

Nonthermal Processing Technologies For Food

High pressure processing technology has been adopted worldwide at the industrial level to preserve a wide variety of food products without using heat or chemical preservatives. High Pressure Processing: Technology Principles and Applications will review the basic technology principles and process parameters that govern microbial safety and product quality, an essential requirement for industrial application. This book will be of interest to scientists in the food industry, in particular to those involved in the processing of products such as meat, fish, fruits, and vegetables. The book will be equally important to food microbiologists and processing specialists in both the government and food industry. Moreover, it will be a valuable reference for authorities involved in the import and export of high pressure treated food products. Finally, this update on the science and technology of high pressure processing will be helpful to all academic, industrial, local, and state educators in their educational efforts, as well as a great resource for graduate students interested in learning about state-of-the-art technology in food engineering.

Handbook of Research on Food Processing and Preservation Technologies will be a 5-volume collection that attempts to illustrate various design, development, and applications of novel and innovative strategies for food processing and preservation. The role and applications of minimal processing techniques (such as

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ozone treatment, vacuum drying, osmotic dehydration, dense phase carbon dioxide treatment, pulsed electric field, and high-pressure assisted freezing) are also discussed, along with a wide range of applications. The handbook also explores some exciting computer-aided techniques emerging in the food processing sector, such as robotics, radio frequency identification (RFID), three-dimensional food printing, artificial intelligence, etc.

Some emphasis has also been given on nondestructive quality evaluation techniques (such as image processing, terahertz spectroscopy imaging technique, near infrared, Fourier transform infrared spectroscopy technique, etc.) for food quality and safety evaluation. The significant roles of food properties in the design of specific foods and edible films have been elucidated as well. The first volume in this set, *Nonthermal and Innovative Food Processing Methods*, provides a detailed discussion of many nonthermal food process techniques. These include high-pressure processing, ultraviolet light technology, microwave-assisted extraction, high pressure assisted freezing, microencapsulation, dense phase carbon dioxide aided preservation, to name a few. The volume is a treasure house of valuable information and will be an excellent reference for researchers, scientists, students, growers, traders, processors, industries, and others.

A number of food engineering operations, in which heat is not used as a preserving factor, have been employed and are applied for preparation (cleaning, sorting, etc.), conversion (milling, agglomeration, etc.) or preservation (irradiation, high pressure processing, pulsed electric

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fields, etc.) purposes in the food industry. This book presents a comprehensive treatise of all normally used food engineering operations that are carried out at room (or ambient) conditions, whether they are aimed at producing microbiologically safe foods with minimum alteration to sensory and nutritive properties, or they constitute routine preparative or transformation operations. The book is written for both undergraduate and graduate students, as well as for educators and practicing food process engineers. It reviews theoretical concepts, analyzes their use in operating variables of equipment, and discusses in detail different applications in diverse food processes.

"This new volume, *Emerging Thermal and Nonthermal Technologies in Food Processing*, provides a comprehensive overview of thermal and nonthermal processing of food with new and innovative technologies. Recent innovations in thermal as well as nonthermal technologies, which are specifically applied for potable water and fluid foods (milk, juice, soups, etc.), are well documented for their high bioavailability of macro- and micronutrients and are very promising. This brings together valuable information on fluid and microbial characteristics and quality dynamics that facilitate the adoption of new technology for food processing. Some new technologies and methods covered include the application of microwaves in heating, drying, pasteurization, sterilization, blanching, baking, cooking, and thawing; microwave-assisted extraction of compounds; using low-electric fields; alternation of temperature and pressure of supercritical carbon dioxide;

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ultrasound-assisted osmotic dehydration; hydrodynamic cavitation; high-pressure processing; gamma-irradiation; and more. The nonthermal technologies discussed have been developed as an alternative to thermal processing while still meeting required safety or shelf-life demands and minimizing the effects on nutritional and quality attributes. With contributions from a broad range of leading researchers, this comprehensive volume will be a valuable reference and useful guide for students, educators, researchers, food processors, and industry personnel looking for up-to-date insights in the field. The authors believe that worldwide adoption of these novel technologies will benefit consumers in terms of enhanced food safety, labeling, nutritional security, and value-added products at reasonable costs"--

Packed with case studies and problem calculations, *Handbook of Food Processing: Food Safety, Quality, and Manufacturing Processes* presents the information necessary to design food processing operations and describes the equipment needed to carry them out in detail. It covers the most common and new food manufacturing processes while addressing relevant novel food processing technologies have significant potential to improve product quality and process efficiency. Commercialisation of new products and processes brings exciting opportunities and interesting challenges. Case studies in novel food processing technologies provides insightful, first-hand experiences of many pioneering experts involved in the development and commercialisation of foods produced by novel processing technologies. Part one presents case studies

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of commercial products preserved with the leading nonthermal technologies of high pressure processing and pulsed electric field processing. Part two broadens the case histories to include alternative novel techniques, such as dense phase carbon dioxide, ozone, ultrasonics, cool plasma, and infrared technologies, which are applied in food preservation sectors ranging from fresh produce, to juices, to disinfestation. Part three covers novel food preservation techniques using natural antimicrobials, novel food packaging technologies, and oxygen depleted storage techniques. Part four contains case studies of innovations in retort technology, microwave heating, and predictive modelling that compare thermal versus non-thermal processes, and evaluate an accelerated 3-year challenge test. With its team of distinguished editors and international contributors, Case studies in novel food processing technologies is an essential reference for professionals in industry, academia, and government involved in all aspects of research, development and commercialisation of novel food processing technologies. Provides insightful, first-hand experiences of many pioneering experts involved in the development and commercialisation of foods produced by novel processing technologies Presents case studies of commercial products preserved with the leading nonthermal technologies of high pressure processing and pulsed electric field processing Features alternative novel techniques, such as dense phase carbon dioxide, ozone, ultrasonics, cool plasma, and infrared technologies utilised in food preservation sectors

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The latest research on the health benefits and optimal processing technologies of herbs and spices This book provides a comprehensive overview of the health benefits, analytical techniques used, and effects of processing upon the physicochemical properties of herbs and spices. Presented in three parts, it opens with a section on the technological and health benefits of herbs and spices. The second part reviews the effect of classical and novel processing techniques on the properties of herbs/spices. The third section examines extraction techniques and analytical methodologies used for herbs and spices. Filled with contributions from experts in academia and industry, *Herbs, Spices and Medicinal Plants: Processing, Health Benefits and Safety* offers chapters covering thermal and non-thermal processing of herbs and spices, recent developments in high-quality drying of herbs and spices, conventional and novel techniques for extracting bioactive compounds from herbs and spices, and approaches to analytical techniques. It also examines purification and isolation techniques for enriching bioactive phytochemicals, medicinal properties of herbs and spices, synergy in whole-plant medicine, potential applications of polyphenols from herbs and spices in dairy products, biotic and abiotic safety concerns, and adverse human health effects and regulation of metal contaminants in terrestrial plant-derived food and phytopharmaceuticals. Covers the emerging health benefits of herbs and spices, including their use as anti-diabetics, anti-inflammatories, and anti-oxidants Reviews the effect of classical and novel processing techniques on the properties of herbs

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and spices Features informed perspectives from noted academics and professionals in the industry Part of Wiley's new IFST Advances in Food Science series Herbs, Spices and Medicinal Plants is an important book for companies, research institutions, and universities active in the areas of food processing and the agri-food environment. It will appeal to food scientists and engineers, environmentalists, and food regulatory agencies.

The second edition of Emerging Technologies in Food Processing presents essential, authoritative, and complete literature and research data from the past ten years. It is a complete resource offering the latest technological innovations in food processing today, and includes vital information in research and development for the food processing industry. It covers the latest advances in non-thermal processing including high pressure, pulsed electric fields, radiofrequency, high intensity pulsed light, ultrasound, irradiation, and addresses the newest hurdles in technology where extensive research has been carried out. Provides an extensive list of research sources to further research development Presents current and thorough research results and critical reviews Includes the most recent technologies used for shelf life extension, bioprocessing simulation and optimization

Nonthermal Processing Technologies for Food offers a comprehensive review of nonthermal processing technologies that are commercial, emerging or over the horizon. In addition to the broad coverage, leading experts in each technology serve as chapter authors to

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provide depth of coverage. Technologies covered include: physical processes, such as high pressure processing (HPP); electromagnetic processes, such as pulsed electric field (PEF), irradiation, and UV treatment; other nonthermal processes, such as ozone and chlorine dioxide gas phase treatment; and combination processes. Of special interest are chapters that focus on the "pathway to commercialization" for selected emerging technologies where a pathway exists or is clearly identified. These chapters provide examples and case studies of how new and nonthermal processing technologies may be commercialized. Overall, the book provides systematic knowledge to industrial readers, with numerous examples of process design to serve as a reference book. Researchers, professors and upper level students will also find the book a valuable text on the subject.

The dairy industry usually adopts conventional methods of processing various milk-based food products, which can destroy nutrients and minimize organoleptic qualities. An alternative approach for this is the non-conventional method of non-thermal processing techniques. Not only does this enhance the nutritional profile of the various processed products, but increases the consumer acceptability. There are some emerging non-thermal processing techniques such as pulsed light, cold plasma, high pressure processing, ultrasonic, UV pasteurization, or ozone treatments, which can be successfully employed in dairy processing industries to enhance product acceptability, safety, and quality aspects. Non-Thermal Processing Technologies for the

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Dairy Industry describes several emerging non-thermal processing techniques that can be specially employed for the dairy processing industry. The book narrates the benefits of using pulsed light, cold plasma, high pressure and ultrasonic during processing of various dairy products. Key Features: Addresses techniques used for extraction of functional food components from various dairy products by using super critical CO₂ extraction technology. Explains application of ozone and cold plasma technology for treating dairy processing waste waters with efficient recycling aspects. Discusses the importance of using biopreservatives in shelf life extension of several dairy food products. Portrays scope and significant importance of adopting UV pasteurization in processing market milk along with safety and environmental impacts over processing This book solves the issue of waste generation in dairy industries and further advises recovery of such waste for efficient recycling process. In addition to being useful for dairy technologists, it is a great source for academic scholars and students looking to gain knowledge and excel in the non-thermal processing area.

Consumers increasingly demand foods that retain their natural flavor, color, and texture and contain fewer additives such as preservatives. In response to those needs, one of the most important recent developments in the food industry has been the development of minimal processing technologies designed to limit the impact of processing on nutritional and sensory quality and to preserve food without the use of synthetic additives. This important collection reviews the range of minimal

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processing techniques, their advantages and disadvantages, and their use in food production.

A number of novel thermal and nonthermal processing methods are in active research and development in industry, academic and government laboratories. A key step that needs to be addressed is how to best package commodities processed by high pressure, pulsed electric fields, UV, irradiation, microwave or radio frequency heating, bioactive coating/packaging, or the treatment with probiotics to best preserve the benefits of improved product quality imparted by these emerging preservation technologies. Packaging for Nonthermal Processing of Food reviews typical nonthermal processes, the characteristics of food products after nonthermal treatments, and packaging parameters to preserve the quality and enhance the food safety of the products. In addition, the critical role of information carried by packaging materials to make a new product produced by a novel process attractive to consumers is discussed. Packaging for Nonthermal Processing of Food offers many benefits to industry for providing the practical information on the relationship between new processes and packaging materials, to academia for constructing the fundamental knowledge, and to regulatory agencies for acquiring deeper understanding on the packaging requirements for new processes.

Functional foods are foods which contain bioactive components, either from plant or animal sources, which can have health benefits for the consumer over and above their nutritional value. Foods which have antioxidant or cancer-combating components are in high

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demand from health conscious consumers: much has been made of the health-giving qualities of fruits and vegetables in particular. Conversely, foods which have been processed are suffering an image crisis, with many consumers indiscriminately assuming that any kind of processing robs food of its “natural goodness”. To date, there has been little examination of the actual effects – whether positive or negative – of various types of food processing upon functional foods. This book highlights the effects of food processing on the active ingredients of a wide range of functional food materials, with a particular focus on foods of Asian origin. Asian foods, particularly herbs, are becoming increasingly accepted and demanded globally, with many Western consumers starting to recognize and seek out their health-giving properties. This book focuses on the extraction of ingredients which from materials which in the West are seen as “alternative” - such as flour from soybeans instead of wheat, or bran and starch from rice – but which have long histories in Asian cultures. It also highlight the incorporation of those bioactive compounds in foods and the enhancement of their bioavailability. Functional Foods and Dietary Supplements: Processing Effects and Health Benefits will be required reading for those working in companies, research institutions and universities that are active in the areas of food processing and agri-food environment. Food scientists and engineers will value the new data and research findings contained in the book, while environmentalists, food regulatory agencies and other food industry personnel involved in functional food production or

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development will find it a very useful source of information.

Consumers around the world have become better educated and more demanding in their identification and purchase of quality health-promoting foods; therefore the food industry requires innovative technologies to provide their clientele with safe and stable foods that meet safety regulations . Improving Food Quality with Novel Food Processing Technolo

Food processing is the step of the food chain that principally affects a food's physical or biochemical properties, along with determining the safety and shelf life of the product. This book provides a comprehensive overview of innovations in non-thermal technologies specifically for fluid foods, recognized for their high bioavailability of macronutrients and micronutrients.

Considerable resources and expertise has been devoted to the processing of safe and wholesome foods. Non-thermal technologies have been developed as an alternative to thermal processing, while still meeting required safety or shelf-life demands and minimising the effects on its nutritional and quality attributes. Examines non-thermal processing techniques specifically applied to fluid foods Includes methods for mathematically evaluating each technique Addresses global regulatory requirements for fluid foods Provides recommendations and opportunities for various safety-related issues

Food process engineering, a branch of both food science and chemical engineering, has evolved over the years since its inception and still is a rapidly changing discipline. While traditionally the main objective of food

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process engineering was preservation and stabilization, the focus today has shifted to enhance health aspects, flavour and taste, nutrition, sustainable production, food security and also to ensure more diversity for the increasing demand of consumers. The food industry is becoming increasingly competitive and dynamic, and strives to develop high quality, freshly prepared food products. To achieve this objective, food manufacturers are today presented with a growing array of new technologies that have the potential to improve, or replace, conventional processing technologies, to deliver higher quality and better consumer targeted food products, which meet many, if not all, of the demands of the modern consumer. These new, or innovative, technologies are in various stages of development, including some still at the R&D stage, and others that have been commercialised as alternatives to conventional processing technologies. Food process engineering comprises a series of unit operations traditionally applied in the food industry. One major component of these operations relates to the application of heat, directly or indirectly, to provide foods free from pathogenic microorganisms, but also to enhance or intensify other processes, such as extraction, separation or modification of components. The last three decades have also witnessed the advent and adaptation of several operations, processes, and techniques aimed at producing high quality foods, with minimum alteration of sensory and nutritive properties. Some of these innovative technologies have significantly reduced the thermal component in food processing, offering

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alternative nonthermal methods. *Food Processing Technologies: A Comprehensive Review* covers the latest advances in innovative and nonthermal processing, such as high pressure, pulsed electric fields, radiofrequency, high intensity pulsed light, ultrasound, irradiation and new hurdle technology. Each section will have an introductory article covering the basic principles and applications of each technology, and in-depth articles covering the currently available equipment (and/or the current state of development), food quality and safety, application to various sectors, food laws and regulations, consumer acceptance, advancements and future scope. It will also contain case studies and examples to illustrate state-of-the-art applications. Each section will serve as an excellent reference to food industry professionals involved in the processing of a wide range of food categories, e.g., meat, seafood, beverage, dairy, eggs, fruits and vegetable products, spices, herbs among others.

A comprehensive review of the many new developments in the growing food processing and packaging field Revised and updated for the first time in a decade, this book discusses packaging implications for recent nonthermal processing technologies and mild food preservation such as high pressure processing, irradiation, pulsed electric fields, microwave sterilization, and other hurdle technologies. It reviews typical nonthermal processes, the characteristics of food products after nonthermal treatments, and packaging parameters to preserve the quality and enhance the safety of the products. In addition, the critical role played by packaging materials during the development of a new nonthermal processed product, and how the package is used to make the

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product attractive to consumers, is discussed. Packaging for Nonthermal Processing of Food, Second Edition provides up to date assessments of consumer attitudes to nonthermal processes and novel packaging (both in the U.S. and Europe). It offers a brand new chapter covering smart packaging, including thermal, microbial, chemical, and light sensing biosensors, radio frequency identification systems, and self-heating and cooling packaging. There is also a new chapter providing an overview of packaging laws and regulations in the United States and Europe. Covers the packaging types required for all major nonthermal technologies, including high pressure processing, pulsed electric field, irradiation, ohmic heating, and others Features a brand new chapter on smart packaging, including biosensors (thermal-, microbial-, chemical- and light-sensing), radio frequency identification systems, and self-heating and cooling packaging Additional chapters look at the current regulatory scene in the U.S. and Europe, as well as consumer attitudes to these novel technologies Editors and contributors bring a valuable mix of industry and research experience Packaging for Nonthermal Processing of Food, Second Edition offers many benefits to the food industry by providing practical information on the relationship between new processes and packaging materials, to academia as a source of fundamental knowledge about packaging science, and to regulatory agencies as an avenue for acquiring a deeper understanding of the packaging requirements for new processes.

Food Safety Engineering is the first reference work to provide up-to-date coverage of the advanced technologies and strategies for the engineering of safe foods. Researchers, laboratory staff and food industry professionals with an interest in food engineering safety will find a singular source containing all of the needed information required to understand this rapidly advancing topic. The text lays a solid

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foundation for solving microbial food safety problems, developing advanced thermal and non-thermal technologies, designing food safety preventive control processes and sustainable operation of the food safety preventive control processes. The first section of chapters presents a comprehensive overview of food microbiology from foodborne pathogens to detection methods. The next section focuses on preventative practices, detailing all of the major manufacturing processes assuring the safety of foods including Good Manufacturing Practices (GMP), Hazard Analysis and Critical Control Points (HACCP), Hazard Analysis and Risk-Based Preventive Controls (HARPC), food traceability, and recalls. Further sections provide insights into plant layout and equipment design, and maintenance. Modeling and process design are covered in depth. Conventional and novel preventive controls for food safety include the current and emerging food processing technologies. Further sections focus on such important aspects as aseptic packaging and post-packaging technologies. With its comprehensive scope of up-to-date technologies and manufacturing processes, this is a useful and first-of-its kind text for the next generation food safety engineering professionals.

Thermal processing remains one of the most important processes in the food industry. Now in its second edition, *Thermal Food Processing: New Technologies and Quality Issues* continues to explore the latest developments in the field. Assembling the work of a worldwide panel of experts, this volume highlights topics vital to the food industry today an

Food safety is a constant challenge for the food industry, and food irradiation technology has developed significantly since its introduction, moving from isotope irradiation to the use of electron beam technology. *Electron Beam Pasteurization and*

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Complementary Food Processing Technologies explores the application of electron beam pasteurization in conjunction with other food processing technologies to improve the safety and quality of food. Part one provides an overview of the issues surrounding electron beam pasteurization in food processing. Part two looks at different thermal and non-thermal food processing technologies that complement irradiation. Finally, a case study section on the commercial applications of e-beam processing provides examples from industry.

Non-thermal operations in food processing are an alternative to thermal operations and similarly aimed at retaining the quality and organoleptic properties of food products. This volume covers different non-thermal processing technologies such as high-pressure processing, ultrasound, ohmic heating, pulse electric field, pulse light, membrane processing, cryogenic freezing, nanofiltration, and cold plasma processing technologies. The book focuses both on fundamentals and on recent advances in non-thermal food processing technologies. It also provides information with the description and results of research into new emerging technologies for both the academy and industry. Key features: Presents engineering focus on non-thermal food processing technologies. Discusses sub-classification for recent trends and relevant industry information/examples. Different current research-oriented results are included as a key parameter. Covers high-pressure processing, pulse electric field, pulse light technology, irradiation, and ultrasonic techniques. Includes mathematical modeling and numerical simulations. Food Processing: Advances in Non-Thermal Technologies is aimed at graduate students, professionals in food engineering, food technology, and biological systems engineering.

This book presents a selection of innovative postharvest

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management practices for vegetables. It covers technologies in harvesting, handling, and storage of vegetables, including strategies for low-temperature storage of vegetables, active and smart packaging of vegetables, edible coatings, application of nanotechnology in postharvest technology of vegetable crops, and more. It considers most of the important areas of vegetable processing while maintaining nutritional quality and addressing safety issues. Fruits and vegetables are important sources of nutrients such as vitamins, minerals, and bioactive compounds, which provide many health benefits. However, due to poor postharvest management—such as non-availability of cold chain management and low-cost processing facilities, large quantities of vegetables perish before they reach the consumer. Furthermore, higher temperatures in some regions also contribute to an increased level of postharvest losses. With chapters written by experts in the postharvest handling of vegetable, this volume addresses these challenges. It is devoted to presenting both new and innovative technologies as well as advancements in traditional technologies. Reflecting current trends in alternative food processing and preservation, this reference explores the most recent applications in pulsed electric field (PEF) and high-pressure technologies, food microbiology, and modern thermal and nonthermal operations to prevent the occurrence of food-borne pathogens, extend the shelf-life of foods, and improve Reviews innovative processing techniques and recent developments in food formulation, identification, and utilization of functional ingredients Food Formulation: Novel Ingredients and Processing Techniques is a comprehensive and up-to-date account of novel food ingredients and new processing techniques used in advanced commercial food formulations. This unique volume will help students and industry professionals alike in understanding the current

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trends, emerging technologies, and their impact on the food formulation techniques. Contributions from leading academic and industrial experts provide readers with informed and relevant insights on using the latest technologies and production processes for new product development and reformulations. The text first describes the basis of a food formulation, including smart protein and starch ingredients, healthy ingredients such as salt and sugar replacers, and interactions within the food components. Emphasizing operational principles, the book reviews state-of-the-art 3D printing technology, encapsulation and a range of emerging technologies including high pressure, pulsed electric field, ultrasound and supercritical fluid extraction. The final chapters discuss recent developments and trends in food formulation, from foods that target allergies and intolerance, to prebiotic and probiotic food formulation designed to improve gut health. A much-needed reference on novel sourcing of food ingredients, processing technologies, and application, this book: Explores new food ingredients as well as impact of processing on ingredient interactions Describes new techniques that improve the flavor and acceptability of functional food ingredients Reviews mathematical tools used for recipe formulation, process control and consumer studies Includes regulations and legislations around tailor-made food products Food Formulation: Novel Ingredients and Processing Techniques is an invaluable resource for students, educators, researchers, food technologists, and professionals, engineers and scientists across the food industry.

Green Food Processing Techniques: Preservation, Transformation and Extraction advances the ethics and practical objectives of "Green Food Processing" by offering a critical mass of research on a series of

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methodological and technological tools in innovative food processing techniques, along with their role in promoting the sustainable food industry. These techniques (such as microwave, ultrasound, pulse electric field, instant controlled pressure drop, supercritical fluid processing, extrusion...) lie on the frontier of food processing, food chemistry, and food microbiology, and are thus presented with tools to make preservation, transformation and extraction greener. The Food Industry constantly needs to reshape and innovate itself in order to achieve the social, financial and environmental demands of the 21st century. Green Food Processing can respond to these challenges by enhancing shelf life and the nutritional quality of food products, while at the same time reducing energy use and unit operations for processing, eliminating wastes and byproducts, reducing water use in harvesting, washing and processing, and using naturally derived ingredients. Introduces the strategic concept of Green Food Processing to meet the challenges of the future of the food industry Presents innovative techniques for green food processing that can be used in academia, and in industry in R&D and processing Brings a multidisciplinary approach, with significant contributions from eminent scientists who are actively working on Green Food Processing techniques

Innovative Thermal and Nonthermal Processing,

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Bioaccessibility and Bioavailability of Nutrients and Bioactive Compounds presents the implications of conventional and innovative processing on the nutritional and health aspects of food products. Chapters cover the relationship between gastronomic science, nutrition and food science in the development of healthy products, introduce the most commonly used conventional and innovative approaches to preserve foods and extract valuable compounds, describe how processing affects bioavailability and bioaccessibility of lipids, particularly fatty acids, protein, amino acids and carbohydrates, and discuss how processing affects bioavailability and bioaccessibility of minerals, water-soluble vitamins, and fat soluble vitamins. Final sections cover processing, bioavailability and bioaccessibility of bioactive compounds, describing how processing (conventional and non-conventional) is affecting to bioavailability and bioaccessibility of bioactive sulphur compounds, polyphenols, flavonoids, and bioactive peptides. Presents the implications of conventional and innovative processing on the nutritional and health aspects of food products Introduces the most commonly used conventional and innovative approaches to preserve foods and extract valuable compounds Explains how processing (conventional and non-conventional) affects the bioavailability and bioaccessibility of bioactive sulphur compounds, polyphenols,

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flavonoids and bioactive peptides

The new volume looks at some important emerging food processing technologies in light of the demand for functional food products and high-value and nutritionally rich products. *Technologies for Value Addition in Food Products and Processes* covers a selection of important recent developments in food processing that work to enrich or maintain nutritional value of food products, including such applications as non-thermal plasma, refractance window drying, extrusion, enzyme immobilization, and dry fractionation. Dry fractionation, in particular, has emerged as a sustainable alternative to wet processes in last three decades for producing protein concentrates from legumes. Several chapters on fish processing cover both traditional knowledge and advances in fish processing technologies. A chapter on bioethanol production discusses the past and present status of the industry, focusing on economic feasibility and environmental viability. A chapter also discusses traditional fermentation process and nutritional aspects of ethnic foods followed by the Rabha-Hasong, Mishing and Karbi communities of Assam, India. With the contribution from experts in their respective fields, this volume provides new information on novel food processing technologies.

Food Process Engineering and Technology, Third Edition combines scientific depth with practical

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usefulness, creating a tool for graduate students and practicing food engineers, technologists and researchers looking for the latest information on transformation and preservation processes and process control and plant hygiene topics. This fully updated edition provides recent research and developments in the area, features sections on elements of food plant design, an introductory section on the elements of classical fluid mechanics, a section on non-thermal processes, and recent technologies, such as freeze concentration, osmotic dehydration, and active packaging that are discussed in detail. Provides a strong emphasis on the relationship between engineering and product quality/safety Considers cost and environmental factors Presents a fully updated, adequate review of recent research and developments in the area Includes a new, full chapter on elements of food plant design Covers recent technologies, such as freeze concentration, osmotic dehydration, and active packaging that are discussed in detail This book presents the latest developments in the area of non-thermal preservation of foods and covers various topics such as high-pressure processing, pulsed electric field processing, pulsed light processing, ozone processing, electron beam processing, pulsed magnetic field, ultrasonics, and plasma processing. Non-thermal Processing of Foods discusses the use of non-thermal processing

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on commodities such as fruits and vegetables, cereal products, meat, fish and poultry, and milk and milk products. Features: Provides latest information regarding the use of non-thermal processing of food products Provides information about most of the non-thermal technologies available for food processing Covers food products such as fruits and vegetables, cereal products, meat, fish and poultry, and milk and milk products Discusses the packaging requirements for foods processed with non-thermal techniques The effects of non-thermal processing on vital food components, enzymes and microorganisms is also discussed. Safety aspects and packaging requirements for non-thermal processed foods are also presented. Rounding out coverage of this technology are chapters that cover commercialization, regulatory issues and consumer acceptance of foods processed with non-thermal techniques. The future trends of non-thermal processing are also investigated. Food scientists and food engineers, food regulatory agencies, food industry personnel and academia (including graduate students) will find valuable information in this book. Food product developers and food processors will also benefit from this book. Food can rapidly spoil due to growth of microorganisms, and traditional methods of food preservation such as drying, canning, salting, curing, and chemical preservation can affect the quality of

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the food. Nowadays, various non-thermal processing techniques can be employed in grain processing industries to combat this. They include pulsed electric field processing, high pressure processing, ultrasonic processing, cold plasma processing, and more. Such techniques will satisfy consumer demand for delivering wholesome food products to the market. Non-Thermal Processing Technologies for the Grain Industry addresses these many new non-thermal food processing techniques that are used during grain processing and minimize microbial contamination and spoilage. Key Features: Explains the mechanism involved in application of cold plasma techniques for grain processing, and its strategy for inactivation of microbes by using this technique Deals with the effect of incorporation of electric pulses on quality aspects of various grain based beverage products. Details the innovative high pressure processing techniques used for extraction of antioxidant from food grains Explores the safety issues and applications of non-thermal food processing techniques This book will benefit food scientists, food process engineers, academicians, students, as well as anyone else in the food industry by providing in-depth knowledge and emerging trends about non-thermal processing techniques in various grain-based food processing industries.

Food Processing: Principles and Applications

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second edition is the fully revised new edition of this best-selling food technology title. Advances in food processing continue to take place as food scientists and food engineers adapt to the challenges imposed by emerging pathogens, environmental concerns, shelf life, quality and safety, as well as the dietary needs and demands of humans. In addition to covering food processing principles that have long been essential to food quality and safety, this edition of *Food Processing: Principles and Applications*, unlike the former edition, covers microbial/enzyme inactivation kinetics, alternative food processing technologies as well as environmental and sustainability issues currently facing the food processing industry. The book is divided into two sections, the first focusing on principles of food processing and handling, and the second on processing technologies and applications. As a hands-on guide to the essential processing principles and their applications, covering the theoretical and applied aspects of food processing in one accessible volume, this book is a valuable tool for food industry professionals across all manufacturing sectors, and serves as a relevant primary or supplemental text for students of food science.

Nonthermal Processing Technologies for Food
John Wiley & Sons

"Written by four experts actively researching alternatives to

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conventional thermal methods in food preservation. Presents information on traditional and emerging nonthermal food processing technologies in a convenient, single-source volume--offering an incisive view of the latest experimental results, state-of-the-art applications, and new developments in food preservation technology. Furnishes a thorough review of nonthermal techniques such as high hydrostatic pressure, pulsed electric fields, oscillating magnetic fields, light pulses, ionizing irradiation, the use of chemicals and bacteriocins as preservation aids, and combined methods/hurdle technology."

Thermal technologies have long been at the heart of food processing. The application of heat is both an important method of preserving foods and a means of developing texture, flavour and colour. An essential issue for food manufacturers is the effective application of thermal technologies to achieve these objectives without damaging other desirable sensory and nutritional qualities in a food product. Edited by a leading authority in the field, and with a distinguished international team of contributors, Thermal technologies in food processing addresses this major issue. Part one of the collection begins with reviews of conventional retort and continuous heat technologies. Part two then looks at the key issues of effective measurement and control in ensuring that a thermal process is effective whilst minimising any undesirable changes in a food. There are chapters on temperature and pressure measurement, validation of heat processes, modelling and simulation of thermal processes, and the measurement and control of changes in a food during thermal processing. The final part of the book looks at emerging thermal technologies which becoming more widely used in the food industry. There are chapters on radio frequency heating, microwave processing, infrared heating, instant and high-heat infusion, and ohmic heating A final chapter considers how thermal processing may be combined

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with high pressure processing in producing safe, minimally-processed food products. Thermal technologies in food processing provides food manufacturers and researchers with an authoritative review of thermal processing and food quality.

Food Processing for Increased Quality and Consumption, Volume 18 in the Handbook of Food Bioengineering series, offers an updated perspective on the novel technologies utilized in food processing. This resource highlights their impact on health, industry and food bioengineering, also emphasizing the newest aspects of investigated technologies and specific food products through recently developed processing methods. As processed foods are more frequently consumed, there is increased demand to produce foods that attract people based on individual preferences, such as taste, texture or nutritional value. This book provides advantageous tools that improve food quality, preservation and aesthetics. Examines different frying techniques, dielectric defrosting, high pressure processing, and more Provides techniques to improve the quality and sensory aspects of foods Includes processing techniques for meat, fish, fruit, alcohol, yogurt and whey Outlines techniques for fresh, cured and frozen foods Presents processing methods to improve the nutritional value of foods

The food sector is changing. Consumers want not only tasty and healthy food products, but products that are sustainable and authentic. At the same time, new developments in farming, food processing, and retailing open up new opportunities in the development of food products. Bridging these challenges and opportunities is a major task for food marketing. This book traces consumer trends regarding healthiness, sustainability, authenticity, and convenience. It gives an introduction to current developments in farming, in food processing technology, and in retailing. It also explains

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how segmentation and consumer-led product development can lead to new food products in response to these trends. In this volume, several new food processing and preservation technologies have been investigated by researchers that have the potential to increase shelf life and preserve the quality of foods. This handbook introduces some emerging techniques in the food processing sector, focusing on nonthermal techniques such as high-pressure processing, ultrasonication of foods, microwave vacuum dehydration, thermoelectric refrigeration technology, advanced methods of encapsulation, ozonation, electrospinning, and mechanical expellers for dairy, food, and agricultural processing. These all have a wide range of application. The volume includes studies that show the successful application of these new technologies on a large number of juices, cheeses, yogurts, soups, egg whites and eggs, vegetable slices, purees, and milk, and the extraction, drying enhancement, and modification of enzymes are reported. This volume, part of the multi-volume Handbook of Research on Food Processing and Preservation Technologies will have tremendous application in different areas of the food industry, including food processing, preservation, safety, and quality evaluation. Other volumes of this handbook cover a wide of other emerging technologies. Handbook of Research on Food Processing and Preservation Technologies: Volume 2: Nonthermal Food Preservation and Novel Processing Strategies is an excellent reference resource for researchers, scientists, faculty and students, growers, traders, processors, industries, and others for looking for new nonthermal approaches for food processing and preservation. Advances in Thermal and Non-Thermal Food Preservation provides current, definitive and factual material written by experts on different thermal and non-thermal food preservation technologies. Emphasizing inactivation of

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microorganisms through the application of traditional as well as newer and novel techniques and their combinations, the book's chapters cover: thermal food preservation techniques (e.g., retorting, UHT and aseptic processing), minimal thermal processing (e.g., sous-vide processing), and non-thermal food preservation techniques (e.g., high pressure processing and pulsed technologies). Editors Tewari and Juneja give special emphasis to the commercial aspects of non-conventional food preservation techniques. As the most comprehensive and contemporary resource of its kind, *Advances in Thermal and Non-Thermal Food Preservation* is the definitive standard in describing the inactivation of microorganisms through conventional and newer, more novel techniques.

Membranes processing techniques are used to help separate chemical components based on molecular size under specific pressure. A great advantage of membrane processing techniques is that it is a non-thermal processing technique, which can retain enormous bioactive constituents to a greater extent. Being a less energy intensive process, this technique is widely used in several food processing industries such as in the clarification of fruit juices and wine; the concentration of milk; the preparation of whey protein concentrate; and water and waste treatment, among others. *Applications of Membrane Technology for Food Processing Industries* introduces membrane processing techniques, presenting principles, theory and operational conditions for achieving efficient quality product. It discusses different types of membrane processing techniques viz. reverse osmosis, nanofiltration, ultrafiltration, electro dialysis, microfiltration, pervaporation, including its applications, advantages and disadvantages. Key Features: Deals with the retention of antioxidants by using novel membrane processing techniques Includes the application of membrane processing techniques

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in whey processing Explains the method for degumming, dewaxing and decolorization of edible crude oils Narrates application of membrane processing techniques in waste water treatment for efficient use Readers, such as professors, scientist, research scholars, students and industrial personnel, will come to know about the current trends in use of membrane processing techniques for its application in several food processing industries. This book can be a ready reference for the food industrial industry for manufacturing of deacidified clarified fruit juices and wine by using integrated membrane technique approach. In a nutshell, this book will benefit food scientist, academicians, students and food industrial persons by providing in-depth knowledge about membrane processing of foods for quality retention and also for efficient consumer acceptability.

Innovative Technologies for Food Preservation: Inactivation of Spoilage and Pathogenic Microorganisms covers the latest advances in non-thermal processing, including mechanical processes (such as high pressure processing, high pressure homogenization, high hydrodynamic pressure processing, pressurized fluids); electromagnetic technologies (like pulsed electric fields, high voltage electrical discharges, Ohmic heating, chemical electrolysis, microwaves, radiofrequency, cold plasma, UV-light); acoustic technologies (ultrasound, shockwaves); innovative chemical processing technologies (ozone, chlorine dioxide, electrolysis, oxidized water) and others like membrane filtration and dense phase CO₂. The title also focuses on understanding the effects of such processing technologies on inactivation of the most relevant pathogenic and spoilage microorganisms to ensure food safety and stability. Over the course of the 20th century, the interest and demand for the development and application of new food preservation methods has increased significantly. The research in the last 50 years has produced various

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innovative food processing technologies and the use of new technologies for inactivation of spoilage and/or pathogenic microorganisms will depend on several factors. At this stage of development there is a need to better understand the mechanisms that govern microbial inactivation as induced by new and innovative processing technologies, as well as suitable and effective conditions for inactivating the microorganism. Serves as a summary of relevant spoilage and pathogenic microorganisms for different foods as influenced by the application of innovative technologies for their preservation Provides readers with an in-depth understanding on how effective innovative processing technologies are for controlling spoilage and pathogenic microorganisms in different foods Integrates concepts in order to find the optimum conditions for microbial inactivation and preservation of major and minor food compounds

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