

Modified Atmosphere And Active Packaging Technologies Contemporary Food Engineering

Meat is a global product, which is traded between regions, countries and continents. The onus is on producers, manufacturers, transporters and retailers to ensure that an ever-demanding consumer receives a top quality product that is free from contamination. With such a dynamic product and market place, new innovative ways to process, package and assess meat products are being developed. With ever increasing competition and tighter cost margins, industry has shown willingness to engage in seeking novel innovative ways of processing, packaging and assessing meat products while maintaining quality and safety attributes. This book provides a comprehensive overview on the application of novel processing techniques. It represents a standard reference book on novel processing, packaging and assessment methods of meat and meat products. It is part of the IFST Advances in Food Science book series.

Modified atmosphere (MA) and controlled atmosphere (CA) technologies have great potential in a wide range of applications. The increasingly global nature of food production and the increased emphasis on reducing chemical preservatives and pesticides have put the spotlight on these centuries-old technologies. Yet until now, there have been very few current resources available, and none have covered all aspects. Provides extensive background on the theory and application of modified and controlled atmospheres
Written by top international experts in research and industry, *Modified and Controlled Atmospheres for the Storage, Transportation, and Packaging of Horticultural Commodities* explores the science and application of the modified atmosphere (MA) and the controlled atmosphere (CA). It covers all technological applications, including storage, transport, and packaging for all fruits, vegetables, and ornamentals of temperate, subtropical, and tropical origin. Tracing the historical developments of these technologies, it provides information on the ideal conditions to be used for many horticultural commodities. It also outlines the effects of MA and CA on the physiology and biochemistry of these commodities as well as on their flavor and quality. Providing the most comprehensive resource on all basic and applied aspects of these technologies, the text also reviews the vast amount of literature already written on this topic. This extensive work captures, for the first time, the entire subject of MA and CA, presenting a complete review of the technological aspects of this important development in food safety and preservation.

Recent nationwide recalls of spinach due to *E. coli* contamination and peanut butter due to *Salmonella*, make the emerging development of "active" and "intelligent" packaging crucial for consumer safety and quality assurance. Now that it is possible to make packaging that can detect and inform consumers of contamination, as well as prevent or reduce the growth of human foodborne pathogens, the food packaging and safety industry needs a comprehensive overview of the state-of-the-science and future directions of this widely important field. Drawing on the research of a diverse group of scientists and pioneers in the field, *Intelligent and Active Packaging for Fruits and Vegetables* explores the new technology and applications used to bring fresh, safe, nutritious produce to the consumer. It explains Modified Atmosphere Packaging (MAP) and its use in packaging fruits and vegetables, as well as, fish and meat. It includes variations and advances on MAP such as high vapor-permeable films, and demonstrates modeling techniques to assist

in the prediction and selection of packaging type. The book contains a chapter on the trends, opportunities, and challenges of RFID temperature monitoring in food packaging. It also considers the interaction between container and food product, as well as the use of non-toxic insect repellent plastics. There is a chapter on the regulatory implications of the use of nanotechnology in food packaging. Finally, the book discusses consumer perception, the specific needs of developing countries, and current implementation in Europe. Explaining the very latest in packaging technology and opening areas for future research, *Intelligent and Active Packaging for Fruits and Vegetables* provides an excellent knowledge base from which to revolutionize the delivery of safe and nutritious food. Based on thousands of citations from peer-reviewed, trade, commercial, and patent literature and interviews with those who have worked in the laboratory, in pilot plants, and in production, *Active Packaging for Food Applications* provides a state-of-the-art guide to understanding and utilizing these technologies. The book highlights technologies that are currently in commercial use or have the potential to become commercial, including oxygen scavenging, moisture control, ethylene removal from fresh food, antimicrobials, odor removal, and aroma emission. In addition, it explores the pros and cons involved in using antimicrobial agents in package materials. *Active Packaging for Food Applications* provides you with a detailed guide and reference to the technologies - and their applications - involved in enhancing food and beverage preservation.

Active Packaging for Food Applications

Principles of Modified-Atmosphere and Sous Vide Product Packaging

New Methods of Food Preservation

Production, Processing and Technology

Active Food Packaging

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

Active antimicrobial food packaging is a new generation of packaging. Antimicrobial food additives are incorporated in the food packaging systems to inhibit, retard, or inactivate microbial growth to extend the shelf life of foods. This book is composed of five chapters, and is aimed at

introducing the reader to active antimicrobial food packaging, as well as concerns of the consumers on synthetic-based food additives.

Consumers are switching to fresh, minimally processed foods, creating challenges in terms of ensuring food safety. The shift in food production from local to global has led to a complex logistics chain. These trends and challenges have led to the development of packaging materials with better barrier properties, and active and intelligent packaging. A recent trend is the increasing sustainability of food packaging. Modified atmosphere or vacuum packaging gives a longer shelf life by reducing the growth of spoilage microorganisms and/or oxidation processes. This chapter focuses on modified-atmosphere packaging (MAP). The effects of high and low O₂, elevated CO₂ concentrations and equilibrium modified-atmosphere packaging (EMAP) are considered. The influence on food infectants, toxin-producing bacteria and mycotoxins is discussed. Recent studies on MAP have had contradictory results, mostly owing to differences in experimental design and materials.

The book will be focused on the three most important aspects of food packaging: Modeling, Materials and Packaging Strategies. The modeling section will provide a complete overview of mass transport phenomena in polymers intended for food packaging applications. The materials section will cover the most interesting problem-solving solutions in the field of food packaging, i.e., low environmental impact active films with antimicrobial activity. Lastly, the packaging section will provide an overview of the most recent approaches used to prolong the shelf life of several food products.

Intelligent and Active Packaging for Fruits and Vegetables

Novel Food Packaging Techniques

Handbook of Banana Production, Postharvest Science, Processing Technology, and Nutrition

Principles and Practice, Third Edition

MAP Plus

A comprehensive introduction to the physiology, biochemistry, and molecular biology of produce growth, paired with cutting-edge technological advances in produce preservation. Revised and updated, the second edition of Postharvest Biology and Nanotechnology explores the most recent developments in postharvest biology and nanotechnology. Since the publication of the first edition, there has been an increased understanding of the developmental physiology, biochemistry, and molecular biology during early growth, maturation, ripening, and postharvest conditions. The contributors—*noted experts in the field*—review the improved technologies that maintain the shelf life and quality of fruits, vegetables, and flowers. This second edition contains new strategies that can be implemented to remedy food security issues, including but not limited to phospholipase D inhibition technology and ethylene inhibition via 1-MCP technology. The text offers an

introduction to technologies used in production practices and distribution of produce around the world, as well as the process of senescence on a molecular and biochemical level. The book also explores the postharvest value chain for various produce, quality evaluation techniques, and the most current nanotechnology applications. This important resource:

- Expands on the first edition to explore in-depth postharvest biology with emphasis on developments in nanotechnology
- Contains contributions from leaders in the field
- Includes the most recent advances in postharvest biology and technology, including but not limited to phospholipase D and 1-MCP technology
- Puts the focus on basic science as well as technology and practical applications
- Applies a physiology, biochemistry, and biotechnology approach to the subject

Written for crop science researchers and professionals, horticultural researchers, agricultural engineers, food scientists working with fruits and vegetables, *Postharvest Biology and Nanotechnology, Second Edition* provides a comprehensive introduction to this subject, with a grounding in the basic science with the technology and practical applications.

Microbial attacks occur on food surfaces even when the food is packaged. This can be attributed to moisture permeability in the packaging materials and other environmental conditions. Therefore, active agents like antimicrobial components and antioxidants must be incorporated into the packaging system; these active agents function by enhancing the stability of the product to a greater extent. Implementing an active packaging system ensures the safety and quality aspects of packaged foods so that consumers may use the products without worry. *Active Packaging for Various Food Applications* addresses the significance of active packaging for enhancing the quality and safety of various packaged foods. This book discusses extending the shelf life of various food products by incorporating various active packaging systems. It also addresses bioactive materials used for packing food products and applications of nanomaterials in an active packaging system. Key Features: Describes the uses of active packaging materials for various food processing industries like dairy, cereals, fruits and vegetables, meat, etc. Explains the application of biosensors for the detection of spoilage of active packed food products Discusses the importance of active packaging techniques for retaining antioxidants and micro as well as macronutrients Highlights the importance of active packaging of foods and its advantages This book is a great source for academicians, scientists, research scholars, and food industry personnel because it sheds light on the recent techniques used in active packaging systems for enhancing quality aspects.

Modified atmosphere packaging (MAP) has proved to be one of the most significant and innovative growth areas in retail food packaging of the past two decades. Bulk modified atmosphere packs have been an accepted form of packaging for meat and poultry in the USA since the early 1970s, but MAP is only now of being widely adopted. Today there is a substantial wholesale on the verge market for bulk packaged fresh vegetables and fruit, and the most significant retail MAP products

are fresh pasta, pre-cooked poultry and sausage, and biscuits (a unique American product). The United Kingdom is the biggest single market for the modified atmosphere packaging of fresh chilled food products, accounting for about half of the total European market. A further quarter is represented by France. The success of MAP in both the British and French markets can be attributed to the large, highly sophisticated food retailing multiples and dense populations existing in both countries.

Antimicrobial Food Packaging takes an interdisciplinary approach to provide a complete and robust understanding of packaging from some of the most well-known international experts. This practical reference provides basic information and practical applications for the potential uses of various films in food packaging, describes the different types of microbial targets (fungal, bacteria, etc.), and focuses on the applicability of techniques to industry. Tactics on the monitoring of microbial activity that use antimicrobial packaging detection of food borne pathogens, the use of biosensors, and testing antimicrobial susceptibility are also included, along with food safety and good manufacturing practices. The book aims to curtail the development of microbiological contamination of food through anti-microbial packaging to improve the safety in the food supply chain. Presents the science behind anti-microbial packaging and films reflecting advancements in chemistry, microbiology, and food science Includes the most up-to-date information on regulatory aspects, consumer acceptance, research trends, cost analysis, risk analysis and quality control Discusses the uses of natural and unnatural compounds for food safety and defense

Food Quality and Shelf Life

Biopackaging

Principles and Applications of Modified Atmosphere Packaging of Foods

Environmentally Compatible Food Packaging

Postharvest Biology and Nanotechnology

Packaging continues to be one of the most important and innovative areas in food processing. Edited by a leading expert in the field, and with its distinguished international team of contributors, Novel food packaging techniques provides an authoritative and comprehensive review of the key trends. Part one discusses the range of active packaging techniques such as the use of oxygen and other scavengers, moisture regulation and antimicrobial packaging in food preservation. It also covers the use of intelligent systems such as time-temperature and freshness indicators to assess food quality. Part two reviews developments in modified atmosphere packaging (MAP) and its role in enhancing product safety and quality. Part three describes packaging applied in practice to particular products such as meat and fish. Part four covers other key issues such as packaging optimisation, the legislative context, sustainable packaging and consumer attitudes. Novel food packaging techniques is a standard reference for the food industry in optimising the use of packaging to improve product safety and quality. Provides an authoritative and comprehensive review of the key trends of food packaging Discusses the range of active packaging techniques such as the use of oxygen and other scavengers, moisture regulation and antimicrobial packaging in food preservation Covers packaging optimisation, the legislative context,

sustainable packaging and consumer attitudes

Packaging plays an essential role in protecting and extending the shelf life of a wide range of foods, beverages and other fast-moving consumer goods. There have been many key developments in packaging materials and technologies in recent years, and Trends in packaging of food, beverages and other fast-moving consumer goods (FMCG) provides a concise review of these developments and international market trends. Beginning with a concise introduction to the present status and trends in innovations in packaging for food, beverages and other fast-moving consumer goods, the book goes on to consider modified atmosphere packaging and other active packaging systems, including smart and intelligent packaging, and the role these play in augmenting and securing the consumer brand experience. Developments in plastic and bioplastic materials and recycling systems are then discussed, followed by innovations and trends in metal, paper and paperboard packaging. Further chapters review international environmental and sustainability regulatory and legislative frameworks, before the use of nanotechnology, smart and interactive packaging developments for enhanced communication at the packaging/user interface are explored. Finally, the book concludes by considering potential future trends in materials and technologies across the international packaging market. With its distinguished editor and international team of expert contributors, Trends in packaging of food, beverages and other fast-moving consumer goods (FMCG) is an important reference tool, providing a practical overview of emerging packaging technologies and market trends for research and design professionals in the food and packaging industry, and academics working in this area. Introduces the present status, current trends and new innovations in the field whilst considering future trends in materials and technologies Considers modified atmosphere packaging and other active packaging systems including smart and intelligent packaging Discusses developments in plastic and bioplastic materials and recycling systems

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.

Food packaging performs an essential function, but packaging materials can have a negative impact on the environment. This collection reviews bio-based, biodegradable and recycled materials and their current and potential applications for food protection and preservation. The first part of the book looks at the latest advances in bio-based food packaging materials. Part two discusses the factors involved in choosing alternative packaging materials such as consumer preference, measuring the environmental performance of food packaging, eco-design, and the safety and quality of recycled materials. Part three contains chapters on the applications of

environmentally-compatible materials in particular product sectors, including the packaging of fresh horticultural produce, dairy products and seafood. This section also covers active packaging, modified atmosphere packaging and biobased intelligent food packaging. The book finishes with a summary of the legislation and certification of environmentally-compatible packaging in the EU. With its distinguished editor and contributors, Environmentally-compatible food packaging is a valuable reference tool for professionals in the food processing and packaging industries. Reviews bio-based, biodegradable and recycled materials and their current and potential applications Discusses consumer preference, environmental performance, eco-design and the quality of recycled materials as factors involved in choosing alternative packaging materials Summarises EU legislation and certification of environmentally compatible packaging

Modified Atmosphere, Intelligent and Active Packaging

Modified and Controlled Atmospheres for the Storage, Transportation, and Packaging of Horticultural Commodities

Innovations in Food Packaging

Antimicrobial Food Packaging

This is the first in-depth presentation in book form of both modified atmosphere and sous vide food preservation and packaging technologies and applications. The use of these technologies with all applicable food product categories is examined. The authors are specialists in these preservation/packaging methods from North America and Europe. All significant aspects are examined including processes and materials, applications, microbiological control, and regulations and guidelines. Topics of special interest include use of hurdles, HACCP, gas absorbents and generators, and time-temperature indicators. Extensive practical reference data is economically presented in tables.

Many factors are relevant in making the proper choice of food packaging material, including those related to shelf life and biodegradability. To meet these demands, new processing and preservation techniques have arisen, most notably modified atmosphere packaging (MAP) and active packaging (AP). Modified Atmosphere and Active Packaging Technologies

This book examines the whole range of modern packaging options. It covers edible packaging based on carbohydrates, proteins, antioxidative and antimicrobial packaging, and the chemistry of food and food packaging, such as plasticization and polymer morphology. Issues related to shelf life and biodegradability are also discussed, in addition to newly discovered processing and preservation techniques, most notably modified atmosphere packaging (MAP) and active packaging (AP).

Soft and semi-soft farmhouse cheeses made from pasteurized milk and having high moisture content are common craft products in various countries, including Ireland. These cheeses have limited

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shelf-life, in most cases requiring controlled refrigerated conditions during distribution and sale. The ultimate goal of this work was to develop a packaging system for a soft cheese which significantly extended its shelf-life while maintaining its quality. This would expand market possibilities and improved market value. Modified Atmosphere Packaging and Active Packaging were applied. For the determination of the optimal MAP the study required: (i) mathematical modelling of the gas exchange rate of the cheese as a function of temperature and gas composition, (ii) mathematical modelling of O₂ and CO₂ mass transfer coefficients through perforations as a function of temperature, number and size of the perforations, (iii) combination of the previous models into one which could be used to predict the equilibrium modified atmosphere for different packaging designs and the variability expected in each case, (iv) determination of the shelf-life of cheese under different MAP designs selected based on the previous results and (v) study of the performance of the optimal MAP design when stored under variable temperature. The possibility to use biodegradable films for the packaging of the cheeses was studied. This task required (i) determination of properties of the films and how they were affected by the inclusion of certain additives and (ii) comparison of the use of edible film with the original commercial packaging material cheese. Finally, the possibility to use O₂ scavengers as a form of active packaging was explored. This task required: (i) mathematical modelling of O₂ absorption of the scavengers as a function of temperature and (ii) study of the performance of a permeable packaging system containing cheese and O₂ scavengers.

Markets, Materials and Technologies

Smart Packaging Technologies for Fast Moving Consumer Goods

Food and Beverage Packaging Technology

Production, Postharvest Science, Processing and Nutrition

Engineering Design of Active and Modified Atmosphere Packaging of Soft Cheese

Food Packaging: Principles and Practice, Third Edition presents a comprehensive and accessible discussion of food packaging principles and their applications. Integrating concepts from chemistry, microbiology, and engineering, it continues in the tradition of its bestselling predecessors and has been completely revised to include new, updated, and expanded content and provide a detailed overview of contemporary food packaging technologies. Features Covers the packaging requirements of all major food groups Includes new chapters on food packaging closures and sealing systems, as well as optical, mechanical, and barrier properties of thermoplastic polymers Provides the latest information on new and active packaging technologies Offers guidance on the design and analysis of shelf life experiments and the shelf life estimation of foods Discusses the latest details on food contact materials including those of public interest such as

BPA and phthalates in foods Devotes extensive space to the discussion of edible, biobased and biodegradable food packaging materials An in-depth exploration of the field, *Food Packaging: Principles and Practice* includes all-new worked examples and reflects the latest research and future hot topics. Comprehensively researched with more than 1000 references and generously illustrated, this book will serve students and industry professionals, regardless of their level or background, as an outstanding learning and reference work for their professional preparation and practice.

With a wealth of illustrations, examples, discussion questions, and case studies, the *Food Packaging Science and Technology* covers basic principles and technologies as well as advanced topics such as active, intelligent, and sustainable packaging with unparalleled depth and breadth of scope. Emphasizing the application of relevant scientific principles to create effective designs and quality products, an international team of contributors draws on their collective experience to equip you with the necessary knowledge and tools to tackle modern food packaging problems. Divided into four parts, this book begins with an extensive discussion of packaging materials science. Contributions review the basic concepts of chemical and physical properties as they relate to food packaging. They cover gas permeation and migration and give detailed information on the four basic types of packaging materials: plastics, glass, metal, and cellulosic. The second part applies the previous information to the field of packaging technologies. Traditional methods and concepts such as end-of-line operations, permeation and migration, canning and aseptic packaging, and vacuum/modified atmosphere packaging are juxtaposed with the more advanced technologies of microwavable packaging, active packaging, and intelligent packaging. Part 3 discusses shelf life determination and elements of storage stability and packaging requirements of various food categories. The final part presents issues related to packaging sociology, addressing sustainable packaging, as well as sociological and legislative considerations.

This volume presents a wide range of new approaches aimed at improving the safety and quality of food products and agricultural commodities. Each chapter provides in-depth information on new and emerging food preservation techniques including those relating to decontamination, drying and dehydration, packaging innovations and the use of botanicals as natural preservatives for fresh animal and plant products. The 28 chapters, contributed by an international team of experienced researchers, are presented in five sections, covering: Novel decontamination techniques Novel preservation techniques Active and atmospheric packaging Food packaging Mathematical modelling of food preservation processes Natural preservatives This title will be of great interest to food scientists and engineers based in food manufacturing and in research establishments. It will also be useful to advanced students of food science and technology.

Pineapple is the third most important tropical fruit in the world, with production occurring throughout the tropics. The demand for low acid fresh pineapples and its processed products is one of the fastest growing markets, especially in Europe and North America. This book provides an in depth and contemporary coverage of knowledge and practices in the value chain of this popular fruit, from production through to consumption. The chapters explore all the most recent developments in areas such as breeding, novel processing technologies, postharvest physiology and storage, packaging, nutritional

quality and safety aspects. An outstanding team of authors from across the globe have contributed to make this the definitive pineapple handbook. Handbook of Pineapple Technology: Production, Postharvest Science, Processing and Nutrition is the ultimate guide for scientists in the food industries specializing in fruit processing, packaging and manufacturing. It is also a useful resource for educators and students of food technology and food sciences as well as research centers and regulatory agencies around the world.

Modified Atmosphere Packaging of Foods

17. New research on modified-atmosphere packaging and pathogen behaviour
Science and Technology

Food Packaging Science and Technology

Packaging for Food Preservation

Brings together articles from many of the world's leading experts in modified atmosphere, controlled atmosphere, and vacuum packaging technologies for the packaging of fresh and minimally processed foods. These articles offer a brief overview of the scientific principles of CA, MA, and VP; examine various commercial applications of CA, MA and VP in the United States and throughout Europe; present summaries of ongoing research on MA and CA packaging; and provide a broad perspective on issues related to health and safety.

A complete guide to the principles and practical application of modified atmosphere packaging Modified atmosphere packaging (MAP) is one of the most cost-effective, versatile, and commonly used methods of preserving food products available today. Employed in both ambient and chilled conditions, it can prolong shelf-life and preserve the quality of a wide array of items via careful processes of atmospheric engineering. The essential scientific principles underlying this technology can, however, be difficult to grasp and effectively apply. With Modified Atmosphere Packaging of Foods, esteemed food science professor Dong Sun Lee provides a thorough and practical explanation of all aspects of MAP. Chapters covering the development, impact, and day-to-day application of the technique give a well-rounded understanding of its pivotal role in the food industry, while accounts of other active packaging methods help to provide broader context. This important new book includes: Detailed guidance on all aspects of MAP – from its scientific background to its practical application Information on how specific MAP products may be developed according to their particular engineering principles Coverage of the related active and intelligent packaging techniques Discussion of relevant food safety issues and regulations Containing vital information for industry professionals and food science researchers alike, Modified Atmosphere Packaging of Foods is an essential text for all those working to improve the quality and shelf-life of the food we eat.

Packaging plays an essential role in limiting undesired microbial growth and sensory deterioration. Advances in meat, poultry and seafood packaging provides a comprehensive review of both current and emerging technologies for the effective packaging of muscle foods. Part one provides a comprehensive overview of key issues concerning the safety and quality of packaged meat, poultry and seafood. Part two goes on to investigate developments in vacuum and modified atmosphere packaging for both fresh and processed muscle foods, including advances in bulk packaging and soluble carbon dioxide use. Other packaging methods are the focus of part three, with the packaging of processed, frozen, ready-to-serve and retail-ready meat, seafood and poultry products all reviewed, alongside advances in sausage casings and in-package pasteurization. Finally, part four explores emerging labelling and packaging techniques. Environmentally-compatible, antimicrobial and antioxidant active packaging for meat and poultry are investigated, along with edible films, smart packaging systems, and issues regarding traceability and regulation. With its distinguished editor and

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international team of expert contributors, *Advances in meat, poultry and seafood packaging* is a key text for those involved with the research, development and production of packaged meat, poultry and seafood products. It also provides an essential overview for post-graduate students and academic researchers with an interest in the packaging of muscle foods.

Provides a comprehensive review of current and emerging technologies for the effective and safe packaging of muscle foods Investigates developments in vacuum and modified atmosphere packaging for fresh and processed muscle foods, including advances in bulk packaging and soluble carbon dioxide use Explores environmentally-compatible, antimicrobial and antioxidant active packaging for meat and poultry, along with edible films, smart packaging systems, and issues regarding traceability and regulation

Food packaging materials have traditionally been chosen to avoid unwanted interactions with the food. During the past two decades a wide variety of packaging materials have been devised or developed to interact with the food. These packaging materials, which are designed to perform some desired role other than to provide an inert barrier to outside influences, are termed 'active packaging'. The benefits of active packaging are based on both chemical and physical effects. Active packaging concepts have often been presented to the food industry with few supporting results of background research. This manner of introduction has led to substantial uncertainty by potential users because claims have sometimes been based on extrapolation from what little proven information is available. The forms of active packaging have been chosen to respond to various food properties which are often unrelated to one another. For instance many packaging requirements for post harvest horticultural produce are quite different from those for most processed foods. The object of this book is to introduce and consolidate information upon which active packaging concepts are based. Scientists, technologists, students and regulators will find here the basis of those active packaging materials, which are either commercial or proposed. The book should assist the inquirer to understand how other concepts might be applied or where they should be rejected.

Advances in microbial food safety

Emerging Technologies in Meat Processing

Advances in Meat, Poultry and Seafood Packaging

Food Packaging Technology

Active Antimicrobial Food Packaging

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.

Food Quality and Shelf Life covers all aspects and challenges of food preservation, packaging and shelf-life. It provides information on the most important pillars in the field, starting

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with active and smart packaging materials, novel technologies, and control tools in all stages between production and consumer. The book gives emphasis to methodological approaches for sensory shelf-life estimation and the impact of packaging on sensorial properties. Researchers and professionals alike will find this reference useful, especially those who are interested in the performance evaluation of future packaging for fresh produce in the cold chain and temperature management in the supply chain. Presents insights regarding new trends in emerging technologies in the field Includes hot topics, such as modified atmosphere packaging and active materials to improve shelf-life Provides shelf-life assessment and modeling methodologies and accelerated shelf-life testing

Modified atmosphere packaging may be defined as an active packaging method in which an altered atmosphere is created in the headspace that retards chemical deterioration while simultaneously retarding growth of spoilage organisms. Shelf lives of perishable products, such as dairy products, meat, poultry, fish, fruits and vegetables, and bakery items are limited by biochemical changes in the product catalysed by exposure to the normal atmosphere (21 % oxygen, 78% nitrogen and less than 0. 1 % carbon dioxide) and growth of spoilage organisms. Modification of the atmosphere within a package containing these products helps to better maintain the quality of the food under longer storage conditions and retards the growth of undesirable organisms. Of course, deterioration is also slowed by chilling, which is required for the transport to market of highly perishable items like meat, poultry and fish that would either spoil or have the potential for contamination by certain food pathogens. Chilling plus a modification of the atmosphere optimizes the keeping quality of food. Modification of the atmosphere has been known for over a century as a means of food preservation and has become a very popular means of food preservation in the latter part of the 20th century. Modified atmosphere packaging (MAP) is practised extensively in Europe, Canada and the USo Both vacuum packaging (rem oval of air from the package) and addition of gases within the package are considered MAP.

A comprehensive guide that covers the banana's full value chain – from production to consumption The banana is the world's fourth major fruit crop. Offering a unique and in-depth overview of the fruit's entire value chain, this important new handbook charts its progression from production through to harvest, postharvest, processing, and consumption. The most up-to-date data and best practices are drawn together to present guidelines on innovative storage, processing, and packaging technologies,

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while fresh approaches to quality management and the value-added utilization of banana byproducts are also explained.

Additionally, the book examines the banana's physiology, nutritional significance, and potential diseases and pests. The book also Edited by noted experts in the field of food science, this essential text: Provides a new examination of the world's fourth major fruit crop Covers the fruit's entire value chain Offers dedicated chapters on bioactive and phytochemical compounds found in bananas and the potential of processing byproducts Gives insight into bananas' antioxidant content and other nutritional properties Identifies and explains present and possible effects of bioactive and phytochemical compounds Handbook of Banana Production, Postharvest Science, Processing Technology, and Nutrition offers the most far-reaching overview of the banana currently available. It will be of great benefit to food industry professionals specializing in fruit processing, packaging, and manufacturing banana-based products. The book is also an excellent resource for those studying or researching food technology, food science, food engineering, food packaging, applied nutrition, biotechnology, and more.

Progress in Food Preservation

Active Packaging for Various Food Applications

Trends in Packaging of Food, Beverages and Other Fast-Moving Consumer Goods (FMCG)

Modified Atmosphere, Active and Intelligent Packaging Conference, 2003

Principles and Applications

Modified Atmosphere Packaging for Fresh-cut Fruits and Vegetables provides comprehensive coverage of all aspects of modern MAP technologies for fresh-cut fruits and vegetables. Coverage begins with the general MAP concept and application by introducing the concept of MAP, how MAP works for fresh-cut produce and the benefits and shortfalls of MAP in its application. The book then discusses the basic aspects of MAP - packaging materials and machinery. In these sections, the book addresses not only the general information about MAP materials, but also supplies examples to introduce the new packaging films and their successful application in produce and fresh-cut fruits and vegetables. Unique chapters and sections in the book include relevant patents for MAP, commercial practices and MAP packaging machinery. Generally, packaging machinery is only included in books specifically covering packaging engineering. Coverage of this important aspect is included in the book since fresh-cut manufacturers spend much more time in the day-to-day operations on

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packaging machinery and systems as compared to packaging film materials. In the final section, Modified Atmosphere Packaging for Fresh-cut Fruits and Vegetables highlights the latest developments in the packaging industry and how they could impact the fresh-cut industry.

This new edition of Innovations in Food Packaging ensures that readers have the most current information on food packaging options, including active packaging, intelligent packaging, edible/biodegradable packaging, nanocomposites and other options for package design. Today's packaging not only contains and protects food, but where possible and appropriate, it can assist in inventory control, consumer education, increased market availability and shelf life, and even in ensuring the safety of the food product. As nanotechnology and other technologies have developed, new and important options for maximizing the role of packaging have emerged. This book specifically examines the whole range of modern packaging options. It covers edible packaging based on carbohydrates, proteins, and lipids, antioxidative and antimicrobial packaging, and chemistry issues of food and food packaging, such as plasticization and polymer morphology. Professionals involved in food safety and shelf life, as well as researchers and students of food science, will find great value in this complete and updated overview. New to this edition: Over 60% updated content – including nine completely new chapters – with the latest developments in technology, processes and materials. Now includes bioplastics, biopolymers, nanoparticles, and eco-design of packaging.

Modified Atmosphere and Active Packaging Technologies
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The world population has been increasing day by day, and demand for food is rising. Despite that, the natural resources are decreasing, and production of food is getting difficult. At the same time, about one-quarter of what is produced never reaches the consumers due to the postharvest losses. Therefore, it is of utmost importance to efficiently handle, store, and utilize produce to be able to feed the world, reduce the use of natural resources, and help to ensure sustainability. At this point, postharvest handling is becoming more important, which is the main determinant of the postharvest losses. Hence, the present book is intended to provide useful and scientific information about

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postharvest handling of different produce.

Postharvest Handling

Modified Atmosphere Food Packaging

Food Packaging

Handbook of Pineapple Technology

Modified Atmosphere Packaging for Fresh-Cut Fruits and Vegetables