaging strategies. Part four examines nanotechnology in sustainable plastics with chapters examining the food packaging applications of polylactic acid (PLA) nanocomposites, polyhydroxyalkanoates (PHAs), starch-based polymers, chitosan and carragenan polysaccharides and protein-based resins for packaging gluten (WG)-based materials. The final chapter presents the safety and regulatory aspects of plastics as food packaging materials. With its distinguished editor and international team of expert contributors Multifunctional and nanoreinforced polymers for food packaging proves a valuable resource for researchers in packaging in the food industry and polymer scientists interested in multifunctional and nanoreinforced materials. Provides a comprehensive review of novel polymers and polymer nanocomposites for use in food packaging. Discusses nanofillers for plastics in food packaging including the use of passive and active nanoclays and hydrotalcites and electrospun nanofibers. Investigates high barrier plastics for food packaging assessing recent advances in various plastic packaging technologies such as modified atmosphere packaging (MAP).

Examines the advantages of Embedded and FO-WLP technologies, potential application spaces, package structures available in the industry, process flows, and material challenges. Embedded and fan-out wafer level packaging (FO-WLP) technologies have been developed across the industry over the past 15 years and have been in high volume manufacturing for nearly a decade. This book covers the advances that have been made in this new packaging technology and discusses the many benefits it provides to the electronic packaging industry and supply chain. It provides a compact overview of the major types of technologies offered in this field, on what is available, how it is processed, what is driving its development, and the pros and cons. Filled with contributions from some of the field's leading experts, Advances in Embedded and Fan-Out Wafer Level Packaging Technologies begins with a look at the history of the technology. It then goes on to examine the biggest technology and marketing

trends. Other sections are dedicated to chip-first FO-WLP, chip-last FO-WLP, embedded die packaging, materials challenges, equipment challenges, and resulting technology fusions. Discusses specific company standards and their development results Content relates to practice as well as to contemporary and future challenges in electronics system integration and packaging Advances in Embedded and Fan-Out Wafer Level Packaging Technologies will appeal to microelectronic packaging engineers, managers, and decision makers working in OEMs, IDMs, IFMs, OSATs, silicon foundries, materials suppliers, equipment suppliers, and CAD tool suppliers. It is also an excellent book for professors and graduate students working in microelectronic packaging research.

This Brief is concerned with the material chemistry of food packaging materials. It introduces the properties and peculiarities of typical packaging materials, such as plastics, cellulose components, ceramics and metals. Their overall performance as food packaging material is determined by the chemical and physical properties. The Brief describes how the final properties of a food packaging material can be influenced through chemical modifications in the structure and composition of the used components. The authors also cover potential chemical reactions of food packaging materials that may affect their performance. Potential hazards that may arise, such as influences on the product quality, or effects on their recycling or disposal, are discussed. Different influences, like metal corrosion, chemical resistance and degradability of the main packaging materials, or properties like hydrophobicity, surface energy and migration have to be taken into account. This Brief gives an introduction to all these different aspects of food packaging.

This report considers the wide range of film materials including PE PP, PVC, PS and PET, describing their main characteristics (such as toughness, sealability, barrier performance, strength and stiffness) and commenting on the industry structure and consumption of each. Commodity plastics dominate, with PE and PP together accounting for around 34 million tons. The present and future demand for films is set to continue, fuelled by the strong base, the rapidly developing market in the 'rest of the world', the growing preference for flexible over rigid and the constant innovation in materials and conversion. Plastic Films - Situation and Outlook provides a snapshot of the industry and its future prospects.

The increasing importance of plastic materials in packaging makes it mandatory for everyone in this industry to command a basic understanding of the properties of the common packaging plastics.

The Wiley Encyclopedia of Packaging Technology Packaging technology is of vital importance in all manufacturing industries. The Wiley Encyclopedia of Packaging Technology is designed to provide a comprehensive reference incorporating 188 topics from "Acrylics" to "Zero-Crush Concept" for a wide audience of engineers, technologists, and scientists who seek an introduction to unfamiliar aspects of the packaging process. In addition to providing an exhaustive reference for packaging engineers, the book is also designed to serve, for example, polymer chemists developing new products. It will also meet a need in all technical libraries for an authoritative basic reference on packaging. The 188 entries have been written by 225 acknowledged experts in academia and industry, and each has been reviewed by other experts in the field for completeness and objectivity. This encyclopedia provides coverage of all stages of the packaging process from raw materials through distribution. Multiple articles are included on all major topics, such as bags, boxes, cans, cartons, coextrusion machinery, decorating, filling machinery, films, plastics, steel, and testing. A significant contribution to packaging literature, this encyclopedia brings together in a single volume expertise from many disciplines. It contains many landmark articles, such as blow molding, corrugated boxes, fabricated cans, steel cans, economics of packaging, glass container design, glass container manufacturing, indicating devices, multilayer flexible packaging, paper, specifications and quality assurance, and international standards and practices. Numerous bibliographies accompany the articles. In addition, the encyclopedia includes over 200 tables and nearly 600 figures—all prepared with the cooperation of a distinguished Advisory Board. The result is a unique, informative work that will serve the diverse interests and concerns of those in the field of packaging with authoritative, reliable, state-of-the-art information of the subject.

Our intuition on how the world works could well be wrong. We are surprised when new competitors burst on the scene, or businesses protected by large and deep moats find their defenses easily breached, or vast new markets are conjured from nothing. Trend lines resemble saw-tooth mountain ridges. The world not only feels different. The data tell us it is different. Based on years of research by the directors of the McKinsey Global Institute, *No Ordinary Disruption: The Four Forces Breaking all the Trends* is a timely and important analysis of how we need to reset our intuition as a result of four forces colliding and transforming the global economy: the rise of emerging markets, the accelerating impact of technology on the natural forces of market competition, an aging world population, and accelerating flows of trade, capital and people. Our intuitions formed during a uniquely benign period for the world economy—often termed the Great Moderation. Asset prices were rising, cost of capital was falling, labour and resources were abundant, and generation after generation was growing up more prosperous than their parents. But the Great Moderation has gone. The cost of capital may rise. The price of everything from grain to steel may become more volatile. The world's labor force could shrink. Individuals, particularly those with low job skills, are at risk of growing up poorer than their parents. What sets *No Ordinary Disruption* apart is depth of analysis combined with lively writing informed by surprising, memorable insights that enable us to quickly grasp the disruptive forces at work. For evidence of the shift to emerging markets, consider the startling fact that, by 2025, a single regional city in China—Tianjin—will have a GDP equal to that of the Sweden, of that, in the decades ahead, half of the world's economic growth will come from 440 cities including Kumasi in Ghana or Santa Carina in Brazil that most executives today would be hard-pressed to locate on a map. What we are now seeing is no ordinary disruption but the new facts of business life— facts that require executives and leaders at all levels to reset their operating assumptions and management intuition.

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.

Now in a fully revised and updated second edition, this volume provides a contemporary overview of food processing/packaging technologies. It acquaints the reader with food preservation processes, shelf life and logistical considerations, as well as packaging materials, machines and processes necessary for a wide range of packaging presentations. The new edition addresses environmental and sustainability concerns, and also examines applications of emerging technologies such as RFID and nanotechnology. It is directed at packaging technologists, those involved in the design and development of packaging, users of packaging in food companies and those who specify or purchase packaging.

Key Features: An up-to-date and comprehensive handbook on the most important sector of packaging technology Links methods of food preservation to the packaging requirements of the common types of food and the available food packages Covers all the key packaging materials - glass, plastics and paperboard Fully revised second edition now covers sustainability, nanotechnology and RFID

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

Hard or protective coatings are widely used in conventional and modern industries and will continue to play a key role in future manufacturing, especially in the micro and nano areas. **Protective Thin Coatings Technology** highlights the developments and advances in the preparation, characterization, and applications of protective micro-/nanoscaled films and coatings. This book Covers technologies for sputtering of flexible hard nanocoatings, deposition of solid lubricating films, and multilayer transition metal nitrides Describes integrated nanomechanical characterization of hard coatings, corrosion and tribo-corrosion of hard coatings, and high entropy alloy films and coatings Investigates thin films and coatings for high-temperature applications, nanocomposite coatings on magnesium alloys, and the correlation between coating properties and industrial applications Features various aspects of hard coatings, covering advanced sputtering technologies, structural characterizations, and simulations, as well as applications This first volume in the two-volume set, **Protective Thin Coatings and Functional Thin Films Technology**, will benefit industry professionals and researchers working in areas related to semiconductors, optoelectronics, plasma technology, solid-state energy storages, and 5G, as well as advanced students studying electrical, mechanical, chemical, and material engineering. Two of the hottest research topics today are hybrid nanomaterials and flexible electronics. As such, this book covers both topics with chapters written by experts from across the globe. Chapters address hybrid nanomaterials, electronic transport in black phosphorus, three-dimensional nanocarbon hybrids, hybrid ion exchangers, pressure-sensitive adhesives for flexible electronics, simulation and modeling of transistors, smart manufacturing technologies, and inorganic semiconductors.

Smart Packaging Technologies for Fast Moving Consumer Goods approaches the subject of smart packaging from an innovative, thematic perspective: Part 1 looks at smart packaging technologies for food quality and safety Part 2 addresses smart packaging issues for the supply chain Part 3 focuses on smart packaging for brand protection and enhancement Part 4 centres on smart packaging for user convenience. Each chapter starts with a definition of the technology, and proceeds with an analysis of its workings and components before concluding with snapshots of potential applications of the technology. The Editors, brought together from academia and industry, provide readers with a cohesive account of the smart packaging phenomenon. Chapter authors are a mixture of industry professionals and academic researchers from the UK, USA, EU and Australasia.

The Science and Technology of Flexible Packaging: Multilayer Films from Resin and Process to End Use provides a comprehensive guide to the use of plastic films in flexible packaging, covering scientific principles, properties, processes, and end use considerations. The book brings the science of multilayer films to the practitioner in a concise and impactful way, presenting the fundamental understanding required to improve product design, material selection, and processes, and includes information on why one material is favored over another for a particular application, or how the film or coating affects material properties. Detailed descriptions and analysis of the key properties of packaging films are provided from both an engineering and scientific perspective. End-use effects are also covered in detail, providing key insights into the way the products being packaged influence film properties and design. The book bridges the gap between key scientific literature and the practical challenges faced by the flexible packaging industry, providing essential scientific insights, best practice techniques, environmental sustainability information, and key principles of structure design to enable engineers and scientists to

deliver superior products with reduced development time and cost. Provides essential information on all aspects of multilayer films in flexible packaging Aids in material selection and processing, shortening development times and delivering stronger products Bridges the gap between scientific principles and key challenges in the packaging industry, with practical explanations to assist practitioners in overcoming those challenges

Polypropylene: The Definitive User's Guide and Databook presents in a single volume a panoramic and up-to-the-minute user's guide for today's most important thermoplastic. The book examines every aspect of science, technology, engineering, properties, design, processing, applications of the continuing development and use of polypropylene. The unique treatment means that specialists can not only find what they want but for the first time can relate to and understand the needs and requirements of others in the product development chain. The entire work is underpinned by very extensive collections of property data that allow the reader to put the information to real industrial and commercial use. Despite the preeminence and unrivaled versatility of polypropylene as a thermoplastic material to manufacture, relatively few books have been devoted to its study. Polypropylene: The Definitive User's Guide and Databook not only fills the gap but breaks new ground in doing so. Polypropylene is the most popular thermoplastic in use today, and still one of the fastest growing. Polypropylene: The Definitive User's Guide and Databook is the complete workbook and reference resource for all those who work with the material. Its comprehensive scope uniquely caters to polymer scientists, plastics engineers, processing technologists, product designers, machinery and mold makers, product managers, end users, researchers and students alike.

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